



WTC IV IN KYOTO

# WORLD TRIBOLOGY CONGRESS 2009

KYOTO, JAPAN

## PRELIMINARY PROGRAMME

Sunday 6th to Friday 11th, September, 2009

**VENUE** Kyoto International Conference Center

Organized by  
Japanese Society of Tribologists / Science Council of Japan

<http://www.wtc2009.jp/>

**Tuesday 8th, September**

**B1-11 Minisymposium/ Hydrogen tribology for future energy I**

8:40-10:20, Room B-1

Session Chair: Shinya Sasaki, Tokyo University of Science, Japan

Joichi Sugimura, Kyushu University, Japan

**B1-111 Keynote Speech: New Challenges to Tribology in Hydrogen:** Joichi Sugimura\*, *Department of Mechanical Engineering, Kyushu University, Fukuoka, Japan, Research Center for Hydrogen Industrial Use and Storage, AIST*

**B1-112 Cryogenic Tribology of High-Speed Bearings and Shaft Seals in Liquid Hydrogen (Invited):** Masataka Nosaka\*, *Department of Mechanical Engineering, The University of Tokyo, Tokyo, Japan*

**B1-113 The Effects of Hydrogen on Microstructural Change and Surface Originated Flaking in Rolling Contact Fatigue:** Hiroki Yamada\*, Hideyuki Uyama, Nobuaki Mitamura, *Basic Technology Research Center, NSK Ltd., Kanagawa, Japan*

**B1-114 Fretting Wear Tests of Steels in Hydrogen Gas Environment:** Naoshi Izumi\*, *Department of Mechanical Engineering, Kyushu University, Fukuoka, Japan*; Nichiro Mimuro, *National Institute of Advanced Industrial Science and Technology*; Takehiro Morita, *Department of Mechanical Engineering, Kyushu University*; Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University, National Institute of Advanced Industrial Science and Technology*

**B1-115 Friction and Wear of Ferrous Materials in Hydrogen Gas Environment:** Kanao Fukuda\*, *Hydrogen Technology Research Center, Kyushu University, Japan*; Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University, Research Center for Hydrogen Industrial Use and Storage, AIST*

**B1-12 Minisymposium/ Hydrogen tribology for future energy II**

10:50-12:30, Room B-1

Session Chair: Shinya Sasaki, Tokyo University of Science, Japan

Joichi Sugimura, Kyushu University, Japan

**B1-121 Keynote Speech: On the Intrinsic and Extrinsic Hydrogen Lubrication Mechanisms of Various Carbon Films: An Imaging TOF-SIMS Study :** Ali Erdemir\*, Osman L. Eryilmaz, *Argonne National Laboratory, Energy Systems Division, Argonne, IL - USA*

**B1-122 Tribological Behaviour of Solid Lubricants in Hydrogen Environment (Invited):** Thomas Gradt\*, Géraldine Theiler, *BAM Federal Institute for Materials Research and Testing, Division VI.2 Tribology and Wear Protection, Berlin, Germany*

**B1-123 Evaluation of Tribo-Coatings in Hydrogen Atmosphere:** Hiroki Mano\*, Takashi Murakami, *Tribology Research Group, Advanced Manufacturing Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba-shi, Ibaraki, Japan, Hydrogen Tribology Team, Research Center for Hydrogen Industrial Use and Storage, AIST*; Masayuki Hata, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science*; Shinya Sasaki, *Hydrogen Tribology Team, Research Center for Hydrogen Industrial Use and Storage, AIST, Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science*; Joichi Sugimura, *Hydrogen Tribology Team, Research Center for Hydrogen Industrial Use and Storage, AIST, Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*

**B1-124 Friction and Wear of Rubber and PTFE in Hydrogen Atmosphere:** Tomoaki Iwai\*, Tomoyuki

Higashiyama, Kosuke Ida, Yutaka Shokaku, *School of Natural Science and Technology, Kanazawa University, Kanazawa, Ishikawa, Japan*

**B1-125 Wear Characteristics of PTFE and PTFE Based Composites in Gaseous Hydrogen:** Yoshinori Sawae\*, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Daichi Yamamoto, *Graduate School of Engineering, Kyushu University*; Kazuhiro Nakashima, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*; Yoshie Kurono, *Hydrogen Technology Research Center, Kyushu University*; Shunichiro Doi, Teruo Murakami, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*; Joichi Sugimura, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Research Center for Hydrogen Industrial Use and Storage, Advanced Industrial Science and Technology*

**B1-13 Minisymposium/ Diamond-Like Carbon for tribology I**

15:00-16:40, Room B-1

Session Chair: Ali Erdemir, Argonne National Laboratory, USA  
Noritsugu Umehara, Nagoya University, Japan

**B1-131 Green Tribology: Lubricant-Compliant Superhard DLC Coatings (Invited):** Jean Michel Martin\*, Maria Isabel De Barros Bouchet, *Ecole Centrale de Lyon, LTDS, Ecully, France*; Takumaru Sagawa, *NISSAN MOTOR CO, LTD, Yokohama, Japan*

**B1-132 Super Hard DLC Coating Technology (Invited):** Hirofumi Takikawa\*, *Department of Electric and Electronic Engineering, Toyohashi University of Technology, Toyohashi, Aichi, Japan*

**B1-133 Industrial Ta-C Coating Technology by Laser-Assisted PVD (Invited):** Volker Weihnacht, Hans-Joachim Scheibe\*, Carl-Friedrich Meyer, Michael Leonhardt, Andreas Leson, *Fraunhofer Institute Material and Beam Technology (IWS), Dresden, Germany*

**B1-134 Advanced Technology for Applying DLC Coating (Invited):** Makoto Kano\*, Takahiro Horiuchi, Kentaro Yoshida, Masahiro Mitsuhashi, Masao Kumagai, *Mechanical and Material Engineering Division, Kanagawa Industrial Technology Center, Ebina, Kanagawa, Japan*

**B1-14 Minisymposium/ Diamond-Like Carbon for tribology II**

17:10-18:50, Room B-1

Session Chair: Makoto Kano, Kanagawa Industrial Technology Center, Japan

Jean Michel Martin, Ecole Centrale de Lyon, France

**B1-141 Fundamental Tribological Mechanisms of Hydrogen-Free and Highly Hydrogenated DLC Films: An Imaging TOF-SIMS Study (Invited):** Osman L.

Eryilmaz\*, Ali Erdemir, *Argonne National Laboratory, Energy Systems Division, Argonne-IL, USA*

**B1-142 Superior Lubrication of Cnx Coating in Nitrogen Gas (Invited):** Noritsugu Umehara\*, *Dept. of Mechanical Science and Engineering, Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan*

**B1-143 Role of Adsorption and Tribophysical Parameters in Lubrication of DLC (Invited):** Mitjan Kalin\*, Igor Velkavrh, Jože Vižintin, *Centre for tribology and technical diagnostics, University of Ljubljana, Ljubljana, Slovenia*

**B1-144 Diamond-like Carbon Coatings for Tribological Applications on Automotive Components (Invited):** Roel Tietema\*, Dave Doerwald, Ruud Jacobs, Thomas Krug, *Hauzer Techno Coating BV, Venlo, The Netherlands*

**B2-11 Minisymposium/ Additives technology of lubricants for the next generation I**

8:40-10:20, Room B-2

Session Chair: Akihito Suzuki, Tokyo Institute of Technology, Japan

Toru Watanabe, Ciba Japan K.K., Japan

**B2-111 Keynote Speech: Tribochemistry of Lubricant Additives on Next-Generation Surface Coatings:** Ardian Morina\*, Tabassumul Haque, Anne Neville, *Institute of Engineering Thermofluids, Surfaces and Interfaces, School of Mechanical Engineering, University of Leeds, UK*

**B2-112 Additives for Improving the Fuel Economy of Diesel Engine Systems (Invited):** Kenji Yamamoto\*, Kazuhiro Umehara, Akihiro Kotaka, *Lubricants Department, Functional Chemicals Development Laboratory, ADEKA Corporation, Tokyo, Japan*

**B2-113 The Investigation of Improvement Effects on Friction Properties of Mononuclear Modtcs Having Azaheterocycles by Episulfidation (Invited):** Chihiro Bandoh, Takuya Hashimoto, Masatsugu Kajitani, *Department of Materials and Life Science, Faculty of Science and Technology, Sophia University, Tokyo, Japan;* Eiji Nagatomi, Noriaki Shinoda, *Automotive Lubricants Group, Central R&D Laboratory, Showa Shell Sekiyu K.K., Kanagawa, Japan;* Toru Sugiyama, *Department of Materials and Life Science, Faculty of Science and Technology, Sophia University, Tokyo, Japan;* Izumi Takayanagi\*, Hiroyuki Tazaki, *Automotive Lubricants Group, Central R&D Laboratory, Showa Shell Sekiyu K.K., Kanagawa, Japan*

**B2-12 Minisymposium/ Additives technology of lubricants for the next generation II**

10:50-12:30, Room B-2

Session Chair: Kedar Shanker Shrestha, Chevron Japan Ltd., Japan

Hideo Tanaka, Evonik Degussa Japan Co., Ltd., Japan

**B2-121 Vehicle Fuel Efficiency Testing of Automatic Transmission Fluids (Invited):** Samuel H. Tersigni, Ramnath N. Iyer, Anthony Rollin\*, *Research and Development Department, Afton Chemical Corporation, Richmond, Virginia, USA;* Kenji Yatsunami, *Research and Development Department, Afton Chemical Japan Corporation, Tsukuba city, Ibaraki, Japan*

**B2-122 Fundamental Study on the Use of the Unisteel Bearing Tester to Differentiate Driveline Lubricant Additive Performance (Invited):** Ananda Gajanayake\*, *Lubrizol International Laboratories Asia-Pacific, Kinuura, Japan;* Andrew Gelder, Susie Hurley, *Lubrizol Limited, Derby, UK;* Michael E. Huston, Christopher F. McFadden, Morey N. Najman, Brian M. O'Connor, Elizabeth Schiferl, *The Lubrizol Corporation, Wickliffe, Ohio, USA*

**B2-123 Comparison of Zinc-Containing and Zinc-Free Hydraulic Packages Using Severe Laboratory Performance Tests (Invited):** Thomas Rühle\*, Steffen Sandhoefner, Thomas Rossrucker, *Rhein Chemie Rheinau GmbH, Mannheim, Germany*

**B2-124 Phenothiazine Derivatives as Antioxidants for Lubricants (Invited):** Dave Chasan, *Ciba Corp, NY, USA;* Edward Ng\*, *Ciba (Singapore) Pte Ltd, Singapore*

**B2-13 Minisymposium/ Energy savings by use of synthetic lubricants (New Generation of Synthetic Lubricants)**

15:00-17:00, Room B-2

Session Chair: Hiroshi Kimura, Kyodo Yushi Co., Ltd., Japan  
Manfred Jungk, Dow Corning GmbH, Germany

**B2-131 Keynote Speech: Savings of Energy and Resorces by the Tribological Approach:** Wilfried Bartz\*, *Technische Akademie Esslingen, Ostfildern, Germany*

**B2-132 Development of Alkanol Amine Esters That Show Low Viscosity, Good Heat-Stability and Lubricity:**

Shingo Maruyama\*, *Matsumura Oil Research Corp. (MORESCO), Kobe, Hyogo, Japan*

**B2-133 Strength and Weaknesses of Silicones for Use as Synthetic Lubricant:** Manfred Jungk\*, *Dow Corning GmbH, Wiesbaden, Germany*

**B2-134 New Oil Soluble Polyalkylene Glycols for Energy Saving Lubricant Applications:** Stephen Merryweather, Daniel Zweifel\*, *Dow Europe GmbH, Horgen, Switzerland*

**B2-135 Environment and Energy Savings by Use of Synthetic Esters:** Keiji Hirao\*, Munehiro Yamada, Takeshi Kajiki, Naoya Maekawa, *Oleo & Speciality Chemicals Research Laboratory, NOF Corporation, Amagasaki, Japan*

**B2-136 Advanced PAO Based Industrial Lubricants for Improved Energy Efficiency:** Thomas G. Dietz\*, *ExxonMobil Lubricants and Petroleum Specialties Company, Fairfax, Virginia, USA*

**B2-14 Minisymposium/ Energy savings by use of synthetic lubricants (Additives and Applications)**

17:10-18:50, Room B-2

Session Chair: Manfred Jungk, Dow Corning GmbH, Germany  
Hiroshi Kimura, Kyodo Yushi Co., Ltd., Japan

**B2-141 Additive Technology for Synthetic Oils:** Ichiro Minami\*, *Department of Chemical Engineering, Faculty of Engineering, Iwate University, Morioka, Iwate, Japan*

**B2-142 Contribution for Energy Savings by Novel Environmental Lubricants Containing Derivatives from Natural Resources:** Ryo Numazaki\*, Shingo Nakayama, Toshihiro Inayama, Yukihiko Isogai, *KYOWA HAKKO CHEMICAL CO.,LTD, Yokkaichi-City, Mie, Japan;* Ichiro Minami, Shigeyuki Mori, *Department of Applied Chemistry, Faculty of Engineering Iwate University, Morioka-City, Iwate, Japan*

**B2-143 Near-dry Machining of Aluminum Alloys with MQL System:** Wataru Obayashi\*, Toshiaki Wakabayashi, Kagawa University, Takamatsu, Japan; Akira Tsukuda, Toshifumi Atsuta, *Kagawa Prefectural Industrial Technology Center, Takamatsu, Japan;* Satoshi Suda, Junichi Shibata, *Nippon Oil Corporation, Yokohama, Japan*

**B2-144 A Fundamental Study on Degradation Process of Urea Greases Based on Synthetic Fluids:** Yuji Onuki\*, Hiroshi Kimura, *Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan*

**C1-11 Lubrication, Lubricants and Additives/ Hydrodynamic Lubrication I**

8:40-10:20, Room C-1

Session Chair: Waldemar M. Dmochowski, National Research Council, Canada

Wojciech Litwin, Gdansk University of Technology, Poland

**C1-111 Simulation of a Thrust Bearing in a Diesel Injection Pump Under Mixed Lubrication Conditions:** Thomas Illner, Lars Bobach, Dirk Bartel\*, Ludger Deters, *Chair of Mechanical Components and Tribology, Department of Mechanical Engineering Otto-von-Guericke University Magdeburg, Magdeburg, Germany*

**C1-112 Experimental Analysis of Air Bearings Dynamic Characteristics by Using an Impact Hammer:** Pierre Matta, Mihai Arghir\*, Olivier Bonneau, *Laboratoire de Mécanique des Solides, Université de Poitiers, SP2MI, Chasseneuil Cedex, France*

**C1-113 Active Lubrication Strategies Applied to Dynamically Loaded Fluid Film Bearings:** Edgar A. Estupinan\*, Ilmar F. Santos, *Department of Mechanical Engineering, Technical University of Denmark, Lyngby, Denmark*

**C1-114 Non-Newtonian Effects in Bearing Behavior: Some Considerations Concerning the Constitutive Laws:** Benyebka Bou-Saïd\*, *Université de Lyon, CNRS INSA-Lyon, LaMCoS, UMR5259, France*

**C1-115 Effect of Cavitation Modeling Approach on the Performance of a Statically Loaded Journal Bearing:** Bardia Vessalpour, *Department of Automotive Engineering, Faculty of Mechanical Engineering, K. N. Toosi University of Technology, Tehran, Iran;* Seyed Ali Jazayeri\*, *Department of Automotive Engineering, Faculty of Mechanical Engineering, K. N. Toosi University of Technology*

**C1-12 Lubrication, Lubricants and Additives/ Hydrodynamic Lubrication II**

10:50-12:30, Room C-1

Session Chair: Mihai M Arghir, *Université de Poitiers, France*  
Sergei Glavatskih, *Luleå University of Technology, Sweden*

**C1-121 Keynote: Bi-Fluid Thin Film Models and Floberg-Elrod Cavitation Model:** Guy Bayada\*, *Université de Lyon, Lamcos CNRS UMR 5259 INSA-Lyon, Villeurbanne, France, Université de Lyon, ICJ CNRS UMR5208 INSA-Lyon, Villeurbanne, France;* Gustavo Buscaglia, *Inst. de Ciencias Matematicas e de Computação, Univ. Sao Paulo, Sao Carlos, SP, Brasil;* Laurent Chupin, *Bérénice Grec, Mohammed Jai, Université de Lyon, ICJ CNRS UMR5208 INSA-Lyon, Villeurbanne, France;* Sébastien Martin, *Département of Mathématiques, Université Paris-Sud, Orsay Cedex*

**C1-122 Pivot Friction Effects on the Dynamic Properties of Tilting Pad Journal Bearings:** Waldemar M. Dmochowski\*, *Azzedine Dadouche, Martin J. Conlon, Institute for Aerospace Research, National Research Council Canada, Ottawa, Ontario, Canada*

**C1-123 Effect of Lobe Offset on the Deformations of Offset-Halves Journal Bearing:** Stanislaw Strzelecki\*, *Department of Mechanical Engineering, Faculty of Engineering, Lodz University of Technology, Lodz, Poland;* Leszek Kusmierz, *Grzegorz Poniewaz, Department of Mechanical Engineering, Faculty of Engineering, Lublin University of Technology, Lublin, Poland*

**C1-124 Viscosity Measurement in Journal Bearing Using Shear Ultrasonic Reflection:** Salmiah Kasolang\*, *Faculty of Mechanical Engineering, Universiti Teknologi MARA, Selangor, Malaysia, Department of Mechanical Engineering, University of Sheffield, UK;* Rob Dwyer-Joyce, *Department of Mechanical Engineering, University of Sheffield, UK*

**C1-13 Lubrication, Lubricants and Additives/ Hydrodynamic Lubrication III**

15:00-16:40, Room C-1

Session Chair: Adrian Predescu, *University Politehnica of Bucharest, Romania*  
Philippe Vergne, *Université de Lyon, France*

**C1-131 Lubrication Studies with Some New Piston Ring Profiles:** Raj Kumar Pandey\*, *Naresh Tandon, Abhinandan Sharma, Industrial Tribology Machine Dynamics and Maintenance Engineering Centre(ITMMEC), I.I.T. Delhi, New Delhi, India*

**C1-132 Influence of oil Type on Tilting Pad Journal Bearing Thermal Characteristics:** Sergei Glavatskih\*, *Division of Machine Elements, Luleå University of Technology, Luleå, Sweden;* Minoru Hanahashi, *Kazuhiko Kawaike, Daido Metal Co., Inuyama, Japan;* Ake Byheden, *Thomas Norrby, Statoil Lubricants, Nynäshamn, Sweden*

**C1-133 Impact of a Rigid Sphere on a Highly Compressible Porous Layer Imbided with a Newtonian Liquid:** Mircea D. Pascovici\*, *Cristian S. Popescu, Victor-Gabriel Marian, Department of Machine Elements and*

*Tribology, University of POLITEHNICA of Bucharest, Bucharest, Romania*

**C1-134 Study of Sliding Thrust Bearings in Application to Screw Compressors:** Masanori Matsuo\*, *The Faculty of Liberal Arts, The Open University of Japan, Chiba City, Japan*

**C1-135 Formulations of Static Parameters for Finite-Width Turbulent Journal Bearings:** Shiuh-Hwa Shyu\*, *Graduate School of Opto-Mechatronics and Materials, WuFeng Institute of Technology, ChiaYi, Taiwan;* Wei-Ren Lee, *Sheng-Jii Hsieh, Dept. of Aeronautics and Astronautics, National Cheng Kung University, Taiwan;* Shen-Min Liang, *Dept. of Computer Application Engineering, Far East University, Taiwan*

**C1-14 Lubrication, Lubricants and Additives/ Hydrodynamic Lubrication IV**

17:10-18:50, Room C-1

Session Chair: Luis San Andres, *Texas A&M University, USA*  
Shiuh-Hwa Shyu, *WuFeng Institute of Technology, Taiwan*

**C1-141 Methodology of Calculation of Dynamics and Hydromechanical Characteristics Complex-Loaded Tribounits, Greased Structurally-Heterogeneous and Non-Newtonian Fluids:** Valery Prokopiev, *Jury Rogdestvensky\*, Alla Boyarshinova, Elena Zadorozhnaya, Valentin Karavaev, Konstantin Gavrilov, Nady Hozenjuk, Igor Levanov, Department of Automobile transport, Faculty of Automobile and Tractor, South Ural State University, Chelyabinsk, Russia*

**C1-142 The Static Characteristics of Externally Pressurized Circular Thrust Bearings with Various Fluid Film Shapes:** Albert E. Yousif\*, *Department of Mechanical Engineering, College of Engineering, Nahrain University, Baghdad-Iraq At present, visiting professor, College of Engineering, Cairo University, Cairo-Egypt*

**C1-143 Dimpled Pivoted Plane Bearings: Modified Coefficients:** Kristian Tønder\*, *Department of Engineering Design and Materials, Norwegian University of Science and Technology, Trondheim, Norway*

**C1-144 Identification of Force Coefficients in a Squeeze Film Damper with a Mechanical Seal: Large Contact Force:** Adolfo Delgado, *Structural Mechanics and Dynamic Lab, General Electric Research Center, USA, Work conducted while at Texas A&M University;* Luis San Andrés\*, *Department of Mechanical Engineering, Texas A&M University*

**C1-145 Influence of Bearing Bush Geometry on Properties of Water Lubricated Marine Main Shaft Bearings:** Wojciech Litwin\*, *Faculty of Ocean Engineering and Ship Technology, Gdansk University of Technology, Gdansk, Poland*

**C2-12 Lubrication, Lubricants and Additives/ Solid Lubricants**

10:50-12:30, Room C-2

Session Chair: Romeo P Glovnea, *Brunel University, UK*  
Mineo Suzuki, *Japan Aerospace Exploration Agency, Japan*

**C2-121 Keynote: Friction and Wear Characteristics in Air of Molybdenum Disulfide Sputtered Films Introduced Dry Air to Vacuum Chamber after Sputtering:** Kenji Matsuda\*, *Department of Mechanical and Control Engineering, Faculty of Engineering, Kyushu Institute of Technology, Kitakyushu-shi, Fukuoka, Japan;* Kiyonori Koguma, *Corporate R&D Center, Technology & Development Division, Yaskawa Electric Corporation;* Motohiro Kaneta, *Department of Mechanics and Electronics, Faculty of Engineering, Kyushu Kyoritsu University;* Michiaki Ikeda, *Department of Biological Functions and Engineering, Kyushu Institute of Technology*

**C2-122 The Influence of Substrate Hardness on the Lifetime of Solid Lubricated Rolling Contacts:** Kümmerle

Timo\*, Birkhofer Herbert, pmd, *Product Development and Machine Elements, Technische Universität Darmstadt, Germany*  
**C2-123 Transition Metal Dichalcogenides Alloyed with Carbon: A Complex Tribological Study:** Tomas Polcar\*, *Department of Control Engineering, Faculty of Electrical Engineering, Czech Technical University in Prague, Prague, Czech Republic, SEG-CEMUC - Department of Mechanical Engineering, University of Coimbra, Rua Luís Reis Santos, Coimbra, Portugal;* Manuel Evaristo, Albano Cavaleiro, *SEG-CEMUC - Department of Mechanical Engineering, University of Coimbra, Rua Luís Reis Santos, Coimbra, Portugal*

**C2-13 Lubrication, Lubricants and Additives/ Additives I**

15:00-16:40, Room C-2

Session Chair: Malcolm F Fox, University of Leeds, UK

Satoshi Ogano, Exxonmobil Yugen Kaisha, Japan

**C2-131 Keynote: Parameters Affecting the Functionality of Additives in Tribological Contacts - An Experimental and Molecular Dynamics Simulation Study:** Aldara Naveira-Suarez\*, *SKF Engineering and Research Centre, Nieuwegein, The Netherlands, Division of Machine Elements, Lulea University of Technology, Sweden;* Maurizio Zaccheddu, *SKF Engineering and Research Centre, Nieuwegein, The Netherlands;* Mattias Grahn, *SKF Engineering and Research Centre, Nieuwegein, The Netherlands, Division of Chemical Engineering, Lulea University of Technology, Sweden;* Rihard H Pasaribu, *SKF Engineering and Research Centre, Nieuwegein, The Netherlands;* Roland Larsson, *Division of Machine Elements, Lulea University of Technology, Sweden*

**C2-132 Tribological Characteristics of Ashless P- and P-S Based Antiwear Additives:** Juliane Benedet\*, *Department of Mechanical Engineering, Tribology Group, Imperial College, London, United Kingdom;* Jonathan Green, Gordon Lamb, *Castrol Ltd., Castrol Technology Centre, Pangbourne, United Kingdom;* Hugh A. Spikes, *Department of Mechanical Engineering, Tribology Group, Imperial College, London, United Kingdom*

**C2-133 Wear Performance Mapping of Lubricant Components on a Hydrogenated DLC Coating:** Tabassumul Haque, Martin N. Webster\*, Dalia G. Yablon, Oscar L. Farnig, Andy H. Tsou, *ExxonMobil Research and Engineering Company, Annandale, NJ, USA*

**C2-134 Tribological Behavior of New Inorganic Fullerene Like Nanoparticles: IF-MoxW1-xS2:** Fabrice Dassenoy\*, Johny Tannous, Michel Belin, Jean-Michel Martin, *Laboratoire de Tribologie et Dynamique des Systèmes, Ecole Centrale de Lyon, Ecully cedex, France;* Andrew Bruhács, Wolfgang Tremel, *Institute for Inorganic Chemistry and Analytical Chemistry, Johannes Gutenberg-Universität, Mainz, Germany*

**C2-14 Lubrication, Lubricants and Additives/ Additives II**

17:10-18:50, Room C-2

Session Chair: Martin Priest, University of Leeds, UK

Martin N. Webster, ExxonMobil Research and Engineering Company, USA

**C2-141 Keynote: The Potential of Ionic Liquids as Additives and Lubricants :** Martin Priest , Malcolm F. Fox\*, *iESTI, School of Mechanical Engineering, University of Leeds, UK*

**C2-142 Defined Comb-Shaped Viscosity Modifiers and Their Impact on Fuel Economy in Modern Driveline Lubricants and Engine Oils:** Jen Lung Wang\*, Torsten Stöhr, Boris Eisenberg, Michael Müller, Thorsten Bartels, *Evonik RohMax Additives GmbH, Darmstadt, Germany*

**C2-143 Consideration about the Emulsification Stability of Cutting Oils for Magnesium Alloy:** Hiroyuki Sakai\*,

*Technical Research Laboratory, Nippon Grease Co., Ltd., Kobe-City, Japan*

**C2-144 Study of Synergy Between ZP and Oleyl Urea Additives for Engine Lubricant:** Clotilde Minfray\*, Paule Njiwa, Thierry Le Mogne, Jean-Michel Martin, *Université de Lyon, Ecole Centrale de Lyon, LTDS, UMR5513, Ecully Cedex, France;* Teppei Tsujimoto, Masaru Mishima, *ENEOS, Yokohama, Japan*

**D-11 Symposium/ Human-related tribology (Cutting Edges of Tribology on Joint Prostheses)**

8:40-10:20, Room D

Session Chair: John Fisher, University of Leeds, UK

Teruo Murakami, Kyushu University, Japan

**D-111 Keynote Speech: Importance of Materials and Lubricants on Tribological Properties in Joint Prostheses in Comparison with Natural Synovial Joints:** Teruo Murakami\*, Yoshinori Sawae, Kazuhiro Nakashima, Nobuo Sakai, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan;* Seido Yarimitsu, *Department of Intelligent Machinery and Systems, Graduate School of Engineering, Kyushu University*

**D-112 Polyethylene Added with Vitamin E as Bearing Surface for Total Joint Replacement (Invited):** Naohide Tomita\*, *Graduate school of Engineering, Kyoto University, Kyoto, Japan*

**D-113 Backside Wear of Modular Knee Bearings; Clinical Evidence and In-Vitro Simulation (Invited):** Douglas W. Van Citters, Francis E. Kennedy\*, John H. Currier, J. Caitlin Huot, *Thayer School of Engineering, Dartmouth College, Hanover, NH, USA;* Salilla Kulwirottama, *International School of Engineering, Chulalongkorn University, Bangkok, Thailand*

**D-114 Performance of Hard-on-Hard Bearings for Total Hip Replacement Under Adverse Conditions (Invited):** Sophie Williams\*, Zhongmin Jin, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, Leeds, UK;* Graham Isaac, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, Leeds, UK, DePuy International Ltd., Leeds, UK;* Claire Brockett, Ian Leslie, John Fisher, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, Leeds, UK*

**D-115 Boundary Lubrication by Glycoproteins (Invited):** Nicholas D. Spencer\*, *Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland;* Marcella Roba, *Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland, Empa, Swiss Federal Institute for Material Science and Technology, Dübendorf, Switzerland;* Marco Naka, *Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland;* Emanuel Gautier, *Orthopaedic Clinic, Cantonal Hospital, Fribourg, Switzerland;* Rowena Crockett, *Empa, Swiss Federal Institute for Material Science and Technology, Dübendorf, Switzerland*

**D-12 Symposium/ Human-related tribology (New Trends in Human-related Tribology)**

10:50-12:30, Room D

Session Chair: Nicholas D Spencer, ETH Zurich, Switzerland

Naohide Tomita, Kyoto University, Japan

**D-121 Keynote Speech: Soft, Wet, and Slippery: Corneal Tribology:** W. Gregory Sawyer\*, Daniel J. Dickrell, *Department of Mechanical and Aerospace Engineering, University of Florida, USA;* Natalia V. Dolgova, Benjamin G. Keselowsky, *Department of Biomedical Engineering, University of Florida;* Scott S. Perry, *Department of Materials Science and Engineering, University of Florida, Gainesville, FL, U.S.A.*

**D-122 Frictional Property of Cartilage-Like Tissues Repaired Using Stem Cell-Based Self-Assembled Tissues (Invited):** Hiromichi Fujie\*, Mamoru Ogata, Machiko Imura, Takuya Suzuki, *Research Institute for Sciences and Technology, Kogakuin University, Hachioji, Tokyo, Japan;* Norimasa Nakamura, *Osaka University Medical School*

**D-123 Investigation of Articular Cartilage Substitution Therapies in the Bovine Knee Joint (Invited):** Laura McCann\*, Eileen Ingham, Zhongmin Jin, John Fisher, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, UK*

**D-124 Dental Tribology (Invited):** Zhongrong Zhou\*, Jing Zheng, *Tribology Research Institute, Southwest Jiaotong University, Chengdu, China*

**D-125 Tribological Approach to Tactile Sensation Using Neural Network (Invited):** Ken Nakano\*, *Yokohama National University, Yokohama, Japan*

**D-13 Symposium/ Large-scale simulation in the field of tribology I**

15:00-16:40, Room D

Session Chair: Judith A. Harrison, United States Naval Academy, USA

Momoji Kubo, Tohoku University, Japan

**D-131 Multiscale Modeling in Tribology and What We Can Learn From it: From Electronic to Mesoscopic Density Functional Approaches (Invited):** Martin H. Müser\*, Ling-Ti Kong, Colin Denniston, *Department of Applied Mathematics, The University of Western Ontario, Canada*

**D-132 Nanomechanics of Superlubricity and Force Microscopy (Invited):** Naruo Sasaki\*, *Department of Materials and Life Science, Faculty of Science and Engineering, Seikei University, Musashino-shi, Tokyo, Japan*

**D-133 Mechanical Behaviour of Nanocrystalline Cu/Ag Tribopair During Large-Scale Atomistic Simulations of Dynamic Friction :** Nicholas Epiphaniou\*, Marco Kalweit, Dimitris Drikakis, *Aerospace Sciences Department, Fluid Mechanics and Computational Science Group, Cranfield University, Bedfordshire, United Kingdom*

**D-134 Large Scale Molecular Dynamics and Polymer Friction :** Ion M. Sivebaek\*, *IFF, FZ-Jülich, Germany, Novo Nordisk A/S, Research and Development, Hillerød, Denmark, Mech. Eng. Dept., Technical University of Denmark, Lyngby, Denmark;* Vladimir N. Samoilov, *IFF, FZ-Jülich, Germany, Moscow MV Lomonosov State Univ., Fac Phys, Moscow, Russia;* Bo N.J. Persson, *IFF, FZ-Jülich, Germany*

**D-14 Symposium/ Large-scale simulation in the field of tribology II**

17:10-18:50, Room D

Session Chair: Momoji Kubo, Tohoku University, Japan

Martin H Muser, The University of Western Ontario, Canada

**D-141 Unraveling the Mechanisms of Boundary Layer Lubrication Using Large-Scale MD (Invited):** Judith A. Harrison\*, *United States Naval Academy, USA*

**D-142 Boundary Slip and Dynamics of Momentum Transfer in Submicron Thick Elasto-Hydrodynamic Lubricating Oil Film Using Molecular Dynamics Simulation (Invited):** Hitoshi Washizu\*, Seiji Kajita, Shi-aki Hyodo, Toshihide Ohmori, *Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan;* Hiroshi Teranishi, Atsushi Suzuki, *Toyota Motor Corp.*

**D-143 Accelerated Molecular Dynamics Simulation of Atomic Stick Slip Friction:** Ashlie Martini\*, Yalin Dong, *Purdue University, School of Mechanical Engineering, USA;* Danny Perez, Arthur F. Voter, *Los Alamos National Laboratory, Los Alamos, NM, USA*

**D-144 Development of Multi-Level Simulator for Tribology and its Applications:** Hiromitsu Takaba\*, Tasuku Onodera, *Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, Sendai, Japan;* Ai Suzuki, *New Industry Creation Hatchery Center, Tohoku University;* Michihisa Koyama, *INAMORI Frontier Research Center, Kyushu University, Fukuoka, Japan;* Hideyuki Tsuboi, Nozomu Hatakeyama, Akira Endou, Carlos A. Del Carpio, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University;* Momoji Kubo, *Fracture and Reliability Research Institute, Graduate School of Engineering, Tohoku University;* Akira Miyamoto, *Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, New Industry Creation Hatchery Center, Tohoku University, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University*

**F-11 Manufacturing and Mechanical Components/ Manufacturing -Material Removal Process**

8:40-10:20, Room F

Session Chair: Akira Azushima, Yokohama National University, Japan

Liang Hong, Texas A&M University, USA

**F-111 Effect of Tool Surface Morphology and Lubricants in Micro Cutting Procs Observed with in-Situ Set-Up:** Kazutoshi Nakamura\*, *Student, Graduate School of Engineering, Nagoya Institute of Technology, Aichi, Japan;* Fumihiro Itoigawa, Takashi Nakamura, *Graduate School of Engineering, Nagoya Institute of Technology;* Hiroki Nagatsu, *Student, Graduate School of Engineering, Nagoya Institute of Technology, Aichi, Japan*

**F-112 Machining Aerospace Material with Sub-Cooled Minimal Quantity Cooling Lubrication Fluids:** Tomas Beno\*, *Department of Engineering science, University West, Trollhättan, Sweden, Technical operations, Volvo Aero Corporation, Trollhättan, Sweden;* Marina Isaksson, *Technical operations, Volvo Aero Corporation, Trollhättan, Sweden;* Lars Pejryd, *Department of Engineering science, University West, Trollhättan, Sweden, Production Technology Center, Innovatum AB, Trollhättan, Sweden*

**F-113 Wear of TiAlN and TiAlN/AlCrN Coated Tools in Low-Speed End Milling of Stainless Steel :** Willey Yun Hsien Liew\*, *Department School of Engineering and Information Technology, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia*

**F-114 Surface Generation Mechanism by Burnishing Action of Cutting Edge in Precision or Ultra-Precision Machining:** Akiyoshi Kobayashi\*, *Department of Mechanical Engineering, Faculty of Science and Technology, Meijo University, Nagoya, Japan;* Yoshinori Niwa, *Department of Mechanical Engineering, Faculty of Science and Technology, Meijo University, Nagoya, Japan*

**F-12 Manufacturing and Mechanical Components/ Manufacturing -Other Process**

10:50-12:30, Room F

Session Chair: Tomas Beno, University West, Sweden

Takashi Nakamura, Nagoya Institute of Technology, Japan

**F-121 A Novel Photo-Resist Planarization Technology by Chemical Mechanical Polishing with Resin abrasive for Next Generation Semiconductor Devices:** Yukiteru Matsui\*, *Process & Manufacturing Engineering Center, Semiconductor Company, Toshiba Corporation, Yokohama, Japan, Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology;* Gaku Minamihaba, Satoko Seta, Yoshikuni Tateyama, Atsushi Shigetani, Takeshi Nishioka, Hiroyuki Yano, Nobuo Hayasaka, *Process & Manufacturing Engineering Center, Semiconductor Company,*

Toshiba Corporation, Yokohama, Japan; Hirotaka Shida, Kazuo Nishimoto, *Microfabrication Process Materials Laboratory, Fine Electronic Research Laboratories, JSR Corporation*; Masabumi Masuko, *Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology*

**F-122 Tribo-Oxidation of Tantalum in ECMP:** Ke Wang\*, Prasenjit Kar, *Materials Science and Engineering, China*; Feng Gao, *Department of Mechanical Engineering, Texas A&M University, College Station, Texas, USA*; Hong Liang, *Materials Science and Engineering, China, Department of Mechanical Engineering, Texas A&M University, College Station, Texas, USA*

**F-123 Evaluation of Coefficients of Friction by Hot Flat Drawing Test for Hot Stamping:** Akira Kamitani, Takahiro Kawamata, Akira Azushima\*, *Dept. of Mechanical Engineering, Graduate School of Engineering, Yokohama National University, Yokohama, Japan*

**F-124 Measurement of Friction Coefficient under Bulk Plastic Deformation in Plane Strain Extrusion Test:** Shunpei Kamitani\*, Kenji Nakanishi, *Department of Mechanical Engineering, Graduate School of Science and Engineering, Kagoshima University, Kagoshima-shi, Kagoshima, Japan*; Takafumi Matsushita, *Student, Graduate School of Science and Engineering, Kagoshima University*; Samion Syahrullail, *Department of Thermo-Fluids, Faculty of Mechanical Engineering, Universiti Teknologi Malaysia*

**F-13 Manufacturing and Mechanical Components/ Bearings - Journal Bearing**

15:00-16:40, Room F

Session Chair: Kazuhiro Hayashi, *Osaka Sangyo University, Japan*  
Yong-Bok Lee, *Korea Institute of Science and Technology, South Korea*

**F-131 Influence of Overlays on the Tribological Behaviour of Journal Bearing Materials:** Florian Grün\*, *CD-Laboratory of Fatigue Analysis, University of Leoben, Leoben, Austria*; István Gódor, *Chair of Mechanical Engineering, University of Leoben, Leoben, Austria*; Walter Gärtner, *Miba Bearing Group, Laakirchen, Austria*; Wilfried Eichlseder, *Chair of Mechanical Engineering, University of Leoben, Leoben, Austria*

**F-132 Stick-Slip Phenomenon Induced by Friction in a Plain Journal Bearing During Start-Up:** Jean Bouyer\*, Michel Fillon, Valéry Valle, *Laboratory of Solid Mechanics, University of Poitiers, UMR CNRS 6610, Chasseneuil Cedex, France*

**F-133 Stability Experiment of Small Bore Journal Bearings Supporting an Asymmetrical Shaft Under Flooded and Starved Lubrication Conditions :** Masayuki Ochiai\*, *Department of Mechanical Engineering, Faculty of Engineering, Tokai University, Kanagawa, Japan*; Masaya Kobayashi, *Graduate School of Engineering, Tokai University*; Hiromu Hashimoto, *Department of Mechanical Engineering, Faculty of Engineering, Tokai University, Kanagawa, Japan*

**F-134 Measurement of Oil Film Behavior in the Main Bearings of an Operating Engine Using Thin Films:** Takumi Kataoka\*, Naoya Kato, *R&D Department, NIPPON SOKEN, INC., Nishio-shi, Aichi, Japan*; Takashi Kikuchi, *Power Train Development Group, TOYOTA MOTOR CORPORATION*

**F-135 Experimental Wear Evaluation of Starved Oil-Lubricated Heavily Loaded, Oscillating Journal Bearings:** Henrik Strand\*, *Volvo Construction Equipment AB, Component Division, Eskilstuna, Sweden*; Staffan Johansson, *Volvo Technology, Chalmers Science Park, Göteborg, Sweden*; Peter Andersson, *VTT Technical Research Centre of Finland,*

*Espoo, Finland* ; Anders Pettersson, *Volvo Construction Equipment AB, Component Division, Eskilstuna, Sweden*

**F-14 Manufacturing and Mechanical Components/ Bearings - Bush and Others**

17:10-18:50, Room F

Session Chair: Robert J Bruckner, *NASA, USA*

Masayuki Ochiai, *Tokai University, Japan*

**F-141 Tribological Properties of Al-Sn-Si Alloy with Enlarged Silicon Particle:** Shinichiro Sakamoto\*, Toru Desaki, *Taiho Kogyo Co., Ltd., Toyota, Aichi, Japan*

**F-142 Service-life of Porous Bearings Impregnated by Greases:** Boleslaw Gienza\*, Tadeusz Kaldonski, Artur Krol, Milena Kaminska, *Institute of Motor Vehicles and Transportation, Faculty of Mechanical Engineering, Military University of Technology, Warsaw, Poland*

**F-143 Design of a Test Rig to Study the Squeeze Film Damper:** Gustavo A. Rodriguez, *Department of Mechanical Engineering, Faculty of Engineering, Universidad Simón Bolívar, Valle de Sartenejas, Edo Miranda, Venezuela*; Jorge E. Torres, *Department of Mechanical Engineering, Faculty of Engineering, Universidad Nacional Experimental del Táchira, San Cristóbal, Edo Táchira, Venezuela*; Sergio E. Diaz\*, *Department of Mechanical Engineering, Faculty of Engineering, Universidad Simón Bolívar, Valle de Sartenejas, Edo Miranda, Venezuela*

**F-144 Ultraprecise Positioning X-Y Stage Composed of Pneumatic Servo Bearing Actuators:** Hiroki Danjo\*, Tomotaka Yoshimura, Takakazu Kitagawa, Masato Kadotani, Tomoko Hirayama, Takashi Matsuoka, *Department of Mechanical Engineering, Doshisha University, Kyoto, Japan*

**G-11 Micro-, Nano- and Molecular Tribology/ Microtribology I**

8:40-10:20, Room G

Session Chair: Kenji Fukuzawa, *Nagoya University, Japan*

Wolfgang P. Weinhöhl, *Innowep GmbH, Germany*

**G-111 Prediction for MEMS Micro-Gears Frictional Impact Degradation:** Mircea Teodorescu\*, *Department of Automotive Engineering, School of Engineering, Cranfield University, Bedfordshire, UK*; Stephanos Theodossiades, *Homer Rahnejat, Wolfson School of Mechanical and Manufacturing Engineering, Loughborough University, Loughborough, UK*

**G-112 Lubrication of High Sliding MEMS:** Tom Reddyhoff\*, Ingrid S Y Ku, *Tribology Group, Department of Mechanical Engineering, Imperial College, London, UK*; Jian Huei Choo, *Tribology Group, Department of Mechanical Engineering, Imperial College, London, UK, now at Vestas Technology R&D Singapore Pte. Ltd., Singapore*; Andrew S Holmes, *Optical and Semiconductor Devices Group, Department of Electrical and Electronic Engineering, Imperial College, London, UK*; Hugh A Spikes, *Tribology Group, Department of Mechanical Engineering, Imperial College, London, UK*

**G-113 Tribology of Dendrimer-Mediated Perfluoropolyether Films on Si Surface for Micro-Electro Mechanical Systems Applications:** Nalam Satyanarayana\*, Myo Minn, Sujeet Kumar Sinha, *Department of Mechanical Engineering, National University of Singapore, Singapore*

**G-114 Resistance of Multilayer Diamond-Like Carbon (DLC) Coatings for MEMS Applications Against Oscillating Wear:** Florian Pape\*, Hans Heinrich Gatzert, *Institute for Microtechnology, Leibniz Universität Hannover, Center for Production Technology, Garbsen, Germany*

**G-12 Micro-, Nano- and Molecular Tribology/ Microtribology II**

10:50-12:30, Room G

Session Chair: Koji Miyake, *National Institute of Advanced Industrial Science and Technology, Japan*

Mircea Teodorescu, Cranfield University, UK

**G-121 In-Situ Microtribology with High Local Resolution on Silicon Rubbers:** Wolfgang P. Weinhold\*, *Innowep GmbH, Wuerzburg, Germany*; Ralph Stengler, *University of Applied Sciences, Faculty of Plastics Engineering, Darmstadt, Germany*; Zenichi Miyagi, *Meiji University, Department of Mechanical Engineering, School of Science and Technology, Kawasaki, Japan*; Thomas Schuessler, *Innowep GmbH, Wuerzburg, Germany*

**G-122 Real-Time Imaging of a Nanometer-Thick Liquid Lubricant Film with a 100-nm-Order Lateral Resolution by Ellipsometric Microscopy:** Kenji Fukuzawa\*, Tomohiko Yoshida, Shintaro Itoh, Hedong Zhang, *Department of Micro/Nano Systems Engineering, Nagoya University, Nagoya, Japan*

**G-123 An Adaptive Multiscale Method for Two Dimensional Nanoscale Adhesive Contacts:** Geng Liu\*, Ruiting Tong, Lan Liu, Liyan Wu, *School of Mechatronic Engineering, Northwestern Polytechnical University, Xi'an, PR China*

**G-124 Numerical Estimation of The Force-Based Crosstalk Coefficients Due to Misorientation Along the Torsion Axis of an AFM Cantilever:** Guillaume Michal\*, Cheng Lu, A. Kiet Tieu, *School of Mechanical, Mechatronical and Material engineering, University of Wollongong, Wollongong, NSW, Australia*

**G-125 Friction Analysis of Coatings by Particle Method:** Yasuhiro Hikita\*, *Fundamental Research Department, Taiho Kogyo Co., Ltd., Toyota-city, Aichi-pref. Japan*; Takahisa Kato, *Department of Mechanical Engineering, Faculty of Engineering, The University of Tokyo, Tokyo, Japan*

### G-13 Micro-, Nano- and Molecular Tribology/ Microtribology III

15:00-16:40, Room G

Session Chair: Rowena Crockett, *Empa, Switzerland*  
Geng Liu, *Northwestern Polytechnical University, China*

**G-131 Selective Layer CMP Process Mimicked with Atomic Force Microscope:** Filip Ilie\*, *Department of Machine Elements and Tribology, Polytechnic University of Bucharest, Bucharest – Romania*; Constatin Tita, *School Group «G-ral Magheru» Way of Traian 43, 240011 Rm-Valcea - Romania*

**G-132 Tribonanodesign as a Method of Obtaining Nanomaterials with Set Properties :** Viacheslav N. Khovanskiy\*, *I.V. Kragelskiy Institute of TRIBOLOGY, Moscow Institute of Cars and Roads (State Technical University), Moscow, Russia*

**G-133 Wear Testing and in Situ Profilometry: What we Saw When We Looked.:** W. Gregory Sawyer\*, Nathan A. Mauntler, Nicolas Argibay, Jason A. Bares, Tony L. Schmitz, *Department of Mechanical and Aerospace Engineering, University of Florida, Gainesville, FL, USA*

**G-134 Effect of Temperature on the Micro-Scale Friction Behavior of Thermoplastic Polymer Film:** Kwang-Seop Kim\*, *Department of Nano Mechanics, Nano-Mechanical Systems Research Division, Korea Institute of Machinery & Materials (KIMM), Daejeon, Republic of Korea*; Jung-Chul Heo, Kyung-Woong Kim, *School of Mechanical, Aerospace & Systems Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea*

**G-135 Surface Potential Interactions Between Silica Particle and Alloy Surface With Ion Implantation in Aqueous Medium :** Jiang Li\*, *Mechanical Engineering School, University of Science and Technology, Beijing, P. R. China*; Haosheng Chen, *State Key Laboratory of Tribology, Tsinghua University, Beijing, P. R. China*

### G-14 Micro-, Nano- and Molecular Tribology/ Microtribology IV

17:10-18:50, Room G

Session Chair: Filip Ilie, *Polytechnic University of Bucharest, Romania*  
Viacheslav N. Khovanskiy, I.V. Kragelskiy  
*Institute of Tribology, Russia*

**G-141 The Role of Protein and Surface Chemistry in the Lubrication of Artificial Hip-Joint Materials:** Rowena Crockett\*, *Empa, Swiss Federal Institute for Material Science and Technology, Dübendorf, Switzerland*; Marcella Roba, *Empa, Swiss Federal Institute for Material Science and Technology, Dübendorf, Switzerland*; 2Laboratory for Surface Science and Technology, *Department of Materials, ETH Zurich, Zürich, Switzerland*; Marco Naka, *2Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland*; Emanuel Gautier, *Orthopaedic Clinic, Cantonal Hospital, Fribourg, Switzerland*; Nicholas D. Spencer, *2Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland*

**G-142 Micro-Tribological Characteristics of Silica/Polymer Nanocomposite Coating:** Li-Yu Lin\*, Dae-Eun Kim, *Department of Mechanical Engineering, Yonsei University, Seoul, South Korea*

**G-143 Nanofretting and Nanowear of Monocrystalline Silicon (100):** Linmao Qian, Jiaxin Yu, Bingjun Yu, *Tribology Research Institute, National Traction Power Lab., Southwest Jiaotong University, Chengdu, China*

**G-144 Micro- and Nano-Scale Tribology of Cast CoCrMo:** Dan Sun\*, Julian A Wharton, Robert JK Wood, *national Centre for Advanced Tribology at Southampton (nCATS), School of Engineering Sciences, University of Southampton, Southampton, UK*; Le Ma, Mark Rainforth, *Department of Engineering Materials, Sir Robert Hadfield Building, University of Sheffield, Sheffield, UK*

### H-11 Tribosystems/ Automobiles I

8:40-10:20, Room H

Session Chair: Ana Eva Jimenez Ballesta, *Technical University of Cartagena, Spain*  
Shuichi Yasuda, *Toyota Industries Corporation, Japan*

**H-111 Keynote: Design and Preliminary Test of the Oil-Free Turbocharger for SUV:** Yong-Bok Lee\*, Dong-Jin Park, Chang-Ho Kim, *Energy Mechanics Research Center, Korea Institute of Science and Technology, Seoul, South Korea*  
**H-112 FreePod® Driven Disc for Dry Clutches:** Géraud Vatin, Loïc Adamczak\*, *Valeo Frictoin Materials, Limoges, France*

**H-113 Engine Oil Deterioration Sensor Integrated with an Oil Filter:** Sang Myung Chun\*, *Department of Automotive Engineering, Faculty of Engineering, Hoseo University, Asan City, Republic of Korea*

### H-12 Tribosystems/ Automobiles II

10:50-12:30, Room H

Session Chair: Toshikazu Nanbu, *Nissan Motor Co., Ltd., Japan*  
Zhenyuan Zhong, *Xi'an Jiaotong University, China*

**H-121 The Dynamic Interaction of Topography, Friction and Wear in Brake Systems:** Michael Mueller\*, Georg-Peter Ostermeyer, *Institute of Dynamics and Vibrations, Braunschweig University of Technology, Germany*

**H-122 A Study on the Effect of Iron Oxide (Fe<sub>2</sub>O<sub>3</sub>) in a Brake Pad on Pad Wear:** Katsuya Okayama\*, Hiroya Kishimoto, Tatsuhisa Kubota, *Department of Friction Engineering, ADVICS Co., Ltd., Toyota-shi, Aichi, Japan*; Ken'ichi Hiratsuka, *Department of Mechanical Science and*

Engineering, Chiba Institute of Technology, Narashino-shi, Chiba, Japan

**H-124 Fretting Failures in Wheel/Hub Bolted Assemblies: A Combined Experimental and Numerical Investigation:** Angelos Zografos\*, Andrew V. Olver, Daniele Dini, Department of Mechanical Engineering, Imperial College London, South Kensington Campus, London, UK

### H-13 Tribosystems/ Automobiles III

15:00-16:40, Room H

Session Chair: Łoic Adamczak, Valeo Friction Materials, France  
Roel Tietema, Hauzer Techno Coating, Netherlands

#### H-131 Experimental Wear Volume Analysis on Al-Si-Cu Laser Textured Cylinder Liners Using Thin Layer Activation Technique:

Enrico Corniani\*, AC<sup>2</sup>T research GmbH - Austrian Center of Competence for Tribology, Austria, Institute of Nuclear Research of the Hungarian Academy of Sciences, Cyclotron Department, Debrecen, Hungary; Luis M. Vilhena, University of Ljubljana, Centre for Tribology and Technical Diagnostics, Ljubljana, Slovenia; Victor G. Marian, AC<sup>2</sup>T research GmbH - Austrian Center of Competence for Tribology, Austria, University Politehnica of Bucharest, Bucharest, Romania; Martin Jech, AC<sup>2</sup>T research GmbH - Austrian Center of Competence for Tribology, Austria; Manel Rodriguez Ripoll, Marko Sedlacek, University of Ljubljana, Centre for Tribology and Technical Diagnostics, Ljubljana, Slovenia; Ferenc Ditroi, Institute of Nuclear Research of the Hungarian Academy of Sciences, Cyclotron Department, Debrecen, Hungary; Friedrich Franek, AC<sup>2</sup>T research GmbH - Austrian Center of Competence for Tribology, Austria, Vienna University of Technology, Vienna, Austria

#### H-132 Simulation of Tribo-Dynamics of Piston/Ring Assembly to Cylinder Bore Interface, Blow-by and LOC:

Ming-Tang Ma\*, Powertrain Analysis/Simulation, AVL List Technical Center (Shanghai) Co., Ltd., Shanghai, China  
**H-133 A Model for Friction and Wear Calculation of Piston Ring and Cylinder Based on Contact Mechanics:** Zhenyuan Zhong\*, Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China; Xianhua Huang, College of Mechanical and Electronic Engineering, Lanzhou University of Technology, Lanzhou, China; Yongsheng Zhu, Youyun Zhang, Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China

**H-134 Wear of Nanocrystalline Cylinder Liner Coatings for Highly Loaded Diesel Engines:** Mareike Hahn\*, Institute of Product Engineering, Materials Science and Engineering, University of Duisburg-Essen, Duisburg, Germany; Ralf Theissmann, Faculty of Engineering and CeNIDE, University of Duisburg-Essen; Birgit Gleising, Institute of Product Engineering, Materials Science and Engineering, University of Duisburg-Essen, Duisburg, Germany; Włodzimierz Dudzinski, Institute of Materials Science and Applied Mechanics, Wrocław University of Technology, Poland; Alfons Fischer, Institute of Product Engineering, Materials Science and Engineering, University of Duisburg-Essen, Duisburg, Germany

### H-14 Tribosystems/ Automobiles IV

17:10-18:50, Room H

Session Chair: Ming-Tang Ma, AVL List Technical Centre (Shanghai) Co., Ltd, Shanghai  
Michael Mueller, Braunschweig University of Technology, Germany

**H-141 Effect of Impregnation on the Tribological Properties of Polysiloxane-Derived Ceramic-Matrix Composites:** T. Gumula, AGH-University of Science and Technology, Faculty of Materials Science and Ceramics, Krakow, Poland; A.E. Jimenez\*, Grupo de Ciencia de Materiales e

Ingeniería Metalúrgica, Departamento de Ingeniería de Materiales y Fabricación, Universidad Politécnica de Cartagena, Campus de la Muralla del Mar, C/Doctor Fleming s/n, Cartagena, Spain; S. Blazewicz, AGH-University of Science and Technology, Faculty of Materials Science and Ceramics, Krakow, Poland; M.D. Bermudez, Grupo de Ciencia de Materiales e Ingeniería Metalúrgica, Departamento de Ingeniería de Materiales y Fabricación, Universidad Politécnica de Cartagena, Campus de la Muralla del Mar, C/Doctor Fleming s/n, Cartagena, Spain

**H-142 A Study on the Mechanism of Engines Oil Consumption:** Akemi Ito\*, Masaaki Nakamura, Keiichi Tsuchihashi, Hino Motors, Ltd., Tokyo, Japan

**H-143 Modelling of the Friction Process in a Frictional Pair Using Chaos Theory Tools:** Adam Polak, Selim Oleksowicz\*, Institute of Automobiles and Internal Combustion Engines, Cracow University of Technology, Poland

**H-144 Analysis of Tribological Characteristics on Sliding Surfaces between Shoe and Swash Plate in a Compressor of Automotive Air Conditioner. (Influence of Shoe Dimensions on Tribological Characteristics) :** Shuichi Yasuda\*, Takahiro Hoshida, Takayuki Kato, Compressor Division, Toyota Industries Corporation, Kariya-shi, Aichi, Japan; Yasuhiro Kondoh, Shuzou Sanda, Toyota Central R&D Labs., Inc.

### I-11 Tribology Fundamentals/ Contact Mechanics I

8:40-10:20, Room I

Session Chair: Makoto Tomimoto, Nano Surface Science Laboratory, Japan  
Youngkuan Xue, Brunel University, UK

#### I-111 Keynote: Recent Advances in Adhesive Contact Models - Thin Films and Time Dependent Materials:

Etienne Barthel\*, Laboratoire CNRS/Saint-Gobain UMR 125 "Surface du Verre et Interfaces", France; Guillaume Haiat, Laboratoire de Mécanique Physique - B2OA, UMR CNRS 7052, France; Antoine Chateauminois, Christian Fréty, Laboratoire de Physico-Chimie des Polymères et des Milieux Dispersés, UMR CNRS 7615 Ecole de Physique et Chimie Industrielles (ESPCI), Paris, France

**I-112 Shakedown in Spherical Contact Under Combined Normal and Cyclic Tangential Loading:** Yuri Kligerman\*, Vadim Zolotarevsky, Izhak Etsion, Faculty of Mechanical Engineering, Technion . Israel Institute of Technology, Haifa, Israel

**I-113 Prediction of the Microgeometry Evolution During Mixed Lubrication between Parallel Surfaces:** Francois Robbe-Valloire\*, Robert Progrid, Bernard Paffoni, LISMM, Institut Supérieur de Mécanique de Paris3, Saint-Ouen, France

**I-114 A Theoretical and Experimental Investigation of Interface Local Slip and Creepage in Layered Systems:** Saverio Reina\*, Daniele Dini, Department of Mechanical Engineering, Imperial College London, South Kensington Campus, London, UK

### I-12 Tribology Fundamentals/ Contact Mechanics II

10:50-12:30, Room I

Session Chair: Etienne Barthel, Laboratoire CNRS/Saint-Gobain UMR 125, France  
Francois Robbe-Valloire, Institut Supérieur de Mécanique de Paris, France

#### I-121 Cyclic Shear Properties of Thin Polymer Films

**Within Contacts:** Eric Tomimoto\*, Laboratoire de Physico-Chimie des Polymères et des Milieux Dispersés (PPMD), Ecole Supérieure de Physique et Chimie Industrielles (ESPCI), UMR CNRS 5621, Paris, France, Dutch Polymer Institute (DPI), Eindhoven, the Netherlands; Antoine Chateauminois\*, Christian Fréty, Laboratoire de Physico-Chimie des Polymères et des

*Milieux Dispersés (PPMD), Ecole Supérieure de Physique et Chimie Industrielles (ESPCI), UMR CNRS 5621, Paris, France*

**I-122 Investigation of Scratch Characteristics of Intestinal Tissue for Biomedical Applications:**

Young-Tae Kim\*, *Graduate School of Mechanical Engineering, Yonsei University, Seoul, South Korea*; Dae-Eun Kim, *Department of Mechanical Engineering, Yonsei University, Seoul, South Korea*

**I-123 Friction Pattern for Tactile Sensor in**

**Anthropomorphic Fingertip:** Makoto Tomimoto\*, *Nano Surface Science Laboratory, Kyoto, Japan*

**I-124 Self-levitating Air Journal Bearing:** Tadeusz Stolarski,

Youngkuan Xue\*, *Mechanical Engineering, School of Engineering and Design, Brunel University, Middlesex, United Kingdom*; Shigeka Yoshimoto, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*

**I-125 Dynamic Analysis of Force Acting on Cage of**

**Deep Groove Ball Bearing:** Akira Ito\*, *Machine Element Dept., Research Laboratory, IHI, Yokohama, Japan*

**I-13 Tribology Fundamentals/ Contact Mechanics III**

15:00-16:40, Room I

Session Chair: Izhak Etsion, Technion, Haifa, Israel

Boyko Stoimenov, *Ecole Centrale de Lyon, France*

**I-131 Keynote: Contact of Materials Under Multiphysical**

**Conditions:** Q. Jane Wang\*, *Department of Mechanical Engineering, Northwestern University, Evanston, USA*

**I-132 The Film Forming Characteristics of Sugar Solution as Component of a New Kind**

**Super-Lubricative Lubricant:** Liran Ma, Chenhui Zhang, Jianbin Luo\*, Zhizuo Ma, Yan Wang, Yuanjing Dai, *State Key Laboratory of Tribology, Tsinghua University, Beijing, China*

**I-133 An Investigation of the Load Support of Fluid**

**Trapped in Dents:** Richard J. Underwood\*, Ritchie S. Sayles, A. Kadiric, *Tribology Group, Department of Mechanical Engineering, Imperial College London, UK*; E. Ioannides, *SKF Engineering & Research Centre, Nieuwegein, Holland*

**I-134 Interferometry Measurement of Lubricating Film Thickness in a Slider-on-Disc Conformal Contact:** F.

Guo\*, *School of Mechanical Engineering, Qingdao Technological University, Qingdao, China*; P.L. Wong, Z. X. Fu, *Department of Manufacturing Engineering and Engineering Management, City University of Hong Kong, Hong Kong, China*

**I-14 Tribology Fundamentals/ Contact Mechanics IV**

17:10-18:50, Room I

Session Chair: F. Guo, Qingdao Technological University, China

Jane Wang, *Northwestern University, USA*

**I-141 The Effect of Surface Roughness on Static Friction and Junction Growth of an Elastic-Plastic**

**Spherical Contact:** Dvir Cohen, Yuri Kligerman, Izhak Etsion\*, *Department of Mechanical Engineering, Technion, Haifa, Israel*

**I-142 Analysis of the Consequences of the Wear Flows on Local Contact Dynamics.:** Aurélien Saulot\*, Claire

Vayssière, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS, UMR5259, France*; Laurent Baillet, *Université de Grenoble, CNRS, Université Joseph Fourier, LGIT, UMR5559, France*; Georges Roche, Yves Berthier, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS, UMR5259, France*

**K-415 An Experimental and Theoretical Investigation into the Relationship between the Normal Load and the**

**Friction Force in Pre-Sliding, Frictional Contacts:** Kris De Moerlooze, Farid Al-Bender\*, Hendrik Van Brussel, *Department of Mechanical Engineering, PMA division, K.U.Leuven, Belgium*

**I-144 Model of Deformable Rigid Body with Dangerous Volume for Contact Problems with Friction :**

Leonid Sosnovskiy\*, *S&P Group TRIBOFATIGUE, Gomel, Republic of Belarus*; Mikhail Zhuravkov, *Faculty of Mechanics and Mathematics, Belarusian State University*; Sergei Sherbakov,

**I-145 The Wear Contact Problem for an Elastic**

**Foundation with an Inhomogeneous Coating:** Alexander V. Manzhirov\*, *Department for Modeling in Solid Mechanics, Ishlinsky Institute for Problems in Mechanics, Russian Academy of Sciences, Moscow, Russia*

**J-11 Surface Engineering/ Tribomaterials I**

8:40-10:20, Room J

Session Chair: Azzedine Dadouche, *National Research Council, Canada*

Minoru Goto, *Ube National College of Technology, Japan*

**J-111 Keynote: Advances in Surface Engineering for Extreme Tribological Applications:**

Ali Erdemir\*, *Argonne National Laboratory, Energy Systems Division, Argonne, IL - USA*

**J-112 Effect of Copper-Molybdenum Oxide on the Tribological Properties of Aluminum Bronze Alloy at**

**High Temperature:** Yoshinori Takeichi\*, Naoki Okamoto, Youta Katayama, Takashi Chujyo, Ichinnorov Bazarraghaa, *Department of Mechanical Engineering, Toyohashi University of Technology, Toyohashi, Aichi, Japan*; Ivan Havetta, Marian Dzimko, *Faculty of Mechanical Engineering, University of Zilina*; Masao Uemura, *Department of Mechanical Engineering, Toyohashi University of Technology, Toyohashi, Aichi, Japan*

**J-113 High Temperature Tribological Characteristics of Fe-Mo-Based Self-Lubricating Composites:**

Junhong Jia\*, jiesheng Han, Jinjun Lu, *State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Lanzhou, PR China*

**J-114 Nanoporous Polymeric Antifriction Material for Biomedical Tribological Applications:**

A. P. Krasnov, E. E. Said-Galiev, A. V. Naumkin, *Nesmeyanov Institute of Organoelement Compounds, Russian Academy of Sciences, Moscow, Russia*; N. S. Gavryshenko, *Priorov CITO, Moscow, Russia*; I. G. Goryacheva\*, *Institute for Problems in Mechanics, Russian Academy of Sciences, Moscow, Russia*; O. V. Afonicheva, A. Yu. Nikolaev, I. O. Volkov, V. A. Mit, *Nesmeyanov Institute of Organoelement Compounds, Russian Academy of Sciences, Moscow, Russia*

**J-12 Surface Engineering/ Tribomaterials II**

10:50-12:30, Room J

Session Chair: Hozumi Goto, *Fukuoka Institute of Technology, Japan*

Yoshinori Takeichi, *Toyohashi University of Technology, Japan*

**J-121 Tribological Properties of Newly Developed Cu/C/RBC Composites as Pantograph Slider Material of**

**Railway Current Collector:** Kei Shibata\*, Takeshi Yamaguchi, Yuta Yao, *Graduate School of Engineering, Tohoku University, Sendai, Miyagi, Japan*; Akihiko Ishizu, Nobuyuki Yokoyama, Junichiro Mishima, *East Japan Railway Company, Tokyo, Japan*; Kazuo Hokkirigawa, *Graduate School of Engineering, Tohoku University*

**J-122 An Investigation on Lead-Free Materials for Heavily Loaded Bearings:**

Azzedine Dadouche\*, Martin J. Conlon, Waldemar Dmochowski, *Gas Turbine Laboratory, Institute for Aerospace Research, National Research Council, Ottawa, Ontario, Canada*; James T. Thomson, Renata Zavadil, Mahi Sahoo, *CANMET-Materials Technology Laboratory, Ottawa, Ontario, Canada*

**J-123 Effect of Heat Accumulation Along Braking Succession on Interactions Between Hot Band, Friction**

**Mechanisms and Tribological Behaviour of a Pad-Disc**

**Pair:** Anne-Lise Cristol, Yannick Desplanques\*, *Laboratoire de Mécanique de Lille UMR CNRS 8107, Ecole Centrale de Lille Cité Scientifique, France*; Werner Österle, *Bundesanstalt für Materialforschung und prüfung Unter den Linden, Berlin, Deutschland*; Gérard Degallaix, *Laboratoire de Mécanique de Lille UMR CNRS 8107, Ecole Centrale de Lille Cité Scientifique, France*

**J-124 VSV Bushing Material System Development:**

Robert W. Bruce\*, *GE Aviation, USA*

**J-125 Tribology of Polymer Injection-Molded Stainless Steel Hybrid Gear:**

Tadashi Komoto\*, *Department of Production Science and Technology, Graduate School of Engineering, Gunma University, Japan*; Jun-ichi Nozawa, Hiroshi Hagiwara, *Research Division, Ogura Clutch Co., Ltd.*; Takahiko Kawai, Hiroyuki Kumehara, *Department of Production Science and Technology, Graduate School of Engineering, Gunma University, Japan*

**J-13 Surface Engineering/ Tribomaterials III**

15:00-16:40, Room J

Session Chair: Miroslav J Babic, *University of Kragujevac, Yugoslavia*

Yoshinori Takeichi, *Toyohashi University of Technology, Japan*

**J-132 Influence of Water Vapor in Hydrogen Gas on the Friction and Wear of Cobalt-Based Alloy:**

Takehiro Morita\*, *Department of Mechanical Engineering, Kyushu University, Fukuoka, Japan*; Takuya Iwao; Kanao Fukuda, *Department of Mechanical Engineering, Kyushu University*; Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University, National Institute of Advanced Industrial Science and Technology, Japan*

**J-133 The Influence of Different Additives on Friction and Sliding Wear of Polyphenylene Sulfide Composites :**

Lada A. Gyurova\*, *Institut fuer Verbundwerkstoffe GmbH (Institute for Composite Materials), University of Kaiserslautern, Kaiserslautern, Germany*; Alois K. Schlarb

**J-134 Tribological Perception of Magneto-Rheological Fluid for Haptic Display:**

Chul-Hee Lee, Min-Gyu Jang\*, Chan-Ki Kim, *Department of Mechanical Engineering, Inha University, Incheon, Korea*

**J-14 Surface Engineering/ Tribomaterials IV**

17:10-18:50, Room J

Session Chair: Hozumi Goto, *Fukuoka Institute of Technology, Japan*

Chul-Hee Lee, *Inha University, Korea*

**J-141 Tribological Properties of Newly Developed Resin/RB Ceramics Composites:**

Motoharu Akiyama, Kunihiko Matsumoto\*, *Tribology Lab. Bearing Basic Technology Development Divison. Engineering Headquarter, Minebea Co., Ltd., Nagano, Japan*; Takeshi Yamaguchi, Kazuo Hokkirigawa, *Graduate School of Engineering, Tohoku University, Sendai, Miyagi, Japan*

**J-142 Frictional Properties between CVD Diamond and High-Hardness Steels:**

Keisuke Shimizu\*, Yasushi Haruna, *High Alloy Steel Group, Research & Development Center, Sanyo Special Steel Co.,LTD., Himeji-Shi, Japan*; Akio Motoi, *Tokyo Metropolitan Industrial Technology Research Institute, Tokyo, Japan*; Kazutaka Kanda, *Department of Mechanical Engineering, Fukui University of Technology, Fukui-Shi, Japan*; Shigeto Takano, *Plant Maintenance Production Engineering Dept., Cutting Tool Plant, Nachi-Fujikoshi Corp., Toyama, Japan*

**J-143 Friction Properties of Resin Filled with Oil-Impregnated Porous Silica:**

Yoshihide Himeno\*,

Eiichirou Shimazu, Masaki Egami, *Elemental Technological R&D Center, NTN corporation, Kuwana, Mie, Japan*

**J-144 Tribological Behavior of Rice Husk Ceramics:**

Tuvshin Dugarjav\*, Takeshi Yamaguchi, Kiminori Furukawa, Shohei Katakura, Kazuo Hokkirigawa, *Graduate School of Engineering, Tohoku University, Sendai, Miyagi, Japan*

**J-145 Effect of a Trace Amount of Water on Tribological Characteristics of Nitride-Based Ceramics Against Steel in High-Temperature Fuel:**

Masashi Wada\*, Kazumi Kashiwagi, Satoshi Kitaoka, *Japan Fine Ceramics Center, Nagoya, Japan*; Yoshio Fuwa, *Toyota Motor Corporation*

**K-11 Surface Engineering/ Texturing I**

8:40-10:20, Room K

Session Chair: Koshi Adachi, *Tohoku University, Japan*  
Tianmin Shao, *Tsinghua University, China*

**K-111 Keynote: A Review of Laser Surface Texturing and Applications:**

Izhak Etsion\*, *Department of Mechanical Engineering, Technion, Haifa, Israel*

**K-112 Effects of Cavitation Ring Formed on Laser-Textured Surface of Mechanical Seal:**

Yuichiro Tokunaga\*, Hideyuki Inoue, Ken Okada, Takao Shimomura, *Eagle Industry Co., Ltd., Takahashi-shi, Okayama, Japan*; Yuji Yamamoto, *Professor Emeritus of Kyushu University, Fukuoka, Japan*

**K-113 Effect of Surface Texturing on Tribological Properties from the Macro- to the Nano-Scale:**

Alberto Rota\*, *CNR-INFN National Research Center S3, Modena, Italy*; Diego Marchetto, Enrico Gualtieri, *Dipartimento di Fisica - Università di Modena e Reggio Emilia, Modena, Italy*; Lorenzo Calabri, Alberto Borghi, *CNR-INFN National Research Center S3, Modena, Italy*; Sergio Valeri, *CNR-INFN National Research Center S3, Modena, Italy, Dipartimento di Fisica - Università di Modena e Reggio Emilia, Modena, Italy*

**K-114 Frictional Characteristics of Aneurysm Clips Finished by Laser Processing:**

Isami Nitta\*, Satoshi Nomura, *Department of Mechanical Engineering, Faculty of Engineering, Niigata University, Niigata, Japan*; Noboru Takatsu, *Gosen Factory, Mizuho Ikakogyo Co., Ltd., Gosen, Japan*

**K-12 Surface Engineering/ Texturing II**

10:50-12:30, Room K

Session Chair: Kazuyuki Mizuhara, *Tokyo Denki University, Japan*

Jane Wang, *Northwestern University, USA*

**K-121 Improving the Tribological Performance of an Elastomer Lip Seal by Surface Texturing :**

Alexey Shinkarenko\*, Yuri Kligerman, Izhak Etsion, *Department of Mechanical Engineering, Technion-Israel Institute of Technology, Haifa, Israel*

**K-122 A Unified Computational Approach to the Optimization of Surface Textures: One Dimensional Bearings:**

Pawel Podsiadlo\*, Gwidon W. Stachowiak, *Tribology Laboratory, School of Mechanical Engineering, Faculty of Engineering, Computing and Mathematics, The University of Western Australia, Crawley, Western Australia, Australia*

**K-123 Improving the Ani-Seizure Ability of Steel-Cast Iron Assembly with Surface Texturing:**

Lidia Galda, Andrzej Dzierwa\*, Pawel Pawlus, *Department of Manufacturing Processes and Production Organisation, Faculty of Mechanical Engineering and Aeronautics, Rzeszow University of Technology, Rzeszow, Poland*; Rafal Reizer, *Department of Marine Electronics and Mechanical Engineering, Faculty of Marine Technology, University of Rzeszow*

**K-124 Smart Surface for Dry and Wet Friction: Bush Cricket Model:**

Michael Varenberg\*, *Department of*

*Mechanical Engineering, Technion - IIT, Haifa, Israel; Stanislav Gorb, Department of Zoology, University of Kiel, Germany*

**K-13 Surface Engineering/ Texturing III**

15:00-16:40, Room K

Session Chair: Andrzej Dzierwa, Rzeszow University of Technology, Poland  
Isami Nitta, Niigata University, Japan

**K-131 Keynote: Progress in Laser Surface Texturing:**

Tianmin Shao\*, *State Key Laboratory of Tribology, Tsinghua University, Beijing, China*

**K-132 Running-in Effect on Friction of SiC Self-mated Sliding in Water:**

Koshi Adachi\*, *Division of Mechanical Engineering, Tohoku University, Sendai, Japan; Tetsuo Yokota, Hitachi Via Mechanics Ltd.; Koji Kato, College of Engineering, Nihon University*

**K-133 Model-Based Virtual Surface Texturing for Lubrication in a Concentrated Conformal Contact:**

Dong Zhu\*, *Tsinghua University, Beijing, China; Toshikazu Nanbu, Nissan Research Center, Nissan Motors, Kanagawa, Japan; Ning Ren, Mechanical Engineering, Northwestern University, Evanston, IL, USA; Yoshiteru Yasuda, Nissan Research Center, Nissan Motors, Kanagawa, Japan; Q. Jane Wang, Mechanical Engineering, Northwestern University, Evanston, IL, USA*

**K-134 Improved Tribological Performance of Micro-Textured Amorphous Carbon Nano-Composite Coatings Sliding in Water:**

Liping Wang\*, Qi Ding, *State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, P.R.China; S.C Wang, R.J.K. Wood, National Centre for Advanced Tribology at Southampton (nCATS), School of Engineering Sciences, University of Southampton, UK; Qunji Xue, Litian Hu, State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, P.R.China*

**K-14 Surface Engineering/ Texturing IV**

17:10-18:50, Room K

Session Chair: Pawel Podsiadlo, The University of Western Australia, Australia  
Michael Varenberg, Technion - Israel Institute of Technology, Israel

**K-141 A Metrological Study on Geometrical Properties of Electroplated Diamond Tools and Their Grinding Performances:**

Mohd Fauzi Ismail\*, *Graduate School of Information and Control Engineering, Nagaoka University of Technology, Nagaoka, Niigata, Japan; Kazuhisa Yanagi, Hiromi Isobe, Faculty of Mechanical Engineering, Nagaoka University of Technology*

**K-142 Influence of Tilt Angle and Grinding Angle of the Plate on Friction and Transfer Layer Formation :**

Pradeep L. Menezes, Kishore, *Department of Materials Engineering, Indian Institute of Science, Bangalore, INDIA; Satish V. Kailas\*, Department of Mechanical Engineering, Indian Institute of Science, Bangalore, INDIA; Michael R. Lovell, Department of Industrial Engineering, University of Wisconsin-Milwaukee, Milwaukee, WI, USA*

**K-143 The Factors Affecting the Usability of Touch Pad:**

Kazuyuki Mizuhara\*, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo Denki University, Tokyo, Japan; Toshikatsu Washio, Surgical Assist Technology Group, AIST, Ibaraki, Japan; Takayuki Ishii, SONY EMCS*

**Poster Session**

14:00-15:00, Exhibition Hall (Viewing 10:00-17:00)

**Tribology Fundamentals/ Contact Mechanics**

**P-101 Electric Contact Analysis between Metal and Semiconductor by Using Schottky Effect:**

Shigeo Kotake\*, Yasuyuki Suzuki, *Department of Mechanical Engineering, Faculty of Engineering, Mie University, Tsu, Mie, Japan*

**P-102 Contact Mechanics of Belt-Pulley Systems:**

Takuya Morimoto\*, Tsubasa Numazawa, Hiroshi Iizuka, *Graduate School of Science and Engineering, Yamagata University, Yonezawa, Yamagata, Japan*

**P-103 Surface Damage Evaluation of Ionmixing and Vapor Deposited TiN Coatings by Friction Test:**

Masayoshi Abo\*, Satoshi Kakunai, Masaru Higa, *Graduate School of Engineering, University of Hyogo, Himeji, Hyogo, Japan*

**P-104 Management of Thermal Streams at Use of the Tool with Wearproof Coverings:**

Rustam I. Akhmetshin\*, Mars Sh. Migranov, *Department of Aviation Technology Systems, Ufa State Aviation Technical University, Ufa, Russia*

**P-105 Topographical and Mechanical Investigations on the Local Tribology of Galvanized Steel Sheets Surfaces:**

Gilles Payen\*, *Mines ParisTech, CEMEF . Centre de Mise en Forme des Matériaux, CNRS UMR 7635, Sophia Antipolis Cedex, France, ArcelorMittal Maizières, R&D Automotive Products | Materials for Visible parts, Maizières-lès-Metz Cedex, France; Eric Felder, Monique Repoux, Mines ParisTech, CEMEF . Centre de Mise en Forme des Matériaux, CNRS UMR 7635, Sophia Antipolis Cedex, France; Jean-Michel Mataire, ArcelorMittal Maizières, R&D Automotive Products | Materials for Visible parts, Maizières-lès-Metz Cedex, France*

**P-106 Adhesive Dynamic JKR Contact: Experiments and Principle of Analysis:**

Eric Charrault, Vincent Le Houérou\*, Christian Gauthier, Robert Schirrer, *Institut Charles Sadron - CNRS UPR 022, Strasbourg cedex 2, France*

**P-107 Effect of External Pre-Load (Tension) on the Tribological Behavior of Polyethylene:**

Mokhtar O.A. Mokhtar\*, Momen S.A. Khalil, *Mechanical Design and Production Department, Faculty of Engineering, Cairo University, Giza, Egypt*

**P-108 Geometry of the Groove Left on the Surface and of the « Self Healing » in Case of Polymer Scratching:**

Christian Gauthier\*, Hervé Pelletier, Robert Schirrer, *Institut Charles Sadron, UPR 22 CNRS, Strasbourg Cedex 2, France*

**P-109 Finite Element Analysis on Effect of Surface Texture on Precise Positioning:**

Jianhua Chen\*, Dongfeng Diao, *Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China*

**P-110 Explicit Finite Element Modeling of Subsurface Originated Spalling in Bearing Contacts:**

Trevor Slack\*, *Department of Mechanical Engineering, Ph.D. Graduate Student, Purdue University, West Lafayette, IN, USA; Farshid Sadeghi, Department of Mechanical Engineering, Professor, Purdue University, West Lafayette, IN, USA*

**Tribology Fundamentals/ Friction**

**P-111 Influence of the Wall Friction Caused by Motion of Oil Flow on Stress-Strain State of a Pipe with a Corrosion Imperfection:**

Sergei Sherbakov\*, *Faculty of Mechanics and Mathematics, Belarusian State University, Minsk, Republic of Belarus, S&P Group TRIBOFATIGUE; Leonid Sosnovskiy, S&P Group TRIBOFATIGUE; Nikita Zalesskiy, S&P Group Agat-System; Pavel Ivankin, Institute for Heat and Mass Transfer of Belarusian Academy of Sciences*

**P-112 Friction Surface Investigation with Isotopes Labelled Ferrocenes:**

Hieronim Piotr Janecki\*, *Department of Materials Science Technology and Designing Technical University, Radom, Poland*

**P-113 Fracture of Glass Plate Induced by Frictional Forces and the Applications:** Atsushi Hashimoto\*, *Faculty of Mechanical Engineering, College of Engineering, Nihon University, Koriyama-city, Fukushima, Japan*; Shingo Nakamura, *Graduate Student, Graduate School of Engineering, Nihon University*

**P-114 Evaluation Method of Static and Kinetic Friction Characteristics by Piezoelectric Impact Drive Mechanism:** Atsushi Okuno\*, Nozomu Araki, Yasuo Konishi, Hiroyuki Ishigaki, *Graduate School of Engineering, University of Hyogo, Himeji, Hyogo, Japan*

**P-115 Size Effect on Tribological Phenomena in Micro Metal Forming:** Kuniaki Dohda\*, Takehiko Makino, *Department of Mechanical Engineering, Nagoya Institute of Technology, Nagoya, Japan*

**P-116 Generalized Boundary Condition Approach in Heat Transfer Frictional Problems:** Nikolay Belyakov\*, *Department of Applied Mathematics, Faculty of Fundamental Sciences, Bauman Moscow State Technical University, Moscow, Russia*; Alexey Nosko, *Department of Lifting and Transport Machines, Faculty of Robotics and Complex Automation, Bauman Moscow State Technical University, Moscow, Russia*

**P-117 Development of Wet Friction Material for Anti Hot-Spot Through Quantitative Analysis:** Sosuke Kawai\*, Xiaoming Gu, Kenji Maruo, Tamotsu Fujii, *Engineering Office No.1, Engineering Division, NSK Warner K.K., Shizuoka, Japan*

**P-118 Influence of Work Material Treatment on Galling in Cold Forming:** Jannica Heinrichs\*, Staffan Jacobson, *Tribomaterials group, The Ångström Laboratory, Uppsala University, Sweden*

**P-119 Effect of Cumulative Damage on Alumina Nanocomposites by Fretting Wear:** Aydemir Ural\*, *LGP, Ecole Nationale d'Ingénieur de Tarbes, Tarbes, France*; Société des Céramiques Techniques (SCT), Bazet, France; Jean-Yves Paris, Jean Denape, Jean-Denis Beguin, Rafic Merhej, *LGP, Ecole Nationale d'Ingénieur de Tarbes, Tarbes, France*; Julien Gurt, *CIRIMAT, UMR CNRS-UPS-INP 5085, Bât. 2R1, Université Paul-Sabatier, Toulouse, France*; Société des Céramiques Techniques (SCT), Bazet, France; Alicia Weibel, Alain Peigney, Christophe Laurent, *CIRIMAT, UMR CNRS-UPS-INP 5085, Bât. 2R1, Université Paul-Sabatier, Toulouse, France*; Geoffroy Chevallier, *CIRIMAT, UMR CNRS-UPS-INP 5085, Bât. 2R1, Université Paul-Sabatier, Toulouse, France*; PNF2; CNRS, MHT, *Université Paul-Sabatier, Toulouse, France*; Claude Estournes, PNF2; CNRS, MHT, *Université Paul-Sabatier, Toulouse, France*; Yann Paranthoen, *Société des Céramiques Techniques (SCT), Bazet, France*

**P-120 Fabrication and Tribological Properties of HSS-Based Self-Lubrication Composites with an Interpenetrating Network:** Yanjun Wang, *School of Mechanical Engineering, University of Jinan, Jinan, China*; Zuomin Liu, *Institute of Tribology, Wuhan University of Technology, Wuhan, China*; Shouren Wang\*

**P-121 Ball-Ring Friction Study:** Ilie Musca\*, *Department of Mechanical Engineering, University "Stefan cel Mare" Suceava, Romania*

**P-122 Experimental Investigation of the Frictional Stability of Engineering Plastics:** Stijn Van Austrève\*, Wouter Ost, Jeroen Van Wittenberghe, Patrick De Baets, *Laboratory Soete, Department of Mechanical Construction and Production, Faculty of Engineering, Ghent University, Ghent, Belgium*

**P-123 Friction Characteristics of Industrial Drum Brake Linings:** Jeroen Van Wittenberghe\*, Wouter Ost, Stijn Van Austrève, Patrick De Baets, *Laboratory Soete, Department of Mechanical Construction and Production, Faculty of Engineering, Ghent University, Ghent, Belgium*

**P-124 Discrete Friction Layer Modeling under Consideration of Thermodynamic Laws :** Georg-Peter

Ostermeyer, *Institute of Dynamics and Vibrations, Faculty of Mechanical Engineering, Technische Universität Braunschweig, Braunschweig, Germany*; Katrin Fischer\*, *Institute of Dynamics and Vibrations, Faculty of Mechanical Engineering, Technische Universität Braunschweig, Braunschweig, Germany*

**P-125 The Role of Surface Treatment in the Tribofilm Formation on Alumina Friction Drive Components:** Johanna Olofsson\*, *Tribomaterials Group, The Ångström Laboratory, Uppsala University, Uppsala, Sweden*; Stefan Johansson, *PiezoMotor AB, Uppsala, Sweden*; Staffan Jacobson, *Tribomaterials Group, The Ångström Laboratory, Uppsala University, Uppsala, Sweden*

**P-126 THD Analysis of a Compliant Journal Bearing Considering Liner Deformation:** Evgeny Kuznetsov\*, Sergei Glavatskih, *Division of Machine Elements, Luleå University of Technology, Luleå, Sweden*; Michel Fillon, *Laboratory of Solid Mechanics, University of Poitiers, UMR CNRS 6610, SP2MI, Futuroscope Cedex, France*

**P-127 Contact Analysis for Material Softening by Frictional Heating:** Atsushi Tajiri\*, Atsushi Orui, Satoshi Momozono, Tsunamitsu Nakahara, *Tokyo Institute of Technology, Tokyo, Japan*

**P-128 Static Friction as a Function of Waiting Time Probed by Dynamics of Driven Vortices in La<sub>2</sub>Xsrxcuo<sub>4</sub> Thin Films:** Daisuke Nakamura, Yuuki Shibuya\*, Yoshinori Imai, Atsutaka Maeda, *Department of Basic Science, the University of Tokyo, Tokyo, Japan*

**P-129 The Distinct Element Method Simulation of Charge Collection Induced by Tribocharging on Insulators:** Masami Uchioki\*, Masayoshi Abo, *Graduate School of Engineering, University of Hyogo, Himeji, Hyogo, Japan*

**P-130 Anti-Wear and Anti-Friction Properties of Natural Additives Originated from Vegetable Oils:** Hiroyuki Itagaki\*, Masaaki Takayanagi, *The Nisshin OilIIO Group, Ltd., Tokyo, Japan*; Shigeyuki Mori, Ichiro Minami, Hidetaka Nanao, Kimihiro Kobayashi, *Department of Chemical Engineering, Faculty of Engineering, Iwate University, Morioka, Japan*

**P-131 Friction Properties of the Porous Rubber Under Wet Condition:** Yutarō Kosugi\*, Tomoaki Iwai, Yutaka Syokaku, *School of Natural Science, Kanazawa University, Ishikawa, Japan*; Naoya Amino, *The Yokohama Rubber Co., Ltd.*

**P-132 Considerations on the Lift-Up Effect in Sliding Friction:** Thierry Janssens\*, Farid Al-Bender, *Division Production Engineering, Machine Design and Automation (PMA), Department of Mechanical Engineering, Faculty of Engineering, Katholieke Universiteit Leuven, Belgium*

**P-133 Influence of Lubricating Conditions on Triboelectrification between Metals and Ceramics:** Hiroaki Matsuura\*, Ken'ichi Hiratsuka, *Department of Mechanical Science and Engineering, Chiba Institute of Technology, Chiba, Japan*; Masahiro Yanagisawa, *Institute for Biomedical Engineering, Waseda University, Japan*

**P-134 Experimental Stick-Slip Model Employing Particle Layers between Two Rotational Annulus Surfaces:** So Sato\*, Ken Nakano, *Yokohama National University, Yokohama, Japan*

#### Tribology Fundamentals/ Wear

**P-135 Study on the Elementary Process of Adhesive Wear: Generation of Wear Elements and Their Growth into Transfer Particles :** Alan Hase\*, *Department of Mechanical Engineering, Faculty of Engineering, Saitama Institute of Technology, Fukaya-shi, Saitama, Japan*; Hiroshi Mishina, *Department of Artificial System Science, Graduate School of Engineering, Chiba University, Chiba-shi, Chiba, Japan*

**P-136 Influence of Low Friction MoS<sub>2</sub>/Ti Coatings**

**Produced by RF-Sputtering** : Huibo He, *School College of Engineering and Technology, Southwest University, Chongqing, China, School of Mechanical & Aerospace Engineering, ReCAPT(K-MEM R&D Cluster), Gyeongsang National University, Jinju, South Korea*; Qi Zhang\*, *Jungseong Kim, Seongmin Moon, Sungki Lyu, School of Mechanical & Aerospace Engineering, ReCAPT(K-MEM R&D Cluster), Gyeongsang National University, Jinju, South Korea*

**P-137 Tribological Characteristics of Cast Cu-base Alloys with Different Initial Structure Under Dry Sliding Friction:**

Viktor Novytskyi\*, *Department of New Cast Materials, Physico-Technological Institute of Metals and Alloys of NASU, Ukraine*; Alexander Shcheretsky, *Vladimir Lakhnenko, Department of Physico-chemistry of alloys, Physico-Technological Institute of Metals and Alloys of NASU, Ukraine*

**P-138 Direct Simulation of Corrosive Wear:** Michimasa Uchida\*, *Akira Iwabuchi, Tomoharu Shimizu, Akihiro Chida, Department of Mechanical Engineering, Faculty of Engineering, Iwate University, Morioka-shi, Iwate, Japan*

**P-139 Effect of Surface Topography on Cavitation Noise: Experimental Study:**

Ge Han\*, *Chen Haosheng, Yan Dayun, Chen Darong, State Key Laboratory of Tribology, Tsinghua University, Beijing, China*

**P-140 Wear of Carbonaceous Brushes and Commutators Immersed in Diesel Oil for Automotive Pump DC Motor:**

Romain Charpenay\*, *Pierre-Henri Cornuault, Philippe Kapsa, Laboratoire de tribologie et dynamique des Systèmes, Ecole Centrale de Lyon, UMR-CNRS 5513, Ecully, France*

**P-141 Effects of Filler Morphology on the Tribological Performances of Polyimide Composites:**

Zhu Peng\*, *Fan Donli, Shen Yongjun, The Institute of Chemistry and Chemical Engineering, Nantong University, Nantong, People's Republic of China*

**P-142 The Size and Shape of Ultra-High Molecular Weight Polyethylene Wear Debris Obtained from Samples Retrieved in Vivo:**

J. P. Wu\*, *X. P. Yan, Reliability Engineering Institute, School of Energy and Power Engineering, Wuhan University of Technology, Wuhan, P. R. China, Key Laboratory of Marine Power Engineering & Technology (Ministry of Communications), Wuhan University of Technology, Wuhan, P. R. China*; J. L. Tipper, *Z. M. Jin, Institute of Medical and Biological Engineering, University of Leeds, Leeds, United Kingdom*; C. Q. Yuan, *Reliability Engineering Institute, School of Energy and Power Engineering, Wuhan University of Technology, Wuhan, P. R. China, Key Laboratory of Marine Power Engineering & Technology (Ministry of Communications), Wuhan University of Technology, Wuhan, P. R. China*

**P-143 Simulation of Surface Topography During „Zero-Wear“ Process:**

Rafal Reizer\*, *Institute of Technology, Faculty of Mathematics and Nature, University of Rzeszow, Rzeszow, Poland*; Lidia Galda, *Andrzej Dzierwa, Pawel Pawlus, Department of Manufacturing Processes and Production Organisation, Faculty of Mechanical Engineering and Aeronautics, Rzeszow University of Technology, Rzeszow, Poland*

**P-144 A Study on the Sizes of Wear Track Grooves on Metallic Materials:**

Naofumi Hiraoka\*, *Eiro Yamane, Department of Manufacturing Technologists, Institute of Technologists, Japan*

**P-145 Tribologic Study of the Steel Ferromagnetic / Steel Ferromagnetic Couple Under Magnetic Field in Different Gas Environments:**

Mohamed Amirat, *hamid Zaidi\*, Jean Frene, Laboratoire LMS, UMR 6610, Université de Poitiers, Chasseneuil, France*

**P-146 Wear Properties of Linear Ultrasonic Motor for High-Precision and High-Speed Positioning Stage:**

Hiroshi Tachikawa\*, *Mizuma Murakami, Koshi Adachi, Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan*; Kazumasa Asumi, *Taiheiy Cement Corporation*; Yuki Takahagi, *Nihon Ceratec Co., Ltd.*

**P-147 Numerical Prediction of Erosion by Gas-Solid Two-Phase Flows:**

Yoshiyuki Iso, *Yoshiyuki Yamane, Yoshitaka Iwasa, Takahisa Nagao\*, Fluid Dynamics Group, Heat&Fluid Dynamics Department, Research Laboratory, IHI Corporation, Yokohama, Japan*; Yasuo Matsunaga, *Materials Evaluation Group, Materials Department, Research Laboratory, IHI Corporation*

**P-148 The Assay of Latex Allergens as a Function of Wear Particle Size of Natural Rubber During Rolling-Sliding Contact:**

Yuki Yamamura\*, *Tomoaki Iwai, Yutaka Shokaku, School of Natural Science and Technology, Kanazawa University, Ishikawa, Japan*

**P-149 Relationship between Abrasion Patterns and Stick-Slip During Sliding between Hard and Soft Surfaces:**

Sho Takamasu\*, *Yokohama National University, Yokohama, Japan*; Arata Tomita, *Yusuke Kuramoto, Bridgestone Corporation, Kodaira, Tokyo, Japan*; Ken Nakano, *Yokohama National University, Yokohama, Japan*

**P-150 Study of Pitting Behaviour of Lubricants:**

Ksenija Topolovec Miklozic\*, *Powertrib Ltd., Laboratory for Tribology and Nano Sciences, The Oxford Science Park, Magdalen Centre, Oxford, United Kingdom*

**P-151 Wear Modelling of Non-Linear Reciprocating Elastomeric Sealing System:**

Kevin J. Monaghan, *Nicholas Epiphaniou\*, BHR group, The fluid engineering centre, Cranfield, Bedfordshire, United Kingdom*

**P-152 Effect of Impact Angle on Erosive Wear Performance of Pump Casing Material in Solid Liquid Mixture:**

Sanjay Jain\*, *Asst. Professor, IES IPS Academy, India*; Sudhir Tiwari, *Sr. Lecturer, SGSITS Indore*

**P-153 Mechanical Properties of Zinc and Iron Polyphosphate Glasses:**

Maura Crobu\*, *Martin Süess, Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland*; Antonella Rossi, *Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland, Dipartimento di Chimica Inorganica ed Analitica, Università degli Studi di Cagliari, Monserrato, Italy*; Nicholas D. Spencer, *Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zürich, Switzerland*

**Micro-, Nano- and Molecular Tribology/ Molecular Tribology**
**P-154 Preparation and Nanotribological Behavior of Hybrid CuS Nanoparticles Molecular Deposition Films:**

Yanbao Guo\*, *Deguo Wang, Siwei Zhang, Faculty of Mechanical and Electronic Engineering, China University of Petroleum, Beijing, China*

**P-155 Evaluation of Dynamic Behaviors of N-Decane from Photo-Induced Tunneling Current:**

Akira Ohtake\*, *Shigeo Kotake, Kengo Suzuki, Tadashi Fujimaki, Yasuyuki Suzuki, Department of Mechanical Engineering, Mie University, Tsu, Mie, Japan*

**P-156 Tribological Behavior of Ultrafine-Grained Ti-Based Alloys:**

Sergey V Chertovskih\*, *Leva Sh Shuster, Faculty of a Basis of designing of mechanisms and machines, Ufa State Aviation Technical University, Ufa, Bashkortostan, Russia*; Vladimir V Stolyarov, *Mechanical Engineering Research Institute of Russian Academy of Science, Moscow, Russia*

**P-157 Simulation of Nanoscale Adhesion and Peeling Processes of Carbon Nanostructures:**

Naruo Sasaki, *Hideaki Okamoto\*, Arihiro Toyoda, Department of Materials and Life Sciences, Faculty of Science and Engineering, Seikei*

University, Musashino-shi, Tokyo, Japan; Makoto Ishikawa, Nariko Hosomi, *JST Tokai Plaza, Nagoya, Japan*; Kouji Miura, *Department of Physics, Aichi University of Education, Kariya, Aichi, Japan*; Noriaki Itamura, *Department of Materials and Life Sciences, Faculty of Science and Engineering, Seikei University, Musashino-shi, Tokyo, Japan*

**P-158 Electric Field Assisted Dip Coating Process of Ultra-thin PFPE Lubricant Film for Magnetic Disks:**

Hiroshi Tani\*, *Mechanical Engineering Department, Kansai University, Suita-shi, Osaka, Japan, High Technology Research Center, Kansai University, Suita-shi, Osaka, JAPAN*; Masami Kubota, Masayuki Kanda, Motohiro Terao, *Kubota Comps Co., Amagasaki-shi, Hyogo, JAPAN*; Norio Tagawa, *Mechanical Engineering Department, Kansai University, Suita-shi, Osaka, Japan, High Technology Research Center, Kansai University, Suita-shi, Osaka, JAPAN*

**P-159 Effect of Lubricant Properties on Triboelectrification and Triboluminescence of Polymers:**

Kazumasa Hosotani\*, Ken'ichi Hiratsuka, *Department of Mechanical Science and Engineering, Chiba Institute of Technology, Chiba, Japan*; Yukinori Ichikawa, *Japan lubricating oil society Technical center, Chiba, Japan*

**P-160 Tribological Study of Liquid Crystal Nano Film Under Electric Field Using Resonance Shear Measurement:**

Shinya Nakano\*, Masashi Mizukami, Kazue Kurihara, *Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai, Japan, Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency (JST)*

**Micro-, Nano- and Molecular Tribology/ Superlubricity**

**P-161 On the Stability of the State of Superlubricity:**

Motohisa Hirano\*, Takahiro Nitta, Hiroataka Kato, *Department of Mathematical and Design Engineering, Faculty of Engineering, Gifu University, Gifu, Japan*

**P-162 Rotational Motion of C60 in C60 Intercalated Graphite Films:**

Takahiro Nakahara, Daisuke Inoue\*, Takahito Ichinose, *Department of Applied Physics and Chemistry, University of Electro-Communications, Tokyo, Japan*; Nariko Hosomi, *Department of Physics, Aichi University of Education, Nagoya, Japan*; Masaru Suzuki, Daisuke Kuwahara, *Department of Applied Physics and Chemistry, University of Electro-Communications, Tokyo, Japan*; Makoto Ishikawa, Junji Amano, *Innovation Plaza Tokai, Japan Science and Technology Agency, Nagoya, Japan*; Kouji Miura, *Department of Physics, Aichi University of Education, Nagoya, Japan*

**P-163 Superlubricity of C60 and C70 Bearings:**

Naruo Sasaki, *Department of Materials and Life Sciences, Faculty of Science and Engineering, Seikei University, Tokyo, Japan*; Makoto Ishikawa, *JST Tokai Plaza, Nagoya, Japan*; Nariko Hosomi, Kouji Miura, *Department of Physics, Aichi University of Education, Kariya, Aichi, Japan*; Noriaki Itamura\*, *Department of Materials and Life Sciences, Faculty of Science and Engineering, Seikei University, Tokyo, Japan*

**P-164 Superlubric Properties and Structure of C<sub>60</sub> Intercalated Graphite:**

Makoto Ishikawa, *Innovation Plaza Tokai, Japan Science and Technology Agency, Nagoya, Japan*; Junji Amano, Nariko Hosomi\*, *Department of Physics, Aichi University of Education, Kariya, Japan*; Naruo Sasaki, *Department of Materials and Life Science, Faculty of Science and Technology, Seikei University, Musashino-shi, Tokyo, Japan*; Kouji Miura, *Innovation Plaza Tokai, Japan Science and Technology Agency, Nagoya, Japan, Department of Physics, Aichi University of Education, Kariya, Japan*

**Micro-, Nano- and Molecular Tribology/ Molecular Simulations**

**P-165 Numerical Study of Thin Lubricant Layer Based on Langevin Method:** Masakazu Odagiri\*, Hiroshi Matsukawa, Norihiro Uehara, *Department of Physics and Mathematics, Aoyama Gakuin University, Sagamihara, Kanagawa, Japan*

**P-166 Interfacial Friction and Related Tribological Phenomena at Nanoscale:**

Takaaki Kawaguchi\*, *Department of Mathematics and Physics, University of Yamanashi, Kofu, Japan*; Hiroshi Matsukawa, *Department of Physics and Mathematics, Aoyama Gakuin University, Sagamihara, Japan*

**P-167 Atomic-Scale Anisotropy of Nanoscratch Behavior of Pure Aluminum:**

Yuan Gao\*, Cheng Lu, Anh Kiet Tieu, *School of Mechanical, Materials and Mechatronic Engineering, University of Wollongong, Australia*

**P-168 Effect of Misfit Angle on Superlubricity of Molybdenum Disulfide: A Computational Chemistry Study:**

Yusuke Morita\*, Tasuku Onodera, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Japan*; Takanori Kuriaki, *Department of Chemical Engineering, Graduate School of Engineering, Tohoku University*; Ai Suzuki, *New Industry Creation Hatchery Center, Tohoku University*; Riadh Sahnoun, *Department of Chemical Engineering, Graduate School of Engineering, Tohoku University*; Michihisa Koyama, *INAMORI Frontier Research Center, Kyushu University, Fukuoka, Japan*; Hideyuki Tsuboi, Nozomu Hatakeyama, Akira Endou, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University*; Hiromitsu Takaba, *Department of Chemical Engineering, Graduate School of Engineering, Tohoku University*; Carlos A. Del Carpio, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University*; Momoji Kubo, *Fracture and Reliability Research Institute, Graduate School of Engineering, Tohoku University*; Akira Miyamoto, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, New Industry Creation Hatchery Center, Tohoku University*

**P-169 Ab-Initio Investigations of the Atomic Structures of Si-DLC Films:**

Tomohisa Kumagai\*, Shu Sawai, Junho Choi, Takahisa Kato, *Department of Mechanical Engineering, Faculty of Engineering, The University of Tokyo, Tokyo, Japan*

**Micro-, Nano- and Molecular Tribology/ Microtribology**

**P-170 Optimization of Hairy Structure for Biomimetic Adhesive System:**

Tae wan Kim\*, *School of Mechanical Engineerig, Pukyong National University, Busan, Korea*

**P-171 Dual-Axis Micro-Mechanical Probe for Highly Sensitive Friction Force Microscope:**

Hiroaki Amakawa\*, *Department of Micro/Nano Systems Engineering, Nagoya University, Aichi, Japan, Research Fellow of the Japan Society for the Promotion of Science*; Kenji Fukuzawa, Mitsuhiro Shikida, Hedong Zhang, Shintaro Itoh, *Department of Micro/Nano Systems Engineering, Nagoya University, Aichi, Japan*

**P-172 Synthesis of Onion-Like Carbon Film and its Tribological Properties:**

Naohiro Matsumoto\*, Jung-Eun Lee, Nobuo Ohmae, *Department of Mechanical Engineering, Graduate School of Engineering, Kobe University, Kobe, Japan*

**P-173 Degradation Mechanisms at Nanoscale of Alumina Nanocomposites with or Without CNT:**

J. D Béguin\*, A.G Ural, *LGP école nationale d'ingénieurs de Tarbes, BP 1629, 65016, Tarbes cedex, France*; J. Gurt Santanach, *CIRIMAT, UMR CNRS-UPS-INP 5085, Bât.2R1, Université Paul-Sabtier, 31062 Toulouse cedex 9, France*; R. Merhej, J. Y Paris, *LGP école nationale d'ingénieurs de Tarbes, BP 1629, 65016, Tarbes cedex, France*; C. Estournès, G. Chevallier, *CIRIMAT, UMR CNRS-UPS-INP 5085, Bât.2R1, Université*

Paul-Sabtier, 31062 Toulouse cedex 9, France, PNF CNRS, MHT, Université Paul-Sabtier, 32062 Toulouse cedex 9, France; A. Weibel, A. Peigney, CIRIMAT, UMR CNRS-UPS-INP 5085, Bât.2R1, Université Paul-Sabtier, 31062 Toulouse cedex 9, France; Y. Paranthoën, SCT, Bazet, France; Ch. Laurent, CIRIMAT, UMR CNRS-UPS-INP 5085, Bât.2R1, Université Paul-Sabtier, 31062 Toulouse cedex 9, France; J. Denape, LGP école nationale d'ingénieurs de Tarbes, BP 1629, 65016, Tarbes cedex, France

**P-174 The Effect of Adhesion and Hardness on Friction Behavior for Elliptical Rough Surfaces:** Jeng-Haur Horng, Department of Power Mechanical Engineering, Formosa University, Yunlin, Taiwan; Chin-Chung Wei, Chin-Yuh Chern\*, Wen-Hsin Chang, Center of MEMS Design and Application, Formosa University, Yunlin, Taiwan

**P-175 The Morphology and Form Mechanism of SiC in Three-Dimensional Needled C/C-SiC Braking Composites:** Zhuan Li\*, Peng Xiao, Xiang Xiong, State Key Laboratory of Powder Metallurgy, Central South University, Changsha, China

**P-176 Sliding Friction of Kr Films Adsorbed on Single Crystalline Graphite Substrate:** Hajime Kobayashi\*, Junko Taniguchi, Masaru Suzuki, Department of Applied Physics and Chemistry, University of Electro-Communications, Tokyo, Japan; Kouji Miura, Department of Physics, Aichi University of Education, Kariya, Nagoya, Japan; Ichiro Arakawa, Department of Physics, Gakushuin University, Tokyo, Japan

**P-177 Tribological Nanoprocessing of Nanoperiod Multilayer Films by Force Modulation of Atomic Force Microscopy.:** Shintaro Kawasaki\*, Wataru Kurosaka, Shojiro Miyake, Department of Systems Engineering, Nippon Institute of Technology, Saitama, Japan

**P-178 Nanoscratch Properties of Extremely Thin Diamond-Like Carbon Films by Atomic Force Microscopy.:** Toshiro Kanazawa\*, Kouichi Oshimoto, Department of Systems Engineering, Faculty of Engineering, Nippon Institute of Technology, Saitama, Japan; Jundoku Kim, ULVAC-PHI, Inc; Shojiro Miyake, Department of Systems Engineering, Faculty of Engineering, Nippon Institute of Technology, Saitama, Japan

**P-179 Density of Lubricants Near DLC Film Surface Having Different Wettability Measured by Neutron Reflectometry:** Takashi Torii\*, Graduate School of Mechanical Engineering, Doshisha University, Japan; Takashi Kashihara, Tomoko Hirayama, Takashi Matsuoka, Dept. of Mechanical Engineering, Doshisha University, JAPAN; Kazuko Inoue, Research Institute for Science and Engineering, Waseda University, JAPAN; Dai Yamazaki, Japan Atomic Energy Agency, JAPAN; Masahiro Hino, Kyoto University Research Reactor Institute, JAPAN

**P-180 Competition between the Slippage and the Superfluidity of <sup>4</sup>He Films:** Kenichi Ideura\*, Hajime Kobayashi, Nariko Hosomi, Junko Taniguchi, Masaru Suzuki, Department of Applied Physics and Chemistry, University of Electro-Communications, Chofu, Tokyo, Japan; Tomoki Minoguchi, Institute of Physics, University of Tokyo, Tokyo, Japan

**P-181 Nano and Micro Tribological Characteristic of Self-Assembled Monolayer Having Different Morphology:** Ko Kurosawa\*, Masabumi Masuko, Akihito Suzuki, Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Tokyo, Japan

**P-182 Wear Property of Carbon Nanotube Film Made by Surface Decomposition of SiC:** Yosuke Tsukiyama\*, Noritsugu Umehara, Department of Mechanical Science and Engineering, Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan; Michiko Kusunoki, Division

of Environmental Research, Ecotopia Science Institute, Nagoya University

**P-183 Tribological Investigation for a Probe Nano Lithography Using Conductive Atomic Force Microscopy:** Yasushi Tomizawa\*, Yongfang Li, BEANS Project, Japan; Toshikatsu Akiba, BEANS Project, Japan, Toshiba Corporation; Gen Hashiguchi, BEANS Project, Japan, Shizuoka University; Koji Miyake, Yasuhisa Ando, BEANS Project, Japan, National Institute of Advanced Industrial Science and Technology; Masakazu Sugiyama, Hiroyuki Fujita, BEANS Project, Japan, The University of Tokyo

**P-184 Wear and Friction Characteristics of a Pencil Type Microprobe for SPM Lithography :** Yongfang Li\*, Yasushi Tomizawa, BEANS Project, Japan; Toshikatsu Akiba, BEANS Project, Japan, Toshiba Corporation; Gen Hashiguchi, BEANS Project, Japan, Shizuoka University; Koji Miyake, Yasuhisa Ando, BEANS Project, Japan, National Institute of Advanced Industrial Science and Technology; Masakazu Sugiyama, Hiroyuki Fujita, BEANS Project, Japan, The University of Tokyo

**P-185 Nanoscale to Macroscale Investigation of the Frictional Properties of Physisorbed Layers of Self-Organized Phthalocyanine Derivatives:** Koji Miyake\*, Miki Nakano, Atsushi Korenaga, Advanced Manufacturing Research Institute (AMRI), National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan; Yukari Hori, Oita Industrial Research Institute, Oita, Japan; Taichi Ikeda, Organic Nanomaterials Center, National Institute for Materials Science, Ibaraki, Japan; Masumi Asakawa, Toshimi Shimizu, Nanotube Research Center, AIST, Ibaraki, Japan

**P-186 Effect of Atomic Geometry of Single- and Polycrystalline Metals and Silicon on Friction:** Yu Tamura\*, Department of Mechanical Science and Engineering, Chiba Institute of Technology, Chiba, Japan; Yasuhisa Ando, National Institute of Advanced Industrial Science and Technology, Ibaraki, Japan; Ken'ichi Hiratsuka, Department of Mechanical Science and Engineering, Chiba Institute of Technology, Chiba, Japan

## Wednesday 9th, September

### B1-21 Mini-symposium/ Ultra-mild wear and tribo-chemical interactions

8:40-10:40, Room B-1

Session Chair: Martin Dienwiebel, University of Karlsruhe, Germany  
Kenichi Hiratsuka, Chiba Institute of Technology, Japan

**B1-211 ZDDP Antiwear Mechanisms Revisited (Invited):** Jean Michel Martin\*, Fabrice Dassenoy, Clotilde Minfray, Ecole Centrale de Lyon, LTDS, Ecully, France

**B1-212 Development of Alternate Antiwear Additives to Protect the Automotive Catalyst System and to Improve Fuel Economy (Invited):** Tze-Chi Jao\*, Jeffrey M.

Guevremont, Mark T. Devlin, Naresh Mathur, Greg H. Guinther, Afton Chemical Corporation, Richmond, USA

**B1-213 New Horizons in Tribology: The Computational Chemistry Paradigm (Invited):** Akira Miyamoto\*, New Industry Creation Hatchery Center, Tohoku University, Sendai, Japan, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Seudai, Japan; Takanori Kuriaki, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, Seudai, Japan; Yusuke Morita, Tasuku Onodera, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Seudai, Japan; Ai Suzuki, New

*Industry Creation Hatchery Center, Tohoku University, Sendai, Japan; Riadh Sahnoun, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, Sendai, Japan; Michihisa Koyama, INAMORI Frontier Research Center, Kyushu University, Fukuoka, Japan; Hideyuki Tsuboi, Nozomu Hatakeyama, Akira Endou, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Sendai, Japan; Hiromitsu Takaba, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University; Carlos A. Del Carpio, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Sendai, Japan; Momoji Kubo, Fracture and Reliability Research Institute, Graduate School of Engineering, Tohoku University, Sendai, Japan*

**B1-214 Ultra-Mild Wear in Al-Si Alloys (Invited):** M. Chen, X. Meng-Burany, S. Dey, *Mechanical, Automotive and Materials Engineering Department, University of Windsor, Windsor, Canada; T. Perry, General Motors Research and Development Center, Michigan, MI, USA; Ahmet T. Alpas\*, Mechanical, Automotive and Materials Engineering Department, University of Windsor, Windsor, Canada*

**B1-215 Ultra-low Friction and Wear of Designer Nanocomposite Coatings Enabled by the Use of a Crystal-Chemical Model (Invited):** Ali Erdemir\*, Osman L. Eryilmaz, *Argonne National Laboratory, Energy Systems Division, Argonne-IL, USA; Mustafa Urgen, Kursat Kazmanli, Istanbul Technical University, Materials Engineering Department, Istanbul, Turkey*

**B1-216 In-Situ Observation and on-Line Monitoring of Wear Processes (Invited):** Ken'ichi Hiratsuka\*, *Chiba Institute of Technology, Dept. Mechanical Science and Engineering, Japan; Martin Dienwiebel, Matthias Scherge, Fraunhofer Institute for Mechanics of Materials, Germany, Institute for Reliability of Systems and Components, University of Karlsruhe (TH), Germany*

### B1-23 Mini-symposium/ History of Tribology

15:00-17:30, Room B-1

Session Chair: Koji Kato, *Nihon University, Japan*  
Takashi Yamamoto, *Tokyo University of Agriculture and Technology, Japan*

**B1-231 History of Tribology in Ancient North East Asia -The Japanese Sledge and the Chinese Chariot- (Invited):** Yorikazu Shimotsuma\*, *Emeritus Professor of Kansai University, Osaka, Japan; Masanori Ogata, Department of Mechanical Engineering, Faculty of Engineering Science, Kansai University; Takeshi Nakatsuji, Department of Mechanical Engineering, Kobe City College of Technology; Yasumi Ozawa, Department of Mechanical Engineering, Faculty of Engineering, Fukui University of Technology*

**B1-232 Observations on Japanese Tribological History and Representative Heritages from Ancient to Modern Times (Invited):** Uzuhiko Tsuboi\*, *JTEKT Corporation, Nagoya, Japan*

**B1-233 History of Rolling Bearings (Invited):** Bo Jacobson\*, *Machine Elements Division, Lund University, Lund, Sweden*

**B1-234 History of Boundary Lubrication (Invited):** Stephen M. Hsu\*, *Department of Mechanical and Aerospace Engineering, George Washington University, Washington DC, USA*

**B1-235 History of Biotribology of Natural Synovial Joints and Artificial Replacements (Invited):** Zhongmin Jin\*, *Duncan Dowson, School of Mechanical Engineering, University of Leeds, Leeds, UK*

### B2-21 Lubrication, Lubricants and Additives/ Lubricating Oil I

8:40-10:20, Room B-2

Session Chair: Peter M Lee, *University of Leeds, UK*

Keiichi Narita, *Idemitsu Kosan Co.,Ltd, Japan*  
**B2-211 Metal-metal Friction Characteristics from CVT Fluids Containing Phosphorus Additives under Extremely High Contacting Pressure Conditions:** Toshiaki Iwai\*, *Mitsugu Kudo, Hiroshi Fujita, Keiichi Narita, Lubricants Research Laboratory, Idemitsu Kosan Co.,Ltd., Ichihara-shi, Chiba, Japan*

**B2-212 Modelling and Application of Industrial Energy Efficient Lubricants:** David A. Green\*, *Shell Global Solutions (UK), Shell Technology Centre Thornton, UK*

**B2-213 Development of Phosphorus-Free Engine Oil Anti-Wear Performance of Sulfur Compound as Substitute ZnDTPs :** Koki Ito\*, *Hideki Kamano, Lubricants Research Laboratory, Idemitsu Kosan Co., Ichihara-shi, Chiba, Japan*

**B2-214 Comparative Studies of Bitumen Oils:** Luis Bastardo- Zambrano\*, *Technical Market Support, Nynas AB, Nynashamn, Sweden*

**B2-215 Tribological Properties of High-Oleaic Biodegradable Soybean Based Lubricant:** Michael N. Kotzalas\*, *The Timken Company, Canton, OH, USA*

### B2-22 Lubrication, Lubricants and Additives/ Lubricating Oil II

10:50-12:30, Room B-2

Session Chair: David A. Green, *Shell Global Solutions, UK*  
Satoshi Ogano, *Exxonmobil Yugen Kaisha, Japan*

**B2-221 Keynote: Development of DPF Applicable Fuel Economy Diesel Engine Oil:** Toyoharu Kaneko\*, *Minoru Yamashita, Department of Fuel Lubricant & Tribology Material, Power Train Material Engineering, Toyota Motor Corporation, Toyota, Aichi, Japan; Masae Ohori, Department of Quality Audit Dept, Engine Engineering Management, Toyota Motor Corporation, Toyota, Aichi, Japan; Motoichi Murakami, Department of Advanced Engine Development, Advanced Power Train Engineering, Toyota Motor Corporation, Susono, Shizuoka, Japan*

**B2-222 Comparison of the Tribofilms Formed on Piston Ring and Cylinder Samples in a Fired Engine and a Reciprocating Tribometer:** Peter M Lee\*, *Ardian Morina, Martin Priest, Anne Neville, Institute of Engineering Thermofluids, Surfaces and Interfaces, School of Mechanical Engineering, University of Leeds, Leeds, UK*

**B2-223 Influence of Base Oil and Antioxidants on the Residual Oil Performance of High-Temperature Chain Lubricating Oil:** Yukitoshi Fujinami\*, *Hideto Kamimura, Tahei Okada, Takuya Ohno, Lubricants Research Laboratory, Idemitsu Kosan Co., Ltd., Ichihara, Chiba, Japan*

**B2-224 Impact of Lubricating Base Stocks on Transmittable Torque Capacity with Application to Metal V-Belt Pushing type CVT Fluids:** Keiichi Narita\*, *Lubricants Research Laboratory, Idemitsu Kosan Co., Ichihara-shi, Chiba, Japan; Martin Priest, iETSI, School of Mechanical Engineering, University of Leeds, Leeds, UK*

### B2-23 Lubrication, Lubricants and Additives/ Lubricating Oil III

15:00-16:40, Room B-2

Session Chair: Shin-ichi Shirahama, *Nippon Oil Corporation, Japan*

Elaine Yamaguchi, *Chevron, USA*

**B2-231 Keynote: Tribology and Energy Efficiency:** Robert I. Taylor\*, *Shell Global Solutions (UK), Shell Technology Centre Thornton, Chester, UK; E. Nagatomi, S. Doki, Showa Shell Sekiyu K.K., Central R&D Laboratory (ARL), Kanagawa, Japan; R. T. Dixon, Shell Global Solutions (UK), Shell Technology Centre Thornton, Chester, UK*

**B2-232 Development of New Hydraulic Fluid Specification for Improved Energy Efficiency:** Steven

Herzog\*, *Evonik RohMax, RohMax Oil Additives, Horsham, PA, USA*; Paul Michael, *Milwaukee School of Engineering, Fluid Power Institute, Milwaukee, USA*

**B2-233 Potential for Polyalkylene Glycols in**

**Automotive Engine Oil Applications:** Stephen Merryweather, *Dow Europe GmbH, Horgen, Switzerland*; Johan Thoen, *Dow Benelux B.V., Terneuzen, The Netherlands*; Daniel Zweifel, *Dow Europe GmbH, Horgen, Switzerland*; Mathias Woydt\*, *BAM Federal Institute for Materials Research and Testing, Berlin, Germany*

**B2-234 Influence of Lubricants in Plain Bearing Performance Part I: Evaluation of Bronze and Babbitted Bearing Performance with Base Oil:** Moritsugu Kasai\*, *Lubricants Research Laboratory, Idemitsu Kosan Co., Ltd., Chiba, Japan*; Michel Fillon, Jean Bouyer, *Laboratory of Solid Mechanics, UMR CNRS 6610, University of Poitiers, France*

**C1-21 Lubrication, Lubricants and Additives/ Hydrodynamic Lubrication V**

8:40-10:20, Room C-1

Session Chair: Raj Kumar Pandey, *IIT (Indian Institute of Technology Delhi), India*  
Kristian Tonder, *Norwegian University of Science and Technology, Norway*

**C1-211 Friction Evaluation of Lubricated Laser**

**Textured Surfaces:** Adrian Predescu\*, Mircea D. Pascovici, Traian Cicone, Cristian S. Popescu, *Department of Machine elements and Tribology, University Politehnica of Bucharest, Bucharest, Romania*; Constantin Grigoriu, Dumitru Dragulinescu, *National Institute for Laser, Plasma and Radiation Physics, Magurele-Bucharest*

**C1-212 Design of Non-Circular Gas Bearings for a**

**Ultra-High Speed Spindle:** Vladimir Viktorov\*, Guido Belforte, Terenziano Raparelli, Federico Colombo, *Department of Mechanics, Politecnico di Torino, Torino, Italy*

**C1-213 The Universal Dependences for a Data Determination of a Hydrodynamics Lubrication of Unstrained Rolling Friction Pairs:**

Igor Elmanov\*, Yuri Bulavin, *Department of Process Metallurgy, Electromechanical Faculty, The Rostov State Transport University, Rostov-on-Don, Russia*

**C1-214 Analytical Model of Thermohydrodynamic**

**Estimation of Slider Bearing:** Mihail G Ionescu\*, *Department of Mechanical Engineering, Faculty of Engineering, "Stefan cel Mare" University, Suceava, Romania*

**C1-22 Lubrication, Lubricants and Additives/ Elastohydrodynamic Lubrication I**

10:50-12:30, Room C-1

Session Chair: Enrico Ciulli, *University of Pisa, Italy*  
Patrick P L Wong, *City University of Hong Kong, China*

**C1-221 Keynote: Laser Textured EHL Contact in Steady-state Regime and Transient Conditions:**

Denis Mazuyer\*, François-Pierre Ninove, *Ecole Centrale de Lyon, Laboratoire de Tribologie et Dynamique des Systèmes, UMR CNRS 5513, Ecully Cedex, France*; Louis Mourier,

**C1-222 Thermal Aspects of Debris in EHL Contacts:** Tom Reddyhoff\*, Richard J Underwood, George K Nikas, Richard S Sayles, Hugh A Spikes, *Tribology Group, Department of Mechanical Engineering, Imperial College, London, UK*

**C1-223 The Response of Ehd Films to Lateral Oscillations:** Konstantinos Kalogiannis, Romeo Glovnea\*, *School of Engineering and Design, Brunel University, United Kingdom*; Stathis Ioannides, *SKF Group Technology Development, The Netherlands*

**C1-224 EHL of Rough Surfaces, Mixed Lubrication and Surface Fatigue:** H P Evans, Ray W Snidle\*, Kayri J Sharif, *School of Engineering, Cardiff University, Cardiff, UK*

**C1-23 Lubrication, Lubricants and Additives/ Elastohydrodynamic Lubrication II**

15:00-16:40, Room C-1

Session Chair: Naoshi Izumi, *Kyushu University, Japan*  
Ray W Snidle, *Cardiff University, UK*

**C1-231 Numerical Analysis of the Oil-Supply Condition in Isothermal Elastohydrodynamic Lubrication of Finite Line Contacts:**

Xiaoling Liu\*, Peiran Yang, *School of Mechanical Engineering, Qingdao Technological University, Qingdao, China*

**C1-232 On-Newtonian Transient**

**Thermoelastohydrodynamic Lubrication Analysis of an Involute Spur Gear:** You-qiang Wang\*, Xue-juan Yi, *School of Mechanical Engineering, Qingdao Technological University, Shandong Province, P.R.China*

**C1-233 Behavior of Surface Dent in Lubricated**

**Point-Contacts:** Wenzhong Wang\*, Zhangbo Wang, *School of Mechanical and Vehicular Engineering, Beijing Institute of Technology, Beijing, P.R. China*; Yuanzhong Hu, *State Key Laboratory of Tribology, Tsinghua University, Beijing, China*; Yuchuan Liu, *GM Powertrain, Pontiac, MI, USA*

**C1-234 The Elastohydrodynamic Lubrication Analysis of Emulsion-Lubricated Composite Plastic Bearings:**

Benhai Liu\*, Youqiang Wang, *School of Mechanical Engineering, Qingdao Technological University, China*  
**C1-235 Examination of Design Factors by Using Theoretical Model for Microgrooved Bearings Under Mixed Lubrication :** Katsuhiko Ashihara\*, Shigeharu Shibata, *Fundamental Research Department, Taiho Kogyo Co., Ltd., Toyota-City, Aichi, Japan*; Hiromu Hashimoto, *Department of Mechanical Engineering, Tokai University*

**C2-21 Lubrication, Lubricants and Additives/ Additives III**

8:40-10:20, Room C-2

Session Chair: Michael A Mueller, *Evonik Rohmax Additives GmbH, Germany*  
Jack Zakarian, *Chevron Products Company, USA*

**C2-212 The Influence of Base Fluids on Film Formation Behaviour of Zinc Di-alkyl Dithiophosphate (ZDDP)**

**Antiwear Additive Types in Automotive Lubricants:** Jian Wen Choo\*, *PETRONAS Research Sdn. Bhd., Research & Technology Division, Selangor, Malaysia*

**C2-431 Influence of Operating Conditions on Lubricating Properties of Vegetable Oils with Different Fatty Acid Types in Four-Ball Tests:**

Teruo Murakami\*, Hiroshi Sakamoto, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Masaaki Takayanagi, Hiroyuki Itagaki, *The Nisshin Oil Group, Ltd.*

**C2-214 What About Effect of Additives in Rolling Contact Fatigue ?:**

Mathilde Meheux, *CETIM, Pôle Fatigue des Composants Mécaniques, SENLIS Cedex, France*; Fabrice Ville, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, Villeurbanne Cedex, France*; Clotilde Minfray\*, Thierry Le Mogne, *Université de Lyon, Ecole Centrale de Lyon, LTDS, UMR5513, Ecully Cedex, France*; Ton Lubrecht, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, Villeurbanne Cedex, France*; Jean-Michel Martin, *Université de Lyon, Ecole Centrale de Lyon, LTDS, UMR5513, Ecully Cedex, France*; Henri-Paul Lieurade, *CETIM, Pôle Fatigue des Composants Mécaniques, SENLIS Cedex, France*

**C2-215 Characterization of Additive's Layer Thickness in Engine Crankcase Oil Between Sliding Pairs:** Hakan Kaleli\*, *Yildiz Teknik Universitesi, Makine Muhendisligi Fakultesi, Makine Muhendisligi Bolumu, Otomotiv Anabilim Dalı, Istanbul, Turkey*; Yves Berthier, *Laboratoire de Mecanique des*

*Contacts et des Structures, Institut National des Sciences Appliquées de Lyon (INSA), Villeurbanne Cedex-FRANCE*

**C2-22 Lubrication, Lubricants and Additives/ Additives IV**

10:50-12:30, Room C-2

Session Chair: Ben Elvidge, Infineum UK, UK

Yuansheng Jin, Tsinghua University, China

**C2-221 Boundary Film Composition and Formation from Synergistic Combinations of Surface Active Compounds:** Douglas T. Jayne\*, Matt D. Gieselman, Farrukh Qureshi, *The Lubrizol Corporation, Wickliffe, Ohio, USA*

**C2-222 Specifically Designed Polyalkylmethacrylate Additives for Fuel Efficient Driveline Lubricants with Improved Fatigue Life:** Michael Müller\*, Thorsten Bartels, Christoph Wincierz, Torsten Stöhr, Boris Eisenberg, *Evonik RohMax Additives GmbH, Darmstadt, Germany*

**C2-223 Lubrication Properties of Alkyl Imidazolium Tetrafluoroborate and Hexafluorophosphate Ionic Liquids Under Mixed Sliding-Rolling Conditions:** Hari Arora, Philippa Cann\*, *Department of Mechanical Engineering, Imperial College, London, UK*

**C2-224 Studies of Extreme Pressure Boundary Tribofilms Formed by Alkali Metal Borate Additives in Gear Lubricants:** Jack Zakarian\*, Michael Haire, Yanan Liang, Prasenjit (Yusuf) Kar, *Lubricants Technology Group, Chevron Products Company, Richmond, California, USA*

**C2-225 Oil Film Formability and Traction of Oils Containing Non-Functionalized Polyalkylmethacrylates:** Masayoshi Muraki\*, *Department of Mechanical Design Engineering, Faculty of Engineering, Shonan Institute of Technology, Fujisawa, Kanagawa, Japan*; Kenta Nakamura, *Department of Mechanical Engineering, Graduate School of Shonan Institute of Technology*

**C2-23 Lubrication, Lubricants and Additives/ Additives V**

15:00-16:40, Room C-2

Session Chair: Hakan Kaleli, Yildiz Technical University, Istanbul

Jack Zakarian, Chevron Products Company, USA

**C2-231 Molybdenum Additive Technology for Engine Oil Applications:** Jai G. Bansal, *Infineum, Linden Business and Technology Centre, Linden, NJ, USA*; Benjamin R. Elvidge\*, *Infineum UK, Abingdon, England*

**C2-232 Viscosity Index Improvers for Low Viscosity Lubricants:** Hironobu Tokunaga\*, Minoru Nishida, Masanori Koike, *Oil Additive Research Dept., Research & Application Division, Sanyo Chemical Industries, Ltd., Japan*; Hideo Nakanishi

**C2-233 Extreme Pressure Properties and Mechanism of Bismuth Naphthenate with Sulfur Containing Additives:** Jian-Qiang Hu\*, *Department of Aviation oil, Xu Zhou Air Force college, Xuzhou, China, State Key Laboratory of Tribology in Tsinghua University, Beijing, China*; Shi-Zhao Yang, Yi-Wei Fei, *Department of Aviation oil, Xu Zhou Air Force college, Xuzhou, China*

**D-21 Symposium/ Environmentally friendly tribology (Eco-tribology) I**

8:40-10:20, Room D

Session Chair: Stephen Hsu, George Washington University, USA

Shinya Sasaki, Tokyo University of Science, Japan

**D-211 Keynote Speech: Ecotribology: Environmentally Acceptable Tribological Practices:** Wilfried J. Bartz\*, *Technische Akademie Esslingen, Germany*

**D-212 EP Additive Performance in Biobased vs. Paraffinic Base Oils (Invited):** Girma Biresaw\*, *Cereal Products and Food Science Research Unit, National Center for Agricultural Utilization Research, Agricultural Research Service, United States Department of Agriculture, Peoria, IL, USA*; Svajus J. Asadauskas, *Institute of Chemistry, Vilnius, Lithuania*; Ted G. McClure, *TribSys LLC, Valparaiso, IN, USA*

**D-213 New Ecological Technology for Heavy-loaded Machine Elements (Invited):** Remigiusz Michalczewski\*, *Tribology Department, Institute for Sustainable Technologies - National Research Institute, Radom, Poland*

**D-214 Correlation between Lubricity and Oxidative Deterioration of Vegetable Oils:** Hiroki Mano\*, Yuko Hibi, Atsushi Korenaga, *Tribology Research Group, Advanced Manufacturing Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Ibaraki, Japan*; Shinya Sasaki, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science*

**D-215 Performance Evaluation of Vegetable Oils as Lubricant in a Four Stroke Engine.:** Jagadeesh K. Mannekote, Satish V. Kailas\*, *Department of Mechanical Engineering, Indian Institute of Science, Bangalore, INDIA*

**D-22 Symposium/ Environmentally friendly tribology (Eco-tribology) II**

10:50-12:30, Room D

Session Chair: Wilfried J Bartz, Technische Akademie Esslingen, Germany

Girma Biresaw, United States Department of Agriculture, USA

**D-221 Keynote Speech: Trends in Environmental Tribology:** Stephen M. Hsu\*, *Energy Institute, Department of Mechanical and Aerospace Engineering, George Washington University, Washington DC, USA*

**D-222 Improving the Environmental Protection and the Economy of I.C. Engines with New Type of Additive (Invited):** J. Fodor\*, *Retired, Budapest, Hungary*

**D-223 Eco-Tribology for Increasing the Efficient Use of Energy and Minimizing Environmental Impact (Invited):** Shinya Sasaki\*, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*

**D-224 The Development of High Performance Shaft Seal "Leaf Seal" in Industrial Turbines (Invited):** Hidekazu Uehara\*, Tanehiro Shinohara, *Mitsubishi Heavy Industries, Ltd. Takasago R&D, Japan*; Shin Nishimoto, Takashi Nakano, *Mitsubishi Heavy Industries, Ltd. Takasago Machinery Works*

**D-225 Mixed Lubrication Analysis of Vane Sliding Surface in Rotary Compressor Mechanisms - Influences of Flexible Structure at Surface End of Vane-Slot - (Invited):** Yasutaka Ito\*, Hitoshi Hattori, *Corporate Research & Development Center, Toshiba Corporation, Kawasaki, Japan*; Kazuhiko Miura, *Toshiba Carrier Corporation*

**D-23 Symposium/ Environmentally friendly tribology (Eco-tribology) III**

15:00-16:40, Room D

Session Chair: Remigiusz Michalczewski, National Research Institute, Poland

Shinya Sasaki, Tokyo University of Science, Japan

**D-231 An Appearance of Rust-Preventive Properties by Optimum Interfacial Tension in Oil on Water for Cutting Process:** Takuya Saka\*, Koichi Goto, *Cutting & Grinding Fluid Group, Metalworking Fluid Technology Dept., Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan*

**D-232 The Correlated Selection of PVD/CVD Coatings and Eco-Lubricants for Heavy-Loaded Machine**

**Components - A New Approach:** Marian Szczerek\*, Remigiusz Michalczewski, Witold Piekoszewski, *Tribology Department, Institute for Sustainable Technologies - National Research Institute, Radom, Poland*

**D-233 Effects of Oxygen-Including Compounds on Cutting Performance in MQL Machining of Aluminum:** Norio Sembongi\*, Junichi Shibata, *Lubricants Research Laboratory, Nippon Oil Corporation, Yokohama, Japan*; Satoshi Suda, *Lubricants and Specialties Sales Department, Nippon Oil Corporation*; Kenji Takahara, Wataru Obayashi, Toshiaki Wakabayashi, *Faculty of Engineering, Kagawa University, Takamatsu, Japan*

**D-234 PVD Component Coatings for Environmentally Friendly Tribosystems:** Kirsten Bobzin, Nazlim Bagcivan\*, *Surface Engineering Institute, RWTH Aachen University, Aachen, Germany*

**D-235 Development of a Human-Friendly, Renewable Resource-Based Metalworking Fluid Technology, and its Impact on Sustainable Manufacturing. (Invited):** Jake W. Pajak\*, *Global Technical Applications; Houghton International Inc., Canada*

#### F-21 Manufacturing and Mechanical Components/ Bearings - Foil Bearing I

8:40-10:20, Room F

Session Chair: Kazuhiro Hayashi, *Osaka Sangyo University, Japan*  
Yong-Bok Lee, *Korea Institute of Science and Technology, South Korea*

**F-211 Prediction of Dynamic Coefficients of Bump-Type Foil Bearing with Bump Considered as Link-Spring Structure:** Kai Feng\*, Shigehiko Kaneko, *Department of Mechanical Engineering, The University of Tokyo, Japan*

**F-212 Modeling of a Gas Foil Bearing for Microturbine Applications: Predictions Versus Experimental Stiffness and Damping Force Coefficients:** Tae Ho Kim, Luis San Andrés\*, *Mechanical Engineering Department, Texas A&M University, College Station, USA*; John Nourse, Jonathan L. Wade, Daniel R. Lubell, *Advanced Technologies and Turbomachinery, Capstone Turbine Corp., Chatsworth, CA, USA*

**F-213 Advances in the Hydrodynamic Simulation and Modeling of Gas Foil Bearings:** Robert J. Bruckner\*, *NASA, Glenn Research Center, Cleveland, Ohio USA*

**F-214 Identifying the Rotordynamic Coefficients of High-Speed, Oil-Free Foil Bearings:** Martin J. Conlon\*, Azzedine Dadouche, Waldemar M. Dmochowski, Randy Payette, Jean-Pierre Bédard, Brian Liko, *Gas Turbine Laboratory, Institute for Aerospace Research, National Research Council, Ottawa, Canada*

#### F-22 Manufacturing and Mechanical Components/ Bearings - Foil Bearing II

10:50-12:30, Room F

Session Chair: Robert J. Bruckner, *NASA, USA*  
Hiromu Hashimoto, *Tokai University, Japan*

**F-221 Performance Test of Double-Bump Air Foil Bearings:** Young-Cheol Kim\*, *Department of System Engineering, Senior Researcher, Korea Institute of Machinery and Materials, Deajeon, Korea*; Dong-Hyun Lee, *Department of Mechanical and Aerospace Engineering, Researcher, Korea Advanced Institute of Science and Technology*; Kyung-Woong Kim, *Department of Mechanical and Aerospace Engineering, Professor, Korea Advanced Institute of Science and Technology*

**F-222 Performances of Aerodynamic, Herring-Bone Grooved, Foil Bearing:** Keiji Hirasata\*, Kazuhiro Hayashi, *Department of Mechanical Engineering, Faculty of Engineering, Osaka Sangyo University, Daito-shi, Osaka, Japan*; Rui Sakaguchi, *Former student of graduate school of Mechanical Engineering, Osaka Sangyo University*

**F-223 Vibration Control and Low Power Consumption of the Combined Smart Bearings:** Yong-Bok Lee\*, Sang-Hwa Lee, Seung-Jong Kim, *Energy Mechanics Research Center, Korea Institute of Science and Technology, Seoul, South Korea*

#### F-23 Manufacturing and Mechanical Components/ Bearings - Rolling Bearing I

15:00-16:40, Room F

Session Chair: Michael N. Kotzalas, *The Timken Company, USA*  
Takashi Nogi, *Japan Aerospace Exploration Agency, Japan*

**F-231 Vertical Stiffnesses of Preloaded Linear Guideway Type Ball Bearings Incorporating the Flexibility of the Carriage and Rail:** Hiroyuki Ohta\*, Keisuke Tanaka, *Department of Mechanical Engineering, Nagaoka University of Technology, Nagaoka-shi, Niigata, Japan*

**F-232 Study of a Long-Life Thrust Needle Roller Bearing Lubricated with Low Viscous Lubricant:** Hiroki Fujiwara\*, Kenji Tamada, *NTN corporation, Kuwana-shi, Mie, Japan*

**F-233 Effect of Retained Austenite on Microstructural Change in Surface-initiated Flaking Process of Rolling Bearings:** Katsuhiko Kizawa\*, Tsuyoshi Mikami, *Research & Development Center, JTEKT CORPORATION, Kashiwara-city, Osaka, Japan*

**F-234 An Investigation into Variation of Friction Coefficient of Thrust Rolling Bearing After Ultrasonic Nanocrystal Surface Modification Treatment: Specific Effect of Load and Rate:** Chang Soon Lee\*, In Gyu Park, *Department of Hybrid Engineering, Sun Moon University, Tangjeon, Asan, South Korea*; Young Shik Pyoun, *Department of Mechanical Engineering, Sun Moon University, Tangjeon, Asan, South Korea*; In Shik Cho, *Department of Hybrid Engineering, Sun Moon University, Tangjeon, Asan, South Korea*; Jong Pil Cheon, Su Kon Han, *Department of Mechanical Engineering, Sun Moon University, Tangjeon, Asan, South Korea*; Ji Ho Nam, *Department of Hybrid Engineering, Sun Moon University, Tangjeon, Asan, South Korea*

**F-235 Nickel-Titanium: A New Candidate Material for Oil-Lubricated Bearing and Mechanical Component Applications:** Christopher DellaCorte\*, S. V. Pepper, R. Noebe, D. R. Hull, *National Aeronautics and Space Administration, Glenn Research Center, Cleveland, Ohio, USA*

#### G-21 Micro-, Nano- and Molecular Tribology/ Molecular Tribology I

8:40-10:20, Room G

Session Chair: Hiroshi Kinoshita, *Kobe University, Japan*  
Zygmunt Rymuza, *Warsaw University of Technology, Poland*

**G-211 Molecular Mechanisms of Polymer Composites Wear as Revealed by Mass-Spectrometry:** Pozdnyakov Aleksei\*, *Laboratory of Physical Chemistry of Materials, Institute of Problems of Mechanical Engineering, St-Petersburg, Russia, Shaped Crystals Physics Laboratory, Ioffe Physico-Technical Institute, St-Petersburg, Russia*; Ginzburg Boris, *Laboratory of Physical Chemistry of Materials, Institute of Problems of Mechanical Engineering, St-Petersburg, Russia*

**G-212 Resonance Shear Measurement on Liquid Nano-Films: Physical Model and Stick-Slip Analysis for Tribological Study:** Masashi Mizukami\*, Kazue Kurihara, *Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai, Japan, Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency (JST)*

**G-213 Tribological Properties of Alkyl Self-Assembled Monolayers Covalently Bonded to Silicon:** Miki Nakano\*, Koji Miyake, *Advanced Manufacturing Research Institute,*

National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan; Hikaru Sano, Hiroyuki Sugimura, Department of Materials Science and Engineering, Kyoto University, Kyoto, JAPAN; Takao Ishida, Yasuhisa Ando, Advanced Manufacturing Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan

**G-214 Mobility of Highly Confined Polymers:** Janet Wong\*, Department of Mechanical Engineering, Imperial College London, UK; Liang Hong, Dow Chemical Company, Midland, MI, USA; Sung Chul Bae, Steve Granick, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, IL, USA

**G-215 Tribological Studies of PLL-g-PEG Polyelectrolyte Copolymers in Aqueous Glycerol Mixtures:** Prathima C. Nalam\*, Jarred N. Clasohm, Nicholas D. Spencer, Laboratory of Surface Science and Technology, Department of Materials, ETH- Zurich, Switzerland

### G-22 Micro-, Nano- and Molecular Tribology/ Molecular Tribology II

10:50-12:30, Room G

Session Chair: Masashi Mizukami, Tohoku University, Japan  
Janet Wong, Imperial College London, UK

**G-221 Lubricating Properties of Carbon Nano-onions:** Jean Michel Martin\*, Ecole Centrale de Lyon, LTDS, Ecully, France; Lucile Joly-Pottuz, University of Lyon, INSA de Lyon, MATEIS, UMR CNRS 5510, Villeurbanne, France; Nobuo Ohmae, Faculty of Engineering, Department of Mechanical Engineering, Kobe University, Kobe, Japan; Eric W. Bucholz, Susan B. Sinnott, Materials Science and Engineering, University of Florida, Gainesville, Florida, USA

**G-222 The Model of Adhesive and Frictional Behaviors of Carbon Nanotube (CNT) Brushes :** Dariusz Jarzabek, Zygmunt Rymuza\*, Institute of Micromechanics and Photonics, Faculty of Mechatronics, Warsaw University of Technology, Warsaw, Poland; Nobuhiro Abe, Nobuo Ohmae, Department of Mechanical Engineering, Graduate School of Engineering, Kobe University, Japan

**G-223 Correlation between Friction and Conformational Change of Densely Packed Vertically Aligned Carbon Nanotube Film Observed by Atomic Force Microscopy:** Koji Miyake\*, Advanced Manufacturing Research Institute (AMRI), National Institute of Advanced Industrial Science and Technology (AIST), Ibaraki, Japan; Hatsuhiko Usami, Faculty of Science and Engineering, Meijo University, Nagoya, Japan; Michiko Kusunoki, Division of Environmental Research, EcoTopia Science Institute, Nagoya University, Nagoya, Japan

**G-224 Microtribological properties of Carbon Nanotube Films Fluorinated by the High Anisotropy and Low Energy Fluorine Atoms Beam:** Hiroshi Kinoshita\*, Naohiro Matsumoto, Nobuo Ohmae, Department of Mechanical Engineering, Faculty of Engineering, Kobe University, Kobe, Japan

**G-225 Nanoscale Peeling of Multi-Walled Carbon Nanotube on Graphite Surface:** Makoto Ishikawa\*, JST plaza Tokai, Nagoya, Japan; Naruo Sasaki, Department of Materials and Life Science, Faculty of Science and Technology, Seikei University, Tokyo, Japan; Kouji Miura, JST plaza Tokai, Nagoya, Japan, Department of Physics, Aichi University of Education, Kariya, Aichi, Japan

### H-21 Tribosystems/ Hard Disk Drives

8:40-10:20, Room H

Session Chair: Atsushi Mitani, Sapporo City University, Japan  
Vedantham Raman, Hitachi Global Storage Technologies, USA

**H-211 Keynote: Investigation of Mechanical Clearance Change with Thermal Fly-Height Control Slider at High**

**Altitude:** Toshiya Shiramatsu\*, Satoru Ookubo, Masayuki Kurita, Hidekazu Kohira, Yoshinori Takeuchi, Hitachi Global Storage Technologies Japan, Ltd., Kanagawa-ken, Japan

**H-212 Development of a Quantitative Wear Depth Measurement Method for Read/Write Element in Hard Disk Drive.:** Sumihiro Matsumura\*, HDD Laboratory, Hitachi Global Storage Technologies Japan, Ltd., Kanagawa, JAPAN

**H-213 Time Evolution Analyses of Ultra-thin Film Surface by the Long Wave Equation (Transient and Boundary Value Approach):** Shigehisa Fukui, Hiroyuki Ishibashi, Fumihiko Saeki\*, Hiroshige Matsuoka, Department of Mechanical and Aerospace Engineering, Graduate School of Engineering, Tottori University, Tottori, Japan

**H-214 Experimental Study on Mechanical Characteristics of Liquid Meniscus Bridge (Characteristics in Wide Contact Angle Range):**

Hiroshige Matsuoka\*, Kyoji Ishihara, Shigehisa Fukui, Department of Mechanical and Aerospace Engineering, Graduate School of Engineering, Tottori University, Koyama, Tottori, Japan

### H-22 Tribosystems/ Manufacturing Equipment

10:50-12:30, Room H

Session Chair: Hiroshige Matsuoka, Tottori University, Japan  
Xinping Yan, Wuhan University of Technology, China

**H-221 Effect of Micro Dimples on Frictional Properties in Boundary Lubricated Condition:** Yoshinori Ishida\*, Panasonic Corporation., Corporate Engineering Division, Home Appliances Company, Kusatsu, Japan; Hatsuhiko Usami, Yasushi Hoshino, Department of Materials Science and Engineering, Faculty of Science and Technology, Meijo University, Nagoya, Japan

**H-222 Modifications on the Viscous High-Speed Air-Bearing Spindle:** Guido M.J. Delhaes\*, Anton van Beek, Ron A.J. van Ostayen, Robert H. Munnig Schmidt, Department of Mechatronic System Design, Faculty of 3ME, Delft University of Technology, Delft, the Netherlands

**H-223 Evaluation of Asymmetric Surfaces by Femtosecond Laser Process for Microparts Feeding:** Atsushi Mitani\*, Faculty of Design, Sapporo City University, Sapporo, Hokkaido, Japan; Shinichi Hirai, Department of Robotics, Faculty of Mechanical Engineering, Ritsumeikan University

**H-224 Parameters Affecting Oil Film Formation between Top of Vane and Cylinder of Multiple Vane Type Compressors:** Eita Kureha\*, Fundamental Research Group, Research and Development Center, Yanmar Co., Ltd., Maibara-shi, Shiga, Japan; Masayoshi Muraki, Department of Mechanical Design Engineering, Faculty of Engineering, Shonan Institute of Technology

### H-23 Tribosystems/ Condition Monitoring I

15:00-16:40, Room H

Session Chair: Mark Craig, University of Southampton, UK  
Masanori Iwaki, Japan Aerospace Exploration Agency, Japan

**H-231 Color Characterization of Membrane Patches for the Oil Degradation Analysis:** Tomomi Honda\*, Kimi Kodo, Department of Mechanical Engineering, University of Fukui, Fukui-shi, Fukui, Japan; Akira Sasaki, STLE Fellow; Yoshiro Iwai, Department of Mechanical Engineering, University of Fukui, Fukui-shi, Fukui, Japan

**H-232 Research on Direct Reading Ferrography for Aero-Engine Wear Condition Monitoring:** Xufeng Jiang\*, Feng Ji, Zhenhui Qiu, Ying Zong, Department of Aviation Oil and Material, Xuzhou Air Force College, Xuzhou, China

**H-233 Prognosis of Remaining Life of Rolling Element Bearings by Using Artificial Neural Network**

**Technique.:** Naresh Chandra Murmu\*, Deepak Kumar Bhakta, Susmita Sarkar, *Tribology Division, Central Mechanical Engineering Research Institute, West Bengal, (CSIR), India*  
**H-234 Study of Wear Evaluation in Reliability Test of Diesel Engine Using Evidence Theory:** Xiping Yan\*, Yuanhua Chen, Sheng Chenxing, *Reliability Engineering Institute, School of Energy and Power Engineering, Wuhan University of Technology, Wuhan, China, Key Laboratory of Marine Power Engineering & Technology (Ministry of Communications), Wuhan University of Technology, Wuhan, China; Xu Taifu, China Classification Society Wuhan Branch, Wuhan, China; Chengqing Yuan, Reliability Engineering Institute, School of Energy and Power Engineering, Wuhan University of Technology, Wuhan, China, Key Laboratory of Marine Power Engineering & Technology (Ministry of Communications), Wuhan University of Technology, Wuhan, China*

**I-21 Tribology Fundamentals/ Contact Mechanics V**  
8:40-10:20, Room I

Session Chair: Makoto Ishida, Railway Technical Research Institute, Japan  
Daniel Nelias, INSA-Lyon, France

**I-211 Keynote: A Multi-Scale Model of Contact and Adhesion:** Hassan Eid, George G. Adams\*, *Department of Mechanical and Industrial Engineering, Northeastern University, Boston, MA, USA; Nick McGruer, Department of Electrical and Computer Engineering, Northeastern University, Boston, MA, USA; Andrea Fortini, Theoretical Physics II, University of Bayreuth, Bayreuth Germany; Alan B. de Oliveira, Sergey Buldyrev, David Srolovitz, Department Physics, Yeshiva University, New York NY, USA*

**I-212 Numerical Simulation on the Adhesive Contact between a Slight Wavy Surface and an Elastic Half-Plane:** Jiunn-Jong Wu\*, *Department of Mechanical Engineering, Chang Gung University, Taiwan*

**I-213 Modeling of Friction due to Adhesion and Hysteresis Losses:** Irina Goryacheva\*, Yulia Makhovskaya, *Institute for Problems in Mechanics, The Russian Academy of Sciences, Moscow, Russia*

**I-214 Continuum and atomistic approaches to modelling adhesion in rough contacts:** Simon Medina\*, Daniele Dini, *Department of Mechanical Engineering, Imperial College London, South Kensington Campus, London, England, UK*

**I-22 Tribology Fundamentals/ Contact Mechanics VI**  
10:50-12:30, Room I

Session Chair: George G Adams, Northeastern University, USA  
Leonid Sosnovskiy, S&P Group TRIBOFATIGUE, Belarus

**I-221 X-FEM Frictional Contacting Crack Model for Fretting Crack Propagation:** Marie-Christine Baietto Dubourg\*, Emilien Pierres, Anthony Gravouil, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, France; Guillermo Morales Espejel, SKF Engineering and Research Center, Nieuwegein, The Netherlands*

**I-222 Numerical Analysis based on Localized Multigrid X-FEM of 3D Crack Pattern Formation during the Scratching of a Polymer :** M. C. Baietto Dubourg\*, J. Rannou, A. Gravouil, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, France; H. Pelletier, C. Gauthier, R. Schirrer, ICS CNRS UPR 22 Strasbourg, France*

**I-223 Thermo-Mechanical Wear Mechanism of Ceramic Materials under Sliding Friction:** Sang-Woo Kim, *Polymer Materials Research Team, Advanced Technology Center, R&D Division for Hyundai-Kia Motors, Hwaseong-Si, Gyeonggi-Do, Korea; Seock-Sam Kim\*, Department of Mechanical Engineering, Kyungpook National University, Daegu, Korea*

**I-224 An Initial Approach of Crack Initiation for Highly Loaded Multilayer Coated System under Rolling Sliding Contact Conditions:** Ken Mao\*, *School of Engineering, The University of Warwick, Coventry, UK*

**I-225 Lubricant Hydraulic Effect on Surface-Breaking Cracks in Rolling-Sliding Contact:** Junbiao Lai\*, *SKF Engineering & Research Centre, Nieuwegein, The Netherlands; Stathis Ioannides, SKF Group Quality & Technology Development, Nieuwegein, The Netherlands, Department of Mechanical Engineering, Imperial College London, UK; Jun Wang, SKF Engineering & Research Centre, Nieuwegein, The Netherlands*

**I-23 Tribology Fundamentals/ Contact Mechanics VII**  
15:00-16:40, Room I

Session Chair: Junbiao Lai, SKF Engineering & Research Centre, Netherlands  
Ken Mao, The University of Warwick, UK

**I-231 Elasto-Plastic Simulation of Rolling Contact vs. Indentation for a Circular or Elliptical Point Contact:** Daniel Nélias\*, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, Villeurbanne, France*

**I-232 Reversal Relationship of Wheel/Rail Adhesion Coefficient to Contact Pressure for Surface Roughness Under Wet Conditions:** Hua Chen\*, Akira Nakamura, Makoto Ishida, *Railway Technical Research Institute, Kokubunji-shi, Tokyo, Japan; Tsunamitsu Nakahara, Tokyo Institute of Technology, Tokyo, Japan*

**I-233 Rolling Contact Fatigue Tests in an Epoxy Resin:** Arthur Francisco\*, Houssein Abbouchi, Bernard Villechaise, *Laboratoire de Mécanique des Solides, IUT Angoulême, Université de Poitiers, Angoulême, France*

**I-234 Study on Vehicle Running Safety for Worn Rail Tread:** Masakazu Adachi\*, *Traffic System Research Department, National Traffic Safety and Environment Laboratory, Chofu-shi, Tokyo, Japan*

**I-235 Local Plastic Deformation of High-Strength Steel under Rolling Contact Fatigue:** Leonid Sosnovskiy, S&P Group TRIBOFATIGUE, Gomel, Republic of Belarus, *Department of Construction Mechanics, Belarusian State University of Transport; Sergei Sherbakov, Faculty of Mechanics and Mathematics, Belarusian State University; Oleg Yelovoy\*, Alexander Komarov, Valentina Komarova, United Institute for Machine Building of Belarusian Academy of Sciences*

**J-21 Surface Engineering/ Tribomaterials V**  
8:40-10:20, Room J

Session Chair: Tadashi Komoto, Gunma University, Japan  
Junhong Jia, Lanzhou Institute of Physical Chemistry, China

**J-211 Torsional Wear Behavior of Articular Cartilage in vitro :** Zhenbing Cai, Minhao Zhu\*, *Laboratory of Advanced Technologies of Materials of Education Ministry, Tribology Research Institute, Southwest Jiaotong University, Chengdu, China; Shanshan Gao, Haiyang Yu, State Key Laboratory of Oral Diseases, West China Hospital of Stomatology, Sichuan University, Chengdu, China; Zhongrong Zhou, Laboratory of Advanced Technologies of Materials of Education Ministry, Tribology Research Institute, Southwest Jiaotong University, Chengdu, China*

**J-212 Investigating Low Friction Behavior of PEEK Reinforced with Carbon Fibers in Nitrogen at Normal and Cryogenic Temperatures:** Tomonaga Oyamada\*, Masahiko Ono, Youichi Murai, *Mechanical Engineering Research Laboratory, Hitachi, Ltd., Hitachinaka, Ibaraki, Japan; Haruo Miura, Tetsuya Kuwano, Hitachi Plant Technologies, Ltd., Tsuchiura, Ibaraki, Japan*

**J-213 Influence of Heat Treatment on Tribological Properties of ZA-27 Alloy:** Miroslav Babic\*, *Faculty of*

*Mechanical Engineering, Tribology Center, University of Kragujevac, Kragujevac, Serbia; Slobodan Mitrovic, Faculty of Mechanical Engineering, Tribology Center, University of Kragujevac, Kragujevac, Serbia; Ilija Bobic, Department of Materials Science, Institute of Nuclear Sciences, "Vinca", P.O. Box 522, 11001 Belgrade; Rato Ninković, RAR, Bosanske krajine 22, 11273 Batajnica*

**J-214 Seizure Behaviors of PEEK Materials in Lubricated Sliding Friction at High Speed:** Tomoharu Akagaki\*, *Department of Mechanical Engineering, Hachinohe National College of Technology, Hachinohe, Japan; Masahiko Kawabata, Tribotex Incorporation, Obu, Aichi, Japan*  
**J-215 Friction and Wear Properties of the Al-Si Alloy Impregnated Graphite Composite (ALGR-MMC) under Insufficiently Lubricated Reciprocating Sliding Conditions:** Hozumi Goto\*, *Claudiu Valentin Suci, Mayumi Shige, Department of Intelligent Mechanical Engineering, Faculty of Engineering, Fukuoka Institute of Technology, Fukuoka, Japan*

### J-22 Surface Engineering/ Coatings I

10:50-12:30, Room J

Session Chair: Junho Choi, *The University of Tokyo, Japan*  
 Maria-Isabel De Barros Bouchet, *Ecole Centrale de Lyon, France*

**J-221 Keynote: Running-in for Reducing Friction of CNx-coatings in Nitrogen Gas:** Koshi Adachi\*, *Division of Mechanical Engineering, Tohoku University, Sendai, Japan; Masakatsu Sugo, Division of Mechanical Engineering, Tohoku University, Sendai, Japan, Currently at: Nissan Motor Co., Ltd.*

**J-222 Effect of Oxygen on Friction and Wear Properties of Carbon Nitride Coatings:** Pengfei Wang\*, *Koshi Adachi, Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan*

**J-223 Extended Tribological Study on Carbon Nitride Coatings under Oscillating Sliding Conditions:** Rolf Waesche\*, *BAM Federal Institute for Materials Research and Testing, Berlin, Germany; Ulrike Springborn, Fraunhofer Institute for Surface Engineering and Thin Films (IST), Braunschweig, Germany; Manfred Hartelt, BAM Federal Institute for Materials Research and Testing, Berlin, Germany; Klaus Bewilogua, Martin Keunecke, Fraunhofer Institute for Surface Engineering and Thin Films (IST), Braunschweig, Germany*

**J-224 The Effect of Ultraviolet Ray Irradiation on Frictional Behavior of Carbon Nitride Coating in Nitrogen Gas:** Takayuki Tokoroyama\*, *Makoto Kamiya, Noritsugu Umehara, Department of Mechanical Science and Engineering, Faculty of Graduate School of Engineering, Nagoya University, Nagoya-shi, Aichi, Japan; Yoshio Fuwa, Vehicle Engineering Group, TOYOTA Motors Co., Ltd.*

### J-23 Surface Engineering/ Coatings II

15:00-16:40, Room J

Session Chair: Koshi Adachi, *Tohoku University, Japan*  
 Rolf Waesche, *BAM Federal Institute for Materials Research and Testing, Germany*

**J-231 Tribochemistry of Ta-C Coatings in Presence of Alcohols and A-C:H Coatings in Dry Conditions:** Christine Matta, *Energy systems division, Tribology section, Argonne National Laboratory, Argonne, IL, USA, Laboratory of Tribology and Systems Dynamic (LTDS), Ecole Centrale de Lyon, Ecully, France; Maria-Isabel De Barros Bouchet\*, Beatrice Vacher, Laboratory of Tribology and Systems Dynamic (LTDS), Ecole Centrale de Lyon, Ecully, France; Osman Levent Eryilmaz, Energy systems division, Tribology section, Argonne National Laboratory, Argonne, IL, USA; Thierry Le Mogne, Jean-Michel Martin, Laboratory of Tribology and Systems Dynamic (LTDS), Ecole Centrale de Lyon, Ecully, France; Ali*

*Erdemir, Energy systems division, Tribology section, Argonne National Laboratory, Argonne, IL, USA*

**J-232 Potential of a new Low-Friction Coating Based on Inorganic Fullerenes -Comparison with State-of-the-Art PVD Coatings:** Benny André\*, *Fredrik Gustavsson, Fredrik Svahn, Staffan Jacobson, Tribomaterials Group, The Ångström Laboratory, Uppsala University, Uppsala, Sweden*

**J-233 Effect of Surface Wettability on Friction Behaviors of Nano-pattered Surface of Diamond-Like Carbon Films :** Young-Jun Jang\*, *Department of Mechanical Science and Engineering, Nagoya University, Nagoya, Aichi, Japan; Jong-Joo Rha, Surface Technology Research Center, Korea Institute of Material Science, Changwon, Korea; Takayuki Tokoroyama, Hiroyuki Kousaka, Noritsugu Umehara, Department of Mechanical Science and Engineering, Nagoya University, Nagoya, Aichi, Japan*

**J-234 Evaluation of Adhesion and Wear Resistance of DLC Films:** Takahiro Horiuchi\*, *Kentaro Yoshida, Makoto Kano, Masao Kumagai, Kanagawa Industrial Technology Center, Kanagawa, Japan; Tetsuya Suzuki, Center for Materials Science, Keio University*

**J-235 Development of Si-DLC Coatings with Ultra-Low Friction and High Hardness :** Junho Choi\*, *Atsushi Tsunoda, Tomohisa Kumagai, Takahisa Kato, Department of Mechanical Engineering, Faculty of Engineering, The University of Tokyo, Tokyo, Japan; Masahiro Kawaguchi, Advanced Material Processing Group, Tokyo Metropolitan Technology Research Institute, Tokyo, Japan*

### K-21 Surface Engineering/ Texturing V

8:40-10:20, Room K

Session Chair: Alberto Rota, *CNR-INFM National Research Center, Italy*

Dong Zhu, *Tsinghua University, China*

**K-212 Fluid and Mixed Lubrication Characteristics of Textured Surface on Slideways:** Atsushi Korenaga\*, *Advanced Manufacturing Research Institute, National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan; Hayato Ogawa, Department of Mechanical Engineering, Tokyo University of Science; Koji Miyake, Miki Nakano, Takashi Murakami, Advanced Manufacturing Research Institute, National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan; Shinya Sasaki, Department of Mechanical Engineering, Tokyo University of Science*

**K-213 Numerical Analysis of the Effect of Cavitation on Lubrication and Friction of Textured Parallel Surfaces:** Fanming Meng, Q. Jane Wang\*, *Department of Mechanical Engineering, Northwestern University, Evanston, IL, USA; Diann Hua, Jordan Liu, Product Development Center of Excellence, Senior Engineer, Caterpillar Inc.*

**K-214 Improving Tribological Performance of Piston Ring Pack and Cylinder Bore pair by Surface Texturing:** Sunggi Kim\*, *Kuenchul Song, Sangbeom Kim, Institute of Technology, Doosan Infracore, Yongin-Si, Gyeonggi-Do, South Korea*

### K-22 Surface Engineering/ Surface Modifications I

10:50-12:30, Room K

Session Chair: Hsiao Yeh Chu, *Kun Shan University, R.O.C.*

Zhou Fei, *Nanjing University of Aeronautics and Astronautics, China*

**K-221 Keynote: Fundamental Phenomena in Tribology of DLC: How to Reduce Friction and Wear:** Julien Fontaine\*, *Laboratoire de Tribologie et Dynamiques des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon, Ecully, France; Ali Erdemir, Energy Systems Division, Argonne National Laboratory, USA; Christophe Donnet, Laboratoire*

Hubert Curien, UMR CNRS 5516, Université Jean Monnet, Saint-Etienne, France and University Institute of France  
**K-222 Friction Properties of MoS<sub>2</sub>-Containing DLC in Ultra High Vacuum:** Shingo Abe\*, Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan; Takanori Takeno, Institute for International Advanced Interdisciplinary Research, Tohoku University International Advanced Research and Education Organization; Koshi Adachi, Tribology Laboratory, Division of Mechanical Engineering, Tohoku University; Hiroyuki Miki, Toshiyuki Takagi, Institute of Fluid Science, Tohoku University

**K-223 New Nanostructural DLC Coatings - Orientants and Their Influence on Oils Lube Ability:** Vladimir A. Levchenko\*, Vladimir N. Matveenko, Department of Colloid Chemistry, Lomonosov Moscow State University, Moscow, Russia; Iliya A. Buyanovsky, Zinaida V. Ignatieva, Department of tribology, Blagonravov Mechanical Engineering Research Institute, Moscow, Russia

**K-224 The Control of Friction Coefficient of DLC Coatings Using Micro-Dimpled Substrate:** Kenichiro Suzuki\*, Department of Engineering and Science, Ibaraki University, Hitachi-city, Ibaraki, Japan; Hiroyuki Akebono, Department of Engineering, Hiroshima University; Hideto Suzuki, Department of Engineering and Science, Ibaraki University, Hitachi-city, Ibaraki, Japan

**K-23 Surface Engineering/ Surface Modifications II**  
 15:00-16:40, Room K

Session Chair: Julien Fontaine, Ecole Centrale de Lyon, France  
 Vladimir A Levchenko, Lomonosov Moscow State University, Russia

**K-231 Friction and Wear Properties of C Ion Implanted Silicon Nitride against Silicon Nitride Balls in Water Lubrication:** Fei Zhou\*, Academy of Frontier Science, Nanjing University of Aeronautics and Astronautics, Nanjing, China, School of Mechanical Engineering, Nanjing University of Aeronautics and Astronautics; Fang Zhou, Meiling Wang, School of Materials Science and Technology, Nanjing University of Aeronautics and Astronautics; Xiaolei Wang, School of Mechanical Engineering, Nanjing University of Aeronautics and Astronautics

**K-232 Effects of High Temperature Plasma Nitriding Process Time on Hardness and Wear Loss:** Hsiao-Yeh Chu\*, Micro and Precision Manufacturing Center, Department of Mechanical Engineering, Kun Shan University, Yung-Kang City, Tainan Hsien, Taiwan, R.O.C.; Jen Fin Lin, Department of Mechanical Engineering, Center for Micro/Nano Science Technology, National Cheng Kung University, Tainan, Taiwan, R.O.C.

**K-233 Friction and Wear Characteristics of Plasma Electrolytic Oxidation Films:** Ichiro Hiratsuka\*, Takeyo Wada, Hirota Niinomi, Material Engineering Department, AISIN SEIKI Co.,Ltd., Kariya, Aichi, Japan

**K-234 Materials Modification with Combined Ions Implantation:** Konstantin Shalnov\*, Vladimir Koukhta, Kensuke Uemura, Thin Films and Surface Modification Division, Nagata Seiki Co., Tsubame-shi, Niigata, Japan; Yoshiro Ito, Nagaoka University of Technology, Japan

**K-235 Effect of the Air-Plasma Pre-Treatment of the Substrate on the Tribological Properties of UHMWPE Thin Films Coated onto Si:** Abdul M. Samad\*, Satyanarayana Nalam, Sujeet K Sinha, Department of Mechanical Engineering, National University of Singapore, Singapore

**Poster Session**

14:00-15:00, Exhibition Hall (Viewing 10:00-17:00)

**Surface Engineering/ Tribomaterials**

**P-201 The Friction Properties between Friction Modifier and Paper Based Friction Material:** Kenichiro Seki\*, F.C.C. CO., LTD., Hamamatsu-city, Shizuoka-pref, Japan; Tomoaki Iwai, Graduate School of Natural Science and Technology Faculty of Engineering, Kanazawa University, Kanazawa, Ishikawa, Japan; Toshihiko Ichihashi, Idemitsu Kosan Co., Ltd., Lubricants Research Laboratory, Ichihara-shi, Chiba, Japan; Toshiki Ikeda, Idemitsu Kosan Co.,Ltd., Tokyo, Japan

**P-202 A Novel Coating Method for Rare Earth Metal Oxides by Hyperthermal Atomic Oxygen:** Shogo Harada\*, Shunsuke Yamamoto, Nobuo Ohmae, Department of Mechanical Engineering, Graduate School of Engineering, Kobe University, Kobe, Japan

**P-203 A Study on Sulfidation Corrosion of Copper Alloy for Plain Bearing:** Kazuaki Toda\*, Shigeru Inami, Takuya Tanaka, Daido Metal Co., Ltd., Inuyama, Japan

**P-204 Tribological Properties of Cu-Sn-Bi Bushing for Transmissions:** Ryo Mukai\*, Hiromi Yokota, Nahomi Hamaguchi, Shinichi Kato, Toru Desaki, Taiho Kogyo Co., Ltd., Toyota-city, Aichi-Pref., Japan

**P-205 Wear Detection by Acoustic Emission:** Rafic Merhej\*, M-E Aktan, Joel Alexis, Jean-Yves Paris, Université de Toulouse, Laboratoire de Génie de Production, Ecole Nationale d'Ingénieurs de Tarbes, Tarbes, France; Julien Gurt Santanach, CIRIMAT UMR CNRS-UPS-INP 5085, Université Paul-Sabatier, France, Société des Céramiques Techniques, Bazet, France; Alicia Webel, Alain Peigney, Christophe Laurent, CIRIMAT UMR CNRS-UPS-INP 5085, Université Paul-Sabatier, France; Geoffroy Chevallier, CIRIMAT UMR CNRS-UPS-INP 5085, Université Paul-Sabatier, France, PNF2 CNRS-MHT, Université Paul-Sabatier, France; Claude Estournes, PNF2 CNRS-MHT, Université Paul-Sabatier, France; Yann Paranthoen, Société des Céramiques Techniques, Bazet, France; Jean Denape, Université de Toulouse, Laboratoire de Génie de Production, Ecole Nationale d'Ingénieurs de Tarbes, Tarbes, France

**P-206 Effects of Addition of Thermoplastic Elastomers on Tribological and Mechanical Properties of Vapor Grown Carbon Fiber Filled Polybutylene Terephthalate Composites:** Yosuke Nishitani\*, Department of Mechanical Engineering, Faculty of Engineering, Kogakuin University, Hachioji, Tokyo, Japan; Takahito Naito, Department of Mechanical Engineering, Graduate School of Engineering, Kogakuin University; Isamu Sekiguchi, Department of Mechanical Engineering, Faculty of Engineering, Kogakuin University, Hachioji, Tokyo, Japan; Takeshi Kitano, Polymer Centre, Faculty of Technology, Tomas Bata University in Zlin

**P-207 Investigation of Micro-Structural Changes and Wear Particle Formation in Different Types of Metal-on-Metal Hip Joints:** Robin A Pourzal\*, Department of Material Science and Engineering, Institute for Product Engineering, University of Duisburg-Essen, Duisburg, Germany; Ralf Theissmann, Faculty of Engineering and CeNIDE, University of Duisburg-Essen, Duisburg, Germany; Birgit Gleising, Alfons Fischer, Department of Material Science and Engineering, Institute for Product Engineering, University of Duisburg-Essen, Duisburg, Germany

**P-208 The Tribological Characteristics of Austenitic Stainless Steel at High Temperature:** Junichi Yoshihisa\*, Tribology G. Machine Elements Dept. Research Laboratory, IHI Corporation, Japan; Nobuo Ohmae, Department of Mechanical Engineering Faculty of Engineering, Kobe University, Kobe, Japan

**P-209 High Temperature Depth Sensing Indentation of WC-Co Hardmetals:** Jonee P. Zuñega\*, National Centre for Advanced Tribology at Southampton, School of Engineering Sciences, University of Southampton, UK; Mark G. Gee, National Physical Laboratory, Middlesex, United Kingdom;

Robert J. K. Wood, *National Centre for Advanced Tribology at Southampton, School of Engineering Sciences, University of Southampton, UK*

**Surface Engineering/ Texturing**

**P-210 Advanced Optical Laser Triangulation**

**Assessment for Tribological Surfaces:** Kang (Jennifer) Cheng Ang\*, Robert J K Wood, Ling Wang, *National Centre for Advanced Tribology at Southampton, University of Southampton, Southampton, United Kingdom*

**P-211 Effect of Film Thickness and Micro-Dimple Shape on the Lubrication Characteristics of Laser Textured Parallel Thrust Bearing:** Tae-Jo Park, *School of Mechanical & Aerospace Engineering, ERI, Gyeongsang National University, Jinju, Korea*; Yun-Geon Hwang\*, Kwan-Joon Kim, *Graduate School of Mechanical & Aerospace Engineering, Gyeongsang National University*

**P-212 Effect of Surface Texturing Pattern on Tribological Property of Slideway:** Hayato Ogawa\*, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*; Atsushi Korenaga, Koji Miyake, Miki Nakano, Takashi Murakami, *National Institute of Advanced Industrial Science and Technology, Japan*; Shinya Sasaki, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*

**P-213 Control of Tribochemical Reactions and Tribological Properties by Textured Surface :** Takahiro Nakamura\*, Shin Matsudate, Tomoo Kubo, Hidetaka Nanao, Shigeyuki Mori, *Department of Chemical Engineering, Iwate University, Morioka, Iwate, Japan*

**P-214 Multiresolution Analysis of Rough Engineering / Tribological Surfaces:** Davide Bianchi\*, *Austrian Center of Competence for Tribology, Wiener Neustadt, Austria*; Andras Vernes, *Austrian Center of Competence for Tribology, Wiener Neustadt, Austria, Institut für Allgemeine Physik, Vienna University of Technology, Vienna, Austria*; Georg Vorlauffer, *Austrian Center of Competence for Tribology, Wiener Neustadt, Austria*; Gerhard Betz, *Austrian Center of Competence for Tribology, Wiener Neustadt, Austria, Institut für Allgemeine Physik, Vienna University of Technology, Vienna, Austria*

**P-215 A Comparative Study of Micro Textured Hydrodynamic Bearings:** Aswad S. Manzoor\*, Andrew V. Olver, Hugh A. Spikes, Simon Medina, Mark A. Fowell, *Department of Mechanical Engineering, Imperial College, London, UK*; Ian G. Pegg, *Dunton Technical Centre, Ford Motor Company, Laindon, Essex, UK*

**P-216 Surface Texturing for Running-in of Silicon-Based Ceramics in Water:** Masatoshi Shimizu\*, Koshi Adachi, *Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan*; Hiroshi Sawada, *CANON MACHINERY INC., Kusatsu-shi, Shiga, Japan*

**P-217 Tribological Effect of Surface Texturing on Die Materials for Practical Application.:** Ki-Hyun Kim\*, *Graduate school of engineering, Iwate university, Morioka, Iwate, Japan*; Akira Iwabuchi, Michimasa Uchidate, *Department of Mechanical Engineering, Iwate University, Morioka, JAPAN*

**P-218 Fabrication of Silver Microdimple-Structured Films for Low Frictional Surfaces:** Yuji Hirai\*, *Tohoku University, Sendai, Japan*; Hiroshi Yabu, *IMRAM, Tohoku University*; Masataka Kaido, Atsushi Suzuki, *TOYOTA MOTOR CORPORATION*; Masatsugu Shimomura, *IMRAM, Tohoku University, WPI, Tohoku University, JST, CREST*

**P-219 Effect of Surface Topography on Friction Behavior of SiC-Particle Reinforced Aluminum Matrix Composites:** Toshiro Miyajima\*, *Department of Mechanical Engineering, Faculty of Engineering, University of Fukui, Fukui, Japan*; Masami Masuda, *Department of Production Systems Engineering, Faculty of Engineering, Toyohashi University of*

*Technology; Yoshiro Iwai, Department of Mechanical Engineering, Faculty of Engineering, University of Fukui, Fukui, Japan*

**P-220 Tribological Property of Laser Surface Textured Silicon Nitride under Lubrication with Water:** Hiroki Yamakiri\*, Shinya Sasaki, *Department of Mechanical Engineering Tokyo University of Science, Tokyo, Japan*; Tsuneo Kurita, *Nagayoshi Kasashima, AMRI, AIST, Tsukuba-shi, Ibaraki, Japan*

**Surface Engineering/ Coatings**

**P-221 Abrasive Wear of Three Laser Clads on Mild Steel Substrates:** N Sacks\*, *School of Chemical and Metallurgical Engineering, University of the Witwatersrand, Johannesburg, South Africa, DST/NRF Centre of Excellence in Strong Materials, South Africa*; P Masete, S Sithole, *School of Chemical and Metallurgical Engineering, University of the Witwatersrand, Johannesburg, South Africa*

**P-222 A New Coating Technique by Rubbing of Fine Particles:** Masayuki Shima\*, Takashi Sugawara, Satoshi Ito, Tatsuhiro Jibiki, Yuriko Ohkubo, *Department of Marine Electronics and Mechanical Engineering, Faculty of Marine Technology, Tokyo University of Marine Science and Technology, Japan*; Hideki Akita, *Technical Research Center, Hitachi Construction Machinery Co., Ltd*

**P-223 Tribological Properties of DLC-Si Film under Oil Lubricated Condition:** Junji Ando\*, *JTEKT Corporation, Kashiwara, Osaka, Japan*; Takeshi Yamaguchi, Taro Endo, *Tohoku University, Sendai, Miyagi, Japan*; Naoko Takahashi, Mamoru Tohyama, Atushi Murase, Toshihide Ohmori, *Toyota Central R&D Labs., Inc., Aichi, Japan*; Kazuo Hokkirigawa, *Tohoku University*

**P-224 Determination of Constitutive Properties of Thin Film on Substrate by Nanoindentation Using FEM and Abductive Network:** T. S. Yang\*, S. Y. Chang, *Department of Mechanical and Computer-Aided Engineering, National Formosa University, Yunlin, Taiwan*

**P-225 Effect of Source Gas on Life of DLC Film-Coated Die for Working Process of Aluminum Sheet under Dry Conditions:** Katsuyuki Fujimura\*, Masayoshi Muraki, Seiji Kataoka, *Department of Mechanical Engineering, Graduate School of Shonan Institute of Technology, Fujisawa, Kanagawa, Japan*

**P-226 Structural and Phase Model of Increase of Wear Resistance of Overlaying Welding Materials:** Skotnikova Alexandrovna Margarita, Zubarev Mihajlovich Yuri, Tsvetkova Viktorovna Galina, Funikov Lvovich Sergey, Alekseev Borisovich Sergey, Ivanov Konstantinovich Evgeny, *Department of Tribotechnic, Faculty of Technology, Saint-Petersburg Machine Building State Institute, Saint-Petersburg, Russia*

**P-227 Antiseizure Property of Manganese Phosphate in Dry Conditions:** Tatsuya Sasaki\*, Hideto Nakao, *Advanced Technology R&D Center, Mitsubishi Electric Corporation, Hyogo, Japan*; Kenji Yano, *Air-Conditioning & Refrigeration Systems Works, Mitsubishi Electric Corporation, Wakayama, Japan*

**P-228 Structural Transformation of Diamond-Like Carbon Films under Various Sliding Conditions:** Masahiro Kawaguchi\*, Saiko Aoki, Atsushi Mitsuo, *Advanced Material Processing Group, R & D Department, Tokyo Metropolitan Industrial Technology Research Institute (TIRI), Tokyo, Japan*; Junho Choi, Takahisa Kato, *Department of Mechanical Engineering, Faculty of Engineering, The University of Tokyo, Tokyo, Japan*

**P-229 Tribological Behavior of MCECR Carbon-Based Nano Films:** Xue Fan\*, Dongfeng Diao, *Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China*; Yan Chen, *NSK*

China Technology Center; Pengfei Wang, School of Mechanical Engineering, Tohoku University

**P-230 Tribological Properties of Ti Doped a-C Films**

**Lubricated by Hank's Solution:** Hong Chunfu\*, Tu Jiangping, Liu Dongguang, Li Ruiling, Wu Zhen tai, Department of Materials Science and Engineering, Zhejiang University, Hangzhou, China; Peng Ran, Sun Hailin, Zhejiang Huijing-teer Coatings Technology Co., Ltd., Hangzhou, China

**P-231 Preparation and Tribological Properties of Nanoparticles Containing Diamond-Like Carbon Films:**

Hiroaki Shimizu\*, Masahito Ban, Department of System Engineering, Nippon Institute of Technology, Saitama, Japan

**P-232 Influence of Fluid Viscosity of Erosion on Surface Damage of Supercritical Nano-Plating :**

Takamasa Ito\*, Student, Graduate school of Engineering, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan; Takuya Tokami, Student, Faculty of Engineering, Tokyo University of Agriculture and Technology; Hironobu Ito, Koji Ikeda, Graduate school of Engineering, Tokyo university of Agriculture and Technology

**P-233 Production of High Adhesive Ti-doped Amorphous Carbon Films for Artificial Hip Joint by Heat Treatment in Vacuum:**

Toshikazu Asakura\*, Course of Mechanical Engineering, School of Engineering, Graduate school, Tokai University, Hiratsuka, Kanagawa, Japan; Masao Kohzaki, Department of Mechanical Engineering, School of Engineering, Tokai University

**P-234 Development of High Adhesive and Lubricious Ti-B-C Thin Films for Cutting of Ti Alloys:**

Shouichi Inaba\*, Course of Mechanical Engineering, School of Engineering, Graduate school, Tokai University, Hiratsuka, Kanagawa, Japan; Masao Kohzaki, Department of Mechanical Engineering, School of Engineering, Tokai University

**P-235 Production of Titanium Nitride - Molybdenum Disulfide Composite Thin Films with High Lubricious Properties :**

Takayuki Suzuki\*, Course of Mechanical Engineering, School of Engineering, Graduate school, Tokai University, Hiratsuka, Kanagawa, Japan; Masao Kohzaki, Department of Mechanical Engineering, School of Engineering, Tokai University

**P-236 Wearproof Structural and Phase Status of the Surface of Preparation of Steel 45 After Plasma Spraying:**

Margarita Alexandrovna Skotnikova, Galina Viktorovna Tsvetkova , Sergey Lvovich Funikov , Sergey Borisovich Alekseev , Eugeny Konstantinovich Ivanov , Sergey Vladimirovich Tsvetkov\*, Department of Tribotechnic, Faculty of Technology, Saint-Petersburg Machine Building State Institute, Saint-Petersburg, Russia

**P-237 Laser Effect on the Residual Stresses of Brush Plated n-Al<sub>2</sub>O<sub>3</sub>/Ni Coating :**

Zhi-jie Liang, Tao Yan, Jun Tan\*,

**P-238 Effect of Nitrogen Flow during Sliding Test on Friction Coefficient of a-C:H:N Films with Various Nitrogen and Hydrogen Contents:**

Hiroataka Ito\*, Kenji Yamamoto, Materials Reserch Laboratory, Kobe Steel Ltd., Kobe, Hyogo, Japan

**P-239 Elevated Temperature Erosion Response of Detonation Gun Sprayed Coatings:**

Pawan Kumar Sapra, Surendra Singh, Satya Prakash, Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Roorkee, India; M. Annanth Kumar\*, The Graduate School of Natural Science and Technology, Okayama University, Okayama, Japan

**P-240 Effect of Deposition Conditions on Mechanical Properties and Wear Behavior of R.F. Reactive Magnetron Sputtered Silicon Nitride Films:**

Jianhua Zhang\*, Zikai Hua, School of Mechatronics Engineering and Automation, Shanghai University, Department of Mechanical Engineering, Shanghai, P.R. China; Thomas Hoornaert, University of Troyes, France

**P-241 Some Surface Aspects of DLC-Coatings as Tribomaterial Durable for Water Lubrication:**

Maiko Tokoro\*, Yusuke Aiyama, Masabumi Masuko, Akihito Suzuki, Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Tokyo, Japan; Hiroataka Ito, Kenji Yamamoto, Surface Design & Corrosion Research Section, Materials Research Laboratory, Kobe Steel, Ltd.

**P-242 Tribochemical Interactions Between Antiwear Additives and Ceramics or Composite Materials:**

Dariusz Ozimina\*, Monika Madej, Department of Tribology, Faculty of Mechatronics and Machine Building, Kielce University of Technology, Bydgoszcz, Poland; Michal Styp-Rekowski, Faculty of Mechanical Engineering, University of Technology and Life Sciences, Bydgoszcz, Poland

**P-243 Application of Laser Gas Nitriding for Improvement of Wear Resistance of Titanium Bearings :**

Edson C. Santos\*, Katsuyuki Kida, Takashi Honda, Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan; Yuji Kashima, Kashima Bearings Corporation, Osaka, Japan

**P-244 Preparation of DLC Film by Sputtering and its Mechanical and Tribological Properties:**

Shinya Okamoto\*, Itto Sugimoto, Shizuka Yamaguchi, Kazutaka Okamoto, Shoichi Nakashima, Hitachi Research Laboratory, Hitachi, Ltd., Hitachi-shi, Japan; Fumiaki Honda, Kenichi Inoue, Matsue Surface Modification Center, Hitachi Tool Engineering, Ltd., Matsue-shi, Japan

**P-245 Improvement of Lubricating Film Formation and Friction Coefficients by using Heat treatment Oil:**

Shuusaku Maeda\*, Yoshihiro Tomita, Technical research laboratory, Nippon Grease Co., Ltd., Kobe City, Japan

**P-246 A Study on Optimal Coating Process of WC-CoFe Coatings Sprayed by HVOF:**

JaeYoung Cho\*, YunKon Joo, S. H. Zhang, TongYul Cho, School of Nano & Advanced Materials Engineering, Changwon National University, Changwon, Gyeongnam, South Korea; JaeHong Yoon

**P-247 Optimization of Diamalloy4006 Coating Process by High Velocity Oxy-fuel Thermal Spray Coating:**

Yun Kon Joo\*, Jae Young Cho, S. H. Zhang, Tong Yul Cho, Jae Hong Yoon, School of Nano & Advanced Materials Science & Engineering, Changwon National University, Gyeongnam, Korea

**P-248 Multi Scale Simulator for Analysis of Mechanical and Frictional Property of Diamond-Like Carbon Film:**

Takanori Kuriaki\*, Yusuke Morita, Tasuku Onodera, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, Sendai, Japan; Ai Suzuki, New Industry Creation Hatchery Center, Tohoku University; Riadh Sahnoun, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University; Michihisa Koyama, IINAMORI Frontier Research Institute, Kyushu University; Hideyuki Tsuboi, Nozomu Hatakeyama, Akira Endou, Hiromitsu Takaba, Carlos A. Del Carpio, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University; Momoji Kubo, Fracture and Reliability Research Institute, Graduate School of Engineering, Tohoku University; Akira Miyamoto, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, New Industry Creation Hatchery Center, Tohoku University

**P-249 Tribological Analysis of Nanocomposited TiAlSiN Layer a Computer Simulation and Experimental Approach:**

Dzimko Dzimko\*, Ivan Havetta, Jozef Bronček, Faculty of Mechanical Engineering, Department of Design and Machine Elements, University of Zilina, Zilina, Slovakia; Uwe Winkelmann, Institute for Mechanical Engineering (IfM), University of Applied Sciences Magdeburg-Stendal, Magdeburg, Germany; Masao Uemura, Department of Mechanical Engineering, Toyohashi University of Technology, Toyohashi, Aichi, Japan

**Surface Engineering/ Surface Modifications**

**P-250 The Research of Cutting Rate for Dental Drills Treated by Plasma Immersion Ion Implantation (PIII) Nitriding Process:**

Chin-Chung Wei\*, Jeng-Haur Horng, Cho-Pei Jiang, *Department of Power Mechanical Engineering, Formosa University, Yunlin, Taiwan*; Wen-Hsin Chang, *Graduate Institute of Clinical Dentistry, College of Medicine, National Taiwan University, Taiwan*; Wan-Gye Yang, *Department of Dentistry, Show Chwan Memorial Hospital, Taiwan*

**P-251 Tribofilms Produced by Supplying Fine Metal Particles on Rubbing Surfaces in a Vacuum:** Hiroataka Kato\*, Akihiro Takimi, *Department of Mechanical Engineering, Fukui National College of Technology, Sabae-shi, Fukui, Japan*; Minoru Umemoto, *Department of Production Systems Engineering, Toyohashi University of Technology*

**P-252 Effects of Nanoparticles on the Properties of Gold-Carbohydrate Nanocomposites:** David Huitink, Tahira Zarrin, Subrata Kundu, Hong Liang\*, *Department of Mechanical Engineering, Texas A&M University, Texas, USA*

**P-253 Friction Properties of Molybdenizing and Nitriding Duplex-Treated Layer on Ni-Base Alloy:** Jianliang Li\*, Dangsheng Xiong, Jihui Dai, *Department of Material Science and Engineering, Nanjing University of Science and Technology, Nanjing, China*; Hongyan Wu, *College of Math and Physics, Nanjing University of Information and Technology, Nanjing, China*

**P-254 Wetting and Tribological Properties of Ion Implanted Bearing Steels:** Le Gu\*, Jinku Li, Liqin Wang, Dezhi Zheng, *Department of Mechanical Engineering, Harbin Institute of Technology, Harbin, China*

**P-255 Identification of Physical and Mechanical Properties of Super Lightweight Exfoliated Graphite Based Composite Materials :** Yuri A. Nikitin\*, Vladimir V. Zaporozhets, *Department of Aviation Technology, Aerospace Institute, National Aviation University of Ukraine, Ukraine*

**P-256 Influence of Surface Finishing Operations on the Dry Sliding Friction and Wear Response of Zirconia Composites:** Koenraad Bonny, Patrick De Baets, Jeroen Van Wittenbergh\*, S. Van Austrève, *Ghent University (UGent), Mechanical Construction and Production Department, Gent, Belgium*; Jozef Vleugels, Omer Van der Biest, *Catholic University of Leuven (K.U.Leuven), Metallurgy and Materials Engineering Department, Leuven, Belgium*; Bert Lauwers, *Catholic University of Leuven (K.U.Leuven), Mechanical Engineering Department, Leuven, Belgium*

**P-257 The Effect of Fine Particle Peening (FPP) Treatment on Adhesion of DLC Coatings on Aluminum Alloy:** Hiroshi Nanbu\*, Shoichi Kikuchi, *Graduate School of Science and Technology, Keio University, Yokohama-shi, Kanagawa, Japan*; Yutaka Kameyama, *RIKEN Ohmori Materials Fabrication Laboratory*; Jun Komotori, *Department of Mechanical Engineering, Keio University*

**P-258 Tribological Performance of Hydrophilic DLC Surfaces in Aqueous and Biological Environment:** Jin Woo Yi\*, *Convergence Technology Laboratory, Korea Institute of Science and Technology, Seoul, Korea*; Midathada Anil, *Center for Advanced Functional Materials, Korea Institute of Science and Technology, Seoul, Korea*; Sk. Faruque Ahmed, Myoung-Woon Moon, *Convergence Technology Laboratory, Korea Institute of Science and Technology, Seoul, Korea*; Jong-Kuk Kim, *Department of Surface Technology, Korea Institute of Materials Science, Changwon, Korea*; Yu Chan Kim, Hyun Kwang Seok, Seung Hee Han, *Center for Advanced Functional Materials, Korea Institute of Science and Technology, Seoul, Korea*; Kwang-Ryeol Lee, *Convergence Technology*

*Laboratory, Korea Institute of Science and Technology, Seoul, Korea*

**P-259 Droplet Volume Calculation Technique:** Sung-Bo Sim\*, Moon-Chul Yoon, *Department of Mechanical Engineering, Faculty of Engineering, Pukyong National University, Busan, Republic of Korea*

**P-260 Tribological Properties of Various DLC Films in Engine Oil:** Itto Sugimoto\*, Shinya Okamoto, Shizuka Yamaguchi, Kazutaka Okamoto, Shoichi Nakashima, *Materials Research Laboratory, Hitachi, Ltd., Hitachi-shi, Japan*

**P-261 The Effect of Hybrid Surface Treatment; Combination of Fine Particle Peening (FPP) and Gas Nitriding on Tribological Behavior of AISI 316 Stainless Steel:** Shoichi Kikuchi\*, Yasuhiro Nakahara, *Graduate School of Science and Technology, Keio University, Yokohama-shi, Kanagawa, Japan*; Jun Komotori, *Department of Mechanical Engineering, Keio University*

**P-262 Effect of Applied DC Voltage to Contact Interface on Friction of Si-based Ceramics in Water :** Takashi Izumi\*, Koshi Adachi, *Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan*

**P-263 Tribological Properties of Atmospheric Oxidized Ti-6Al-4V Alloy Pre-Treated with Fine Particle Peening (FPP):** Yujiro Yasutake\*, Yo Hirota, Shoichi Kikuchi, *Graduate School of Science and Technology, Keio University, Yokohama-shi, Kanagawa, Japan*; Jun Komotori, *Department of Mechanical Engineering, Keio University*

**P-264 Tribological Properties of DLC Film with Nanostructure Induced by Femtosecond Laser Irradiation:** Eisuke Sentoku\*, *JST Innovation Satellite Shiga, Ootsu, Shiga, Japan*; Tetsuya Tamamura, Taidoh Shirakawa, Tomomi Honda, Toshiro Miyajima, Masanori Tao, *University of Fukui*; Junsuke Kiuchi, *EYETEC CO., LTD*; Futoshi Matsui, *Industrial Technology Center of Fukui Prefecture*; Yoshiro Iwai, *University of Fukui*

**Manufacturing and Mechanical Components/ Manufacturing Processes**

**P-265 The Tribological Properties of complex Salt bath Nitrocarburized Low Carbon Alloy Steel for Pressure Vessels:** Dongphil Lim\*, Dongseob Shim, Sangbeom Kim, *Institute of Technology, Doosan Infracore, Republic of Korea*

**P-266 Environmentally Friendly Machining of Stainless Steel with Various Near-dry Methods:** Kenji Takahara\*, Toshiaki Wakabayashi, *Kagawa University, Takamatsu, Japan*; Akira Tsukuda, Toshifumi Atsuta, *Kagawa Prefectural Industrial Technology Center, Takamatsu, Japan*; Satoshi Suda, Junichi Shibata, *Nippon Oil Corporation, Yokohama, Japan*

**P-267 Multiscale Analysis of the Contact Stiffness Effect in Precision Belt-Grinding Process:** Sabeur Mezghani\*, Mohamed Ben Tkaya, Hassan Zahouani, *Laboratoire de Mécanique et de Procédés de Fabrication, Arts et Métiers ParisTech, Châlons en Champagne, France*; Mohamed El Mansori, *Laboratoire de Tribologie et Dynamique des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon, Ecully, France*; Edoardo Sura, *RENAULT S.A.S., Direction de la Mécanique/Direction de l'Ingénierie Process, Paris, France*

**P-268 Material Removal and Surface Modification in Chemical Mechanical Polishing of GaAs Wafer :** Yan Zhou\*, Guoshun Pan, Yonghua Zhu, *The State Key Laboratory of Tribology, Tsinghua University, Beijing, China*, *Research Institute of Tsinghua University in Shenzhen, Shenzhen, China*; Jianbin Luo, Xinchun Lu, *The State Key Laboratory of Tribology, Tsinghua University, Beijing, China*; Yan Liu, *Research Institute of Tsinghua University in Shenzhen, Shenzhen, China*

**P-269 Effect of the Stability Parameters of Nano-SiO2 Slurries on Chemical-Mechanical Polishing (CMP) of Silicon Wafer:** Zhonghua Gu\*, Guoshun Pan, Tuo Li, *The State*

Key Laboratory of Tribology, Tsinghua University, Beijing, China, Research Institute of Tsinghua University in Shenzhen, Shenzhen, China; Jianbin Luo, Xinchun Lu, The State Key Laboratory of Tribology, Tsinghua University, Beijing, China; Yan Liu, Research Institute of Tsinghua University in Shenzhen, Shenzhen, China

**P-270 A Fundamental Study on Wet Blast Processing Using a Micro Slurry-Jet Erosion (MSE) Tester:** Boyu Dong\*, Toshiro Miyajima, Department of Mechanical Engineering, University of Fukui, Fukui-city, Fukui, Japan; Tohru Matsubara, Macoho Co., Ltd., 525 Isurugi, Nagaoka, Nigata, Japan; Yoshiro Iwai, Department of Mechanical Engineering, University of Fukui, Fukui-city, Fukui, Japan

#### Manufacturing and Mechanical Components/ Bearings

**P-271 A Study on Thermohydrodynamic Lubrication of Misaligned Journal Bearing with Rough Surface:** Jun Sun\*, Mei Deng, Yonghong Fu, Changlin Gui, School of Mechanical and Automotive Engineering, Hefei University of Technology, Hefei, China

**P-272 A Coupled Elastohydrodynamic Solution for Rolling Contact Fatigue Cracks:** Robbie Balcombe\*, Mark Fowell, Andrew V. Olver, Department of Mechanical Engineering, Imperial College London, South Kensington Campus, London, UK; Stathis Ioannides, SKF-ERC, Nieuwegein, The Netherlands; Daniele Dini, Department of Mechanical Engineering, Imperial College London, South Kensington Campus, London, UK

**P-273 Investigation of the Wear Resistance of Resin Bearings under Water-Conditions:** Takashi Honda\*, Graduate School of Engineering, Kyushu University, Fukuoka City, Fukuoka, Japan; Katsuyuki Kida, Edson Costa Santos, Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka; Yuji Kashima, Kashima Bearing Corporation, Osaka; Kenji Kanemasu, Yoshinori Industry, Ltd., Osaka

**P-274 Theoretical Analysis of Aerostatic Porous Bearing Guide for Large Glass Sheets in Liquid Crystal Display Manufacturing Equipment :** Masaya Msuda\*, Atsushi Kitano, Tomoko Hirayama, Takashi Matsuoka, Department of Mechanical Engineering, Doshisha University, Kyotanabe, Kyoto, Japan

**P-275 Investigation of Water Repellent Thrust Bearing:** Akitoshi Takeuchi\*, Department of Mechanical Systems Engineering, Kochi University of Technology, Kami-shi, Kochi, Japan; Seichi Terada, Automax Co. Ltd., Tokyo, Japan

**P-276 Bearing Life Calculation for Wind Turbine Gearbox:** Qi Zhang\*, Huibo He, Jaijun Ku, Seongmin Moon, Graduate School of Mechanical Engineering, Gyeongsang National University, Korea; Sungki Lyu, School of Mechanical & Aerospace Eng., ReCAPT(K-MEM R&D Cluster), Gyeongsang Nat. Univ., South Korea

**P-277 Frictional Characteristics of Ball Screws under Oscillating Operation:** Masahiro Ueda\*, Department of Mechanical Engineering, Graduate School of Science and Technology, Meiji University, Kawasaki, Japan; Hirokazu Shimoda, Department of Mechanical Engineering, School of Science and Technology, Meiji University, Kawasaki, Japan; Noritsugu Hiraga, Technical Department, Plastics Machinery Division, Sumitomo Heavy Industries, Ltd., Chiba, Japan

**P-278 Simple Experiment on Permeation of Hydrogen into Steel in Contact:** Takefumi Otsu\*, Department of Mechanical Engineering Science, Graduate School of Kyushu University, Fukuoka, Japan; Hiroyoshi Tanaka, Department of Mechanical Engineering, Kyushu University; Katsu Ohnishi, Research Center for Hydrogen Industrial Use and Storage, National Institute of Advanced Industrial Science and Technology (AIST); Joichi Sugimura, Department of Mechanical

Engineering, Kyushu University, Research Center for Hydrogen Industrial Use and Storage, National Institute of Advanced Industrial Science and Technology (AIST)

**P-279 New Mathematical Model for Calculation of the Rolling Bearing Fatigue Life:** Evgeny B. Varlamov\*, Tchernevskiy Leonid V., All-Russia Research Institute of Bearings Industry, Moscow, Russia

#### Manufacturing and Mechanical Components/ Gears

**P-280 Tooth Surface Temperature and Tooth Root Stress of Spur Gear with Large Face Width:** Kiyotaka Ikejo\*, Kazuteru Nagamura, Department of Mechanical System Engineering, Hiroshima University, Higashi-Hiroshima, Japan; Kouhei Yamaguchi, Former in Graduate School of Hiroshima University; Fumihiko Yokoyama, Hideki Ogata, Takashi Nakajima, IHI Corporation

**P-281 Gear Rattle Modelling and Meshing Gear Teeth Behaviour Estimation Considering Lubrication Influence:** Hiroki Yamaguchi\*, Mitsubishi Motors Corporation, Okazaki, Japan; Kazuhide Togai, Hiroki Yamaura, Mitsubishi Automotive Engineering Co., Ltd.; Jamie Pears, Theo Potter, Romax Technology Ltd., Nottinghamshire, UK

**P-282 A New Approach to Evaluate Friction Characteristics of Reciprocating Seal:** Yasushi Kojima\*, Yuki Sato, Shigenobu Honda, Engineering Research Department, Corporate Technology Office, NOK CORPORATION, Fujisawa-shi, Kanagawa, Japan; Hidenori Arai, Takayuki Oyama, Koichi Mizunoya, Design Department, Oil Seal Division, NOK CORPORATION

**P-284 Gasket Rubber Materials for the Intake Manifold for FFV:** Tomoyuki Koyama\*, Shinya Nakaoka, Shuji Yoshitsune, Jun Kobayashi, Design Department, Gaskets Division, Nihonmatsu Plant, NOK Corporation, Nihonmatsu-shi, Fukushima, Japan; Ayako Niihara, Material Engineering Department, Corporate Technology office, Shonan R&D Center, NOK Corporation

#### Manufacturing and Mechanical Components/ Other Components

**P-285 Fretting Wear of the Fuel Cladding Tubes of Nuclear Fuel Rod against Supporting Grids:** Jin-Seon Kim, Se-Min Park, Young-Ze Lee\*, School of mechanical engineering, Sungkyunkwan University, Korea

**P-286 Effect of Machining Oil Properties on EDM Performance:** Tomohiko Kitamura\*, Ryoichi Okuda, Lubricants Research Laboratory, Idemitsu Kosan Co. Ltd., Ichihara-Shi, Chiba, Japan; Shinya Hayakawa, Fumihito Itoigawa, Takashi Nakamura, Department of Mechanical Engineering, Nagoya Institute of Technology, Nagoya-Shi, Aichi, Japan

**P-287 Effect of Sliding Surface Oil Pocket on Oil Film Pressure in Model Test Piece of Wet Facing:** Takeshi Yamazaki\*, Student, Graduate school of Engineering, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan; Hironobu Ito, Koji Ikeda, Graduate school of Engineering, Tokyo University of Agriculture and Technology

**P-288 Design and Trial of Micro Wedge Ring Type Roller Speed Reducer:** Yuki Oda\*, Masayoshi Muraki, Kikuo Okamura, Department of Mechanical Engineering, Graduate School of Shonan Institute of Technology, Fujisawa, Kanagawa, Japan

**P-289 Effect of Surface Roughness of Mechanical Seal under Blood Sealing:** Jun Tomioka, Norifumi Miyayama\*, Faculty of Science and Engineering, Waseda University, Tokyo, Japan

**Thursday 10th, September**

**B1-31 Tribology Fundamentals/ Friction I**

8:40-10:20, Room B-1

Session Chair: Takahiro Nitta, Gifu University, Japan  
Hassan Zahouani, Ecole Centrale de Lyon, France

**B1-311 Tribological and Kinematic Analysis of Walking-Style for Reducing the Peak Traction Coefficient between Shoe Sole and Floor:**

Takeshi Yamaguchi\*, Kazuo Hokkirigawa, Graduate School of Engineering, Tohoku University, Sendai, Miyagi, Japan

**B1-312 Elementary Investigation in Modifying UHMWPE with Schiff Base Copper Complex for the Use as an Artificial Hip Joint Material:**

Li Wu\*, Wuhan Research Institute of Materials Protection, P. R. China, Wuhan Institute of Technology, P. R. China; Xinlei Gao, Wuhan Polytechnic University, P. R. China; Meng Hua, City University of Hong Kong, P. R. China; Jian Li, Wanzhen Gao, Wuhan Research Institute of Materials Protection, P. R. China

**B1-313 Discrete Element Method : How Complexity Emerges from Simple Interaction Particle Laws:**

Ivan Jordanoff\*, ARTS ET METIERS Paristech, LAMEFIP, France; Yves Berthier, INSA de Lyon, LaMCoS, Villeurbanne, France

**B1-314 Theoretical Study on Mechanics of Paper Feeding with Rubber-Covered Roller Drive:**

Tetsuya Endoh, Manshu Kameike\*, Engineering Research Department, Engineering Office, NOK Corporation, Fujisawa-shi, Kanagawa, Japan; Shuhei Noda, Engineering Department 3, Engineering Office, SYNZTEC Corporation

**B1-315 Experimental and Theoretical Investigations into Slippage Phenomena in Wound Webs:**

Hiromu Hashimoto, Department of Mechanical Engineering, School of Engineering, Tokai University, Hiratsuka City, Kanagawa, Japan; Puttha Jeenkour\*, Mongkol Mongkolwongrojn, Department of Mechanical Engineering, ReCCIT, RGJ, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

**B1-32 Tribology Fundamentals/ Friction II**

10:50-12:30, Room B-1

Session Chair: Hiromu Hashimoto, Tokai University, Japan  
Ivan Jordanoff, ARTS ET METIERS Paristech, France

**B1-321 Measurement of Rolling Friction:** Kenneth G. Budinski\*, Bud Labs, USA

**B1-322 Mixed and Boundary Lubrication**

**Characteristics of Plain Bearing Materials in**

**Contra-Rotating Ball-on-Disk Tribo-Tester:** Hiromitsu Katsuki\*, Akira Ono, Yoshikazu Mizuno, DAIDO METAL CO., LTD., Inuyama, Aichi, Japan; Tsunamitsu Nakahara, Tokyo Institute of Technology

**B1-323 Pure Rolling Contact Fatigue Test Rig:** Jingling Zhou\*, Guoqing Wu, Jiangchun Chen, Junli Zhang, School of Mechanical Engineering, Nantong University, Nantong, China

**B1-324 Influence of Outer Facing Design on Drag Torque of Automatic Transmission Wet Clutches:**

Kazunari Asai\*, Parts R&D Department, Drive-Train Parts Group, Aisin Chemical Co., Ltd., Toyota, Aichi, Japan

**B1-325 Tribological Approach to Improve Transmission Efficiency of a Steel-Belt CVT :**

Hirofumi Michioka\*, Product Performance & System Development Department, R & D Division, JATCO Ltd., Atsugi City, Kanagawa, Japan; Yoshiaki Kato, Advanced Technology Development Department Advanced Technology Division, JATCO Ltd., Tokyo University of Marine Science and Technology

**B1-33 Tribology Fundamentals/ Friction III**

15:00-16:40, Room B-1

Session Chair: Seisuke Kano, National Institute of Advanced Industrial Science and Technology, Japan  
Denis Mazuyer, Ecole Centrale de Lyon, France

**B1-331 A Novel Study on High-Frequency Dry Friction:**

Shuwen K. Wang\*, Jim Woodhouse, John A. Williams, Department of Engineering, The University of Cambridge, UK

**B1-332 Observation of Surface Wave Propagations within Contact Zones during Transition between Stick and Slip Phases:**

Satoru Maegawa\*, Yokohama National University, Yokohama, Japan; Atsushi Suzuki, Toyota Motor Corporation, Japan; Ken Nakano, Yokohama National University, Yokohama, Japan

**B1-333 An Experimental Setup for Measuring Velocity-Dependent and Velocity-Independent Frictions from Free Damped Oscillations:**

Emmanuel RIGAUD\*, Joel PERRET-LIAUDET, Michel BELIN, Jean-Michel MARTIN, Laboratoire de Tribologie et Dynamique des Systèmes, UMR 5513, Ecole Centrale de Lyon, ECULLY Cedex, France

**B1-334 Map of Low-Frequency Stick-Slip of Creep**

**Groan:** Zahru Fuadi\*, Koshi Adachi, Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan; Satoru Maegawa, Ken Nakano, Graduate School of Environment and Information Sciences, Yokohama National University

**B1-335 Sliding Friction of Elastomer with Well-Defined Surface Topography and in Situ Observation of its**

**Frictional Interface:** Takahiro Nitta\*, Kazuyuki Nishio, Yusuke Yoshida, Jun-ichi Sugiura, Motohisa Hirano, Department of Mathematics and Design Engineering, Faculty of Engineering, Gifu University, Gifu, Japan

**B1-34 Tribology Fundamentals/ Friction IV**

17:10-18:50, Room B-1

Session Chair: Ken Nakano, Yokohama National University, Japan  
Shuwen K Wang, The University of Cambridge, UK

**B1-341 Development of a New Wheel Tread Profile and the Examination Result in Narrow-Gauge Lines:**

Osamu Higashida\*, Department of Engineering, West Japan Railway Company Railway headquarters, Osaka, Japan

**B1-342 The Level of Rubbing Sound in Relation to Surface Roughness in Several Systems:**

Boyko Stoimenov\*, Alain Le Bot, Laboratory of Tribology and System Dynamics, Ecole centrale de Lyon, Université de Lyon, Ecully, France; Koshi Adachi, Laboratory of Tribology, Division of Mechanical Engineering, Tohoku University, Sendai, Japan; Koji Kato, Department of Mechanical Engineering, College of Engineering, Nihon University, Koriyama, Fukushima, Japan; Hassan Zahouani, Laboratory of Tribology and System Dynamics, Ecole centrale de Lyon, Université de Lyon, Ecully, France

**B1-343 Tribological Modeling from In-situ Monitoring of Metal Friction and Wear:**

Seisuke Kano, Takeshi Suzuki\*, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan

**B1-344 Friction Dynamics and Vibro-acoustics of a**

**Water Lubricated Rubber/Glass Contact:** Fabrice Deleau, Denis Mazuyer\*, Ecole Centrale de Lyon, Laboratoire de Tribologie et Dynamique des Systèmes, Ecully Cedex, France; Alain Koenen, Valeo Système d'Essuyage, 8 rue Louis Normand 78321 La Verrière, France

**B1-345 Experiments on Burrige-Knopoff Model Using Granular Material Covered Surfaces:**

Osamu Hirayama\*, Takuya Tabuchi, Shigetaka Suzuki, Department of Mechanical Systems Engineering, Tokyo University of Agriculture and Technology, Koganei-shi, Tokyo, Japan

**B2-31 Mini-symposium/ Tribological aspects of fluid power I**

8:40-10:20, Room B-2

Session Chair: Toshiharu Kazama, Muroran Institute of Technology, Japan  
Heinrich W Theissen, RWTH Aachen University, Germany

**B2-311 Efficiency of Axial Piston Pumps utilizing Coated Tribological Systems and Environmentally Friendly Fluids (Invited):** Claus Enekes\*, Hubertus Murrenhoff, *Institute for Fluid Power Drives and Controls, RWTH Aachen University, Aachen, Germany*

**B2-312 A Thermohydrodynamic Lubrication Model Applicable to a Slipper of Swashplate Type Axial Piston Pumps and Motors (Invited):** Toshiharu Kazama\*, *Department of Mechanical Systems Engineering, Muroran Institute of Technology, Muroran, Hokkaido, Japan*

**B2-313 Effect of Groove Sectional Shape on the Lubrication Characteristics of Hydraulic Spool Valve:** Tae-Jo Park\*, *School of Mechanical & Aerospace Engineering, ERI, Gyeongsang National University, Jinju, Korea; Yun-Geon Hwang, Graduate School of Mechanical & Aerospace Engineering, Gyeongsang National University*

**B2-314 Soft EHL Analysis of an Elastomeric Hydraulic Seal During Transient Operation (Invited):** Azam Thatte\*, Richard F. Salant, *George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA*

**B2-32 Mini-symposium/ Tribological aspects of fluid power II**

10:50-12:30, Room B-2

Session Chair: Toshiharu Kazama, Muroran Institute of Technology, Japan  
Heinrich W Theissen, RWTH Aachen University, Germany

**B2-321 Keynote: The German Market Introduction Program for Biobased Lubricants:** Heinrich W Theissen\*, *RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany*

**B2-322 Characterization of Oily High Bulk Modulus Fluid:** Toshiyuki Tsubouchi\*, *Advanced Technology Research Laboratories, Idemitsu Kosan Co., Ltd., Sodegaura, Chiba, Japan; Jitsuo Shinoda, Lubricants Research Laboratory, Idemitsu Kosan Co., Ltd.*

**B2-323 Change of Coefficient of Friction due to Ageing of Fluids:** Jan Schumacher\*, *Institute for Fluid Power Drives and Controls, RWTH Aachen University, Germany; Oliver-Carlos Göhler, Fluifronics GmbH, Krefeld, Germany; Hubertus Murrenhoff, Institute for Fluid Power Drives and Controls, RWTH Aachen University, Germany*

**B2-33 Tribosystems/ Railways, Heavy Machinery and Maintenance**

15:00-16:40, Room B-2

Session Chair: Robert J Bruckner, NASA, USA  
Mamoru Oike, Ishinomaki Senshu University, Japan

**B2-331 Design of a High Speed Back-Up Roll Chock-Bearing System for Optimized Oil Flow Rate:** Michael N. Kotzalas\*, Krich Sawamiphakdi, Mathew G. Wilmer, E. Buddy Damm, *The Timken Company, Canton, OH, USA*

**B2-332 Effects of Oil Supply Flow Rate and Oil Spray Nozzle Design on Tilting Pad Journal Bearing Performance:** Minoru Hanahashi\*, Kazuhiko Kawaike, Masahiro Kusaka, Motohisa Uesato, *Daido Metal Co., Ltd., Inuyama, Japan*

**B2-333 A proposal of lubricant Maintenance by Peroxide Value Monitoring:** Ichiro Minami\*, *Department of Chemical Engineering, Faculty of Engineering, Iwate University, Morioka, Iwate, Japan; Hisakazu Mori, Akihisa Katoh, Yoshio*

Marukane, Yasushi Kohzu, *Sumitomo Chemical Co. Ltd., Nihama, Ehime, Japan*

**B2-334 Life Cycle Assessment Study on Tribological Technologies for Railway:** Taro Tsujimura\*, Naoki Aihara, *Materials Technology Division, Railway Technical Research Institute, Kokubunji-shi, Tokyo, Japan; Hiroshi Tsuchiya, Frictional Materials Lab., Materials Technology Division, Railway Technical Research Institute; Sumiko Hibino, Yasutomo Sone, Lubricating Materials Lab., Materials Technology Division, Railway Technical Research Institute*

**B2-335 Application of the Dang Van Fatigue Criterion to the Rail/Wheel Contact Problem.:** Daniel F. C. Peixoto, Luis A. A. Ferreira\*, Paulo M. S. T. Castro, *Department of Mechanical Engineering and Industrial Management, Faculty of Engineering, University of Porto, Portugal*

**B2-34 Tribosystems/ Aerospace**

17:10-18:50, Room B-2

Session Chair: Masanori Iwaki, Japan Aerospace Exploration Agency, Japan  
Michael N Kotzalas, The Timken Company, USA

**B2-341 Keynote: A Success Story, the Clouds and the Earth's Radiant Energy System Biaxial Scan Assembly :** C. John Lo\*, *Northrop Grumman Aerospace Systems, CA, USA; William R. Jones, Sest, Inc., OH, USA; Philip Tokeshi, Moog Chatsworth Operations, CA, USA; Karen B. Gibson, NASA Langley Research Center, VA, USA*

**B2-342 Research of Friction and Wear in Open Space:** Marat Bronovets\*, *Institute for Problems in Mechanics of the Russian Academy of Sciences, Moscow, Russia*

**B2-343 Effect of the Recess Aspect Ratio on Cryogenic Hybrid Journal Bearings:** Mamoru Oike\*, *Department of Mechanical Engineering, Faculty of Science and Engineering, Ishinomaki Senshu University, Ishinomaki-shi, Miyagi, Japan; Masataka Kikuchi, Satoshi Takada, Takayuki Sudo, Makoto Yoshida, Space Transportation Propulsion Research and development Center, Space Transportation Mission Directorate, Japan Aerospace Exploration Agency*

**B2-344 Tribological Challenges of the Optimized Rotorcraft Propulsion System:** Robert J. Bruckner\*, *NASA, Glenn Research Center, Cleveland, Ohio USA*

**C1-31 Lubrication, Lubricants and Additives/ Elasto-hydrodynamic Lubrication III**

8:40-10:20, Room C-1

Session Chair: Antonius A Lubrecht, INSA Lyon, France  
Session Chair: Kazuyuki Yagi, Kyushu University, Japan

**C1-311 Effects of Surface Topography on Lubrication Film Formation within Mixed Lubricated Contacts during Start up:** Ivan Krupka\*, Martin Hartl, Petr Svoboda, *Institute of Machine and Industrial Design, Faculty of Mechanical Engineering, Brno University of Technology, Brno, Czech Republic*

**C1-312 Formulas for Friction Coefficient Estimation in Non-Conformal Lubricated Contacts:** Enrico Ciulli\*, *Dipartimento di Ingegneria Meccanica, Nucleare e della Produzione, Faculty of Engineering, University of Pisa, Pisa, Italy*

**C1-313 Study on Variable Preload Type Micro-Traction-Drive Utilized Taper-Roller Bearing under Forward Reverse Condition:** Yasuyoshi Tozaki\*, Takeshi Yoshimi, *Mitsubishi Heavy Industries LTD., Technical Headquarters, Nagasaki, Nagasaki, Japan; Isamu Shiotsu, Mitsubishi Heavy Industries LTD., Machine Tool Division, Nagoya, JAPAN*

**C1-314 A Stable Numerical Approach to Original and Asymptotic Equations for Heavily Loaded Line EHL Contacts:** Ilya I. Kudish\*, *Department of Mathematics, Kettering University, Flint, MI, USA*

**C1-315 A Finite Element Fully-Coupled Approach to Solve EHD Problems - How to Build an EHL Solver in Less than Ten Minutes?** : Wassim Habchi\*, *Lebanese American University (LAU), Department of Industrial and Mechanical Engineering, Byblos, Lebanon*; Dominique Eyheramendy, *LMA, Ecole Centrale Marseille, CNRS UPR7051, Marseille Cedex 20, France*; Philippe Vergne, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS, UMR 5259, Villeurbanne, France*; Guillermo Morales-Espejel, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS, UMR 5259, Villeurbanne, France, SKF Engineering and Research Center, Nieuwegein, The Netherlands*

**C1-32 Lubrication, Lubricants and Additives/ Elastohydrodynamic Lubrication IV**

10:50-12:30, Room C-1

Session Chair: Yuji Enomoto, Toyama Industrial Technology Center, Japan

Ilya I Kudish, Kettering University, USA

**C1-321 Mass Conserving Elastohydrodynamic Lubrication Model of Engine Bearings with an Oil Passage: Effects of Surface Textures and Pressure-Viscosity Relation on Friction:** Toshihiro Ozasa\*, *Department of Mechanical Engineering, Faculty of Engineering, Osaka Electro-Communication University, Neyagawa-shi, Osaka, Japan*

**C1-322 Frictional and Rheological Behaviour of EHL Films: the Relative Influence of Additives and Base Oil:**

Juliette Cayer-Barrioz\*, Elie Bou-Chakra, Denis Mazuyer, *Laboratoire de Tribologie et Dynamique des Systèmes, UMR 5513, Ecole Centrale de Lyon, Ecully Cedex, France*; Frédéric Jarnias, Alain Bouffet, *TOTAL FRANCE-Centre de REcherches de Solaize, Solaize, France*

**C1-323 Effect of Oil Starvation on Point Contact Thermal EHL with Surface Irregularity:** Jing Wang\*, *School of Mechanical Engineering, Qingdao Technological University, Qingdao, China*; Peiran Yang, Motohiro Kaneta, *Department of Mechanical and Control Engineering, Kyushu Institute of Technology, Kitakyushu, Japan*

**C1-324 Anomalous Elastohydrodynamic Films of Fatty Alcohols in Circular Contacts:** Kazuyuki Yagi\*, Joichi Sugimura, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Philippe Vergne, *Mecanique des Contacts et des Solides et de la dynamique des Structures, INSA de Lyon, Villeurbanne Cedex, France*

**C1-33 Lubrication, Lubricants and Additives/ Elastohydrodynamic Lubrication V**

15:00-16:40, Room C-1

Session Chair: Juliette Cayer-Barrioz, Ecole Centrale de Lyon, France

Toshihiro Ozasa, Osaka Electro-Communication University, Japan

**C1-331 Shear Stress Analysis of EHL Oil Films Based on Thermal EHL Theory under Elliptical Contact:**

Toshifumi Mawatari\*, Akira Nakajima, *Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University, Saga-shi, Saga, Japan*

**C1-332 Interfacial Slippage Characteristics of Traction Fluids:** Patrick L. Wong\*, *Department of Manufacturing Engineering and Engineering Management, City University of Hong Kong, Hong Kong, China*; Feng Guo, Xinming Li, *Mechanical Engineering Department, Qingdao Technological University, Qingdao, Shandong, China*

**C1-333 EHL Numerical Simulation in Reciprocating Rolling Point Contact:** Naoshi Izumi\*, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Masaru Nakashima, *Graduate School of Kyushu University (present affiliation: Toyota Motor*

*Corporation)*; Kenji Watanabe, *Graduate School of Kyushu University (present affiliation: Miura Co., Ltd.)*; Takehiro Morita, Joichi Sugimura, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*

**C1-334 Film Thickness Prediction in Wide Elliptical EHL**

**Contacts:** A. Canzi, Philippe Sainsot, *Université de Lyon, INSA-Lyon, LaMCoS, CNRS UMR 5259, Villeurbanne, France*; C. H. Venner, *University of Twente, The Netherlands*; A. A. Lubrecht\*, *Université de Lyon, INSA-Lyon, LaMCoS, CNRS UMR 5259, Villeurbanne, France*

**C1-34 Manufacturing and Mechanical Components/ Gears**

17:10-18:50, Room C-1

Session Chair: Fumihito Itoigawa, Nagoya Institute of Technology, Japan

Takashi Nogi, Japan Aerospace Exploration Agency, Japan

**C1-341 Measurement of Contact Pressure Distribution between Gear Teeth Using a Thin-film Sensor:** Yuji Mihara, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo City University, Tokyo, Japan*; Michiyasu Owashi\*, *Graduate school, Tokyo City University*; Yoshitaka Ide, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo City University, Tokyo, Japan*; Tsuneo Someya, *Professor emeritus, The University of Tokyo*

**C1-342 Effect of Surface-Rolling on Surface Durability of High Density Sintered Metal Rollers:** Takao Koide\*, *Department of Mechanical and Aerospace Engineering, Graduate School of Engineering, Tottori University, Tottori, Japan*; Ichiro Ishizuka, *Powertrain Production Engineering Division, Nissan Motor, Co., Ltd.*; Teruie Takemasu, *Department of Mechanical and System Design, Tokyo University of Science, Suwa*; Kouitsu Miyachika, Yasuhiro Fukai, *Department of Mechanical and Aerospace Engineering, Graduate School of Engineering, Tottori University, Tottori, Japan*

**C1-343 Traction Characteristics in Traction Drive of Concave and Convex Roller Pair (Cases using Traction Oils TD10, TD22 and KTF-1):** Kouitsu Miyachika\*, *Department of Mechanical and Aerospace Engineering, Graduate School of Engineering, Tottori University, Tottori, Japan*; Takeshi Wada, Kosuke Fujita, *Department of Mechanical Engineering, Graduate School of Engineering, Tottori University*; Yoshitaka Tamoto, *Lubricants Research Laboratory, Idemitsu Kosan Co. Ltd., Ichihara, Japan*; Takao Koide, *Department of Mechanical and Aerospace Engineering, Graduate School of Engineering, Tottori University, Tottori, Japan*; Satoshi Oda, *Department of Mechanical Systems Engineering, Faculty of Engineering, Fukuyama University, Fukuyama, Japan*

**C1-344 Influence of Running-in on Tooth Surface Strength Increase of Carburized Gears:** Masatoshi Yoshizaki\*, *Power Train Evaluation & Engineering Division, Hino Motors, Ltd., Tokyo, Japan*

**C1-345 Study of Spur Gear Contact Deflection, Compliance and Load-Sharing Ratio, Using Asymptotic Numerical Method Combined with Finite Element Method:** Frej Chaouachi\*, Ali Zghal, *Unité de recherche Mécanique des Solides, de Structure et Développement Technologique. Ecole supérieure des sciences et des techniques Tunis. Université de Tunis*

**C2-31 Lubrication, Lubricants and Additives/ Grease I**

8:40-10:20, Room C-2

Session Chair: Philippa M Cann, Imperial College London, UK  
Akihito Suzuki, Tokyo Institute of Technology, Japan

**C2-311 Lubricating Characteristic of Composite Grease with CNT Additive:** Yicheng Yang\*, *Graduate School of*

*Science and Technology, Shinshu University, Japan; Tsuneaki Yamabe, Ick Soo Kim, Yuji Enomoto, Faculty of Textile Science & Technology, Shinshu University, Ueda, Nagano, Japan*

**C2-312 Development of High Lubricating Grease for Splines:** Satoshi Bunne\*, Shozo Ikejima, *Materials Engineering R&D Department, Denso corporation, Kariya-shi, Aichi-ken, Japan; Kazuhiro Andoh, Engine Electrical Systems Engineering Department, Denso corporation, Kariya-shi, Aichi-ken, Japan; Kiyomi Sakamoto, Lubricants Research Laboratory, Nippon Oil corporation, Yokohama-shi, Kanagawa-ken, Japan*

**C2-313 Lubrication of the Ball Bearing by HYBRID Grease:** Takeshi Hishinuma\*, Toshio Nitta, Takao Kanno, *NOK KLUEBER CO., LTD., Kitaibaraki-shi, Ibaraki-ken, Japan*

**C2-314 Development of Noise Reducing Grease (Part 1) - The Impact of Oil Film Thickness on Noise Reduction Characteristics of Greases - :** Kyosuke Ikuma\*, Mitsuhiro Kakizaki, *Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan; Koji Sakakibara, Shozo Ikejima, Material Engineering R&D Department, DENSO CORPORATION, Kariya, Aichi, Japan; Dr. Nobuyoshi Ohno, Department of Mechanical Engineering, Faculty of Science and Engineering, SAGA UNIVERSITY, Saga-shi, Japan*

## C2-32 Lubrication, Lubricants and Additives/ Grease II

10:50-12:30, Room C-2

Session Chair: Kenji Matsuda, *Kyushu Institute of Technology, Japan*

Tomas Polcar, *Czech Technical University in Prague, Czech Republic*

**C2-321 Keynote: Grease Degradation in Rolling Element Bearings-Development of a Simulation Tests:** Philippa Cann\*, *Tribology Section, Department of Mechanical Engineering, Imperial College, London, UK*

**C2-322 New Life Prediction Method of the Grease by the Activation Energy:** Azusa Ide\*, Yusuke Asai, Akio Takayama, *Motoharu Akiyama, Minebea Co., Ltd, Nagano, Japan*

**C2-323 Dielectric Relaxation Behavior of Lithium 12-Hydroxy Stearate Grease:** Akihito Suzuki\*, Shinichi Kotake, Masabumi Masuko, *Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Tokyo, Japan; Yukitoshi Fujinami, Industrial Lubricants Section, Lubricants Research Laboratory, Idemitsu Kosan Co., Ltd.*

## C2-33 Lubrication, Lubricants and Additives/ Lubricating Oil IV

15:00-16:40, Room C-2

Session Chair: Kosuke Ito, *Nihon University, Japan*  
Robert I. Taylor, *Shell Global Solutions, UK*

**C2-331 Effects of Pocket Aspect Ratio and Restrictor Attack Angle on the Flow and Pressure Fields inside a Steady-State, Single Pocket Hydrostatic Bearing: Numerical Simulation:** Frank E. Horvat, Minel J. Braun\*, *Department of Mechanical Engineering, College of Engineering, The University of Akron, USA*

**C2-332 Ecological Gear Oils - Good Perspectives or Dead-end? Comprehensive Comparison of Two Equivalent Industrial Gear Oils - with a Natural and Mineral Base:** Marian Szczerek\*, Waldemar Tuszynski, Elzbieta Rogos, Andrzej Urbanski, *Institute for Sustainable Technologies - National Research Institute (ITeE-PIB), Radom, Poland*

**C2-333 A Comparative Study of Mineral-Based and Environmentally Adapted Lubricants with Viscosity Index Improvers in Journal Bearings:** Gregory F. Simmons\*, Sergei B. Glavatskih, *Department of Applied Physics*

*and Mechanical Engineering, Luleå University of Technology, Luleå, Sweden*

**C2-334 Molecular Interaction Between Oleic Acid and Base Oils at Elastohydrodynamic Lubrication Contact :** Koji Takiwatari\*, Hidetaka Nanao, Shigeyuki Mori, *Department of Chemical Engineering, Faculty of Engineering, Iwate University, Morioka-shi, Iwate, Japan*

**C2-335 High-Pressure Rheology of Ionic Liquid:** Sobahan Mia\*, Kazutoshi Tomozawa, Shigeki Morita, Nobuyoshi Ohno, *Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University, Saga, Japan*

## C2-34 Lubrication, Lubricants and Additives/ Lubricating Oil V

17:10-18:50, Room C-2

Session Chair: Sahar F El Houssamy, *Egyptian Petroleum Research Institute, Egypt*

Eiji Nagatomi, *Showa Shell Sekiyu K.K., Japan*

**C2-341 Influence of Automotive Gear Oil on Rolling Fatigue Strength of Steel Roller:** Yoshitaka Manabe\*, Shin Saeki, *Lubricants Research & Development Center, Japan Energy Corporation, Toda, Saitama, Japan; Masahiro Fujii, Graduate school of natural science and technology, Okayama University; Akira Yoshida, Department of Mechanics and Robotics, Faculty of Engineering, Hiroshima International University*

**C2-342 Fuel Efficiency of Super High Viscosity Index 0W-20 Engine Oil:** Satoru Yoshida\*, Masaki Maruyama, Yasushi Naitoh, *Lubricants Research & Development Center, JAPAN ENERGY CORPORATION, Toda-shi, Saitama, Japan*

**C2-343 Characterization and Tribological Performances of a New Family of Linear PFPEs:** Fabio Riganti, *Fluids -Sales & Marketing- Solvay Solexis S.p.A.- Bollate (MI) - Italy; Pier Antonio Guarda, Fluids -R&D- Solvay Solexis S.p.A.- Bollate (MI) - Italy; Mitsuo Shinada\*, Fluids -Sales & Marketing- Solvay Solexis K.K. - Tokyo, Japan*

**C2-344 The Use of Renewable Basestock Lubricant Containing Metal-Free Additive and Their Effects on Triboproperties and Diesel Engine CO2 Emission:** Mutiara Husnawan\*, *Department of Mechanical Engineering, Syiah Kuala University, Banda Aceh - Indonesia, Department of Mechanical Engineering, University of Malaya, Kuala Lumpur - Malaysia; H. Hassan Masjuki, T.M.I Mahlia, M. Ghazaly Saifullah, E. N. Mohammad, Department of Mechanical Engineering, University of Malaya, Kuala Lumpur - Malaysia*  
**C2-345 Study of Future Engine Oil:** Naoto Koyamaishi\*, Motoichi Murakami, *Advanced Engine Development Department, Advanced Power Train Division 2, Toyota Motor Corporation, Shizuoka, Japan; Kenichi Komiya, Lubricants Research Laboratory, Research & Development Division, Nippon Oil Corporation; Hiroshi Moritani, Tribology Laboratory, Toyota Central R&D LABS., INC.*

## D-31 Symposium/ Industrial tribology issues in the Asia-Pacific region I

8:40-10:20, Room D

Session Chair: Koji Kato, *Nihon University, Japan*  
Gwidon W Stachowiak, *The University of Western Australia, Australia*

**D-311 Applied Tribology: Marriage of Research and Industrial Applications (Invited):** Michael M. Khonsari\*, *Fellow ASME, STLE, Dow Chemical Endowed Chair in Rotating Machinery, Professor of Mechanical Engineering, Louisiana State University, Baton Rouge, LA, USA*

**D-312 Tribology Needs in the Automotive Industry (Invited):** Martin Priest\*, *iETSI, School of Mechanical Engineering, The University of Leeds, Leeds, UK*

**D-313 Tribology in Australia - Past, Present and Future (Invited):** Gwidon W. Stachowiak\*, *Tribology Laboratory,*

*School of Mechanical Engineering, The University of Western Australia, Crawley, Western Australia*

**D-32 Symposium/ Industrial tribology issues in the Asia-Pacific region II**

10:50-12:30, Room D

Session Chair: Koji Kato, Nihon University, Japan  
Gwidon W Stachowiak, The University of Western Australia, Australia

**D-321 Nano to Macro-scale Tribological Issues in Industrial Technology (Invited):** Dae-Eun Kim\*, *Department of Mechanical Engineering, Yonsei University, Seoul, South Korea*

**D-322 Oil Free Machinery and "Zero Wear"- Dream or Reality? (Invited):** Mathias Woydt\*, *BAM Federal Institute for Materials Research and Testing, Berlin, Germany*

**D-323 New Solutions to New Problems-Tribology in Natural Sand Dust Environment (Invited):** Dongfeng Diao\*, *Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China*

**D-33 Mini-symposium/ Tribology for automotive fuel economy I**

15:00-17:00, Room D

Session Chair: Keiji Hayashi, Toyota Motor Co., Ltd., Japan  
Shuzo Sanda, Toyota Central Research and Development Labs., Inc., Japan

**D-331 Tribo-Technologies for Improving Fuel Efficiency:** Keiji Hayashi\*, Yoshio Fuwa, *Power Train Material Engineering Div., Toyota Motor Corporation, Toyota, Aichi, Japan*

**D-332 Development of Hydrogen-Free DLC Coating and Engine Applications (Invited):** Yutaka Mabuchi\*, Tsuyoshi Higuchi, *Powertrain Materials Group, Materials Engineering Department, Vehicle Component Technology Development Division, Nissan Motor Co., LTD., Kanagawa, Japan*

**D-333 Reduction of Friction between Cam and Follower by Surface Finishing and Coating:** Yuki Matsushita, Shingo Sakaguchi, Mitsuhiro Soejima, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu Sangyo University, Fukuoka, Japan*; Toru Tanji\*, Eiji Ogawa, Motonobu Onoda, *Technical Development Department, Nippon Piston Ring Co., Ltd.*

**D-334 Reduction of Friction Loss in a Valve Train with Roller Rockers:** Hiroharu Tokoro, Shuzo Sanda\*, *Tribology Laboratory, Mechanical System Research Division, Toyota Central Research and Development Labs., Inc., Nagakute, Aichi, Japan*

**D-335 Technical Challenge to Reduce Friction of Piston Rings:** Hidetsugu Yamamoto\*, Seiji Tamaki, Takatsugu Iwashita, Masago Yamamoto, *Teikoku Piston Ring Co., LTD., Okaya-shi, Nagano, Japan*

**D-336 An Analytical Study on the Mixed Lubrication of an Offset Barrel Faced Ring in an Internal Combustion Engine:** Toshiro Hamatake\*, *Department of Mechanical Engineering, Faculty of Engineering, Oita University, Japan*; Tomoya Kimura, *Graduate School of Engineering, Oita University*

**D-34 Mini-symposium/ Tribology for automotive fuel economy II**

17:10-19:10, Room D

Session Chair: Keiji Hayashi, Toyota Motor Co., Ltd., Japan  
Shuzo Sanda, Toyota Central Research and Development Labs., Inc., Japan

**D-341 Soft Metal Overlays of Sliding Bearings for Internal Combustion Engines:** Takashi Tomikawa\*, *Taiho Kogyo Co., Ltd., Toyota-city, Aichi-pref, Japan*

**D-342 Development of Super-low Friction Torque Tapered Roller Bearing for High Efficiency Axle Differential:** Hiroki Matsuyama\*, *Research & Development Center, JTEKT Corporation, Kashiwara-shi, Osaka, Japan*; Kouji Kawaguchi, Atsuji Uemura, Naoki Masuda, *Bearing & Driveline Business Operations Headquarters, JTEKT Corporation*

**D-343 Advanced Technologies for Eco-friendly Engine Oils:** Shigeki Matsui\*, Akira Yaguchi, Kazuo Tagawa, *Research & Development Division, lubricants Research Laboratory, Transportation lubricants R & D Group NIPPON OIL CORPORATION, Yokohama, Kanagawa, Japan*

**D-344 Friction and Wear Characteristics of Low SAPS Oils in Concentrated Sliding Contacts:** Yuki Matsushita, Shingo Sakaguchi, Mitsuhiro Soejima, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu Sangyo University, Fukuoka, Japan*; Karl Winnard, Ian Sherrington, Edward H. Smith\*, *Jost Institute for Tribotechnology, University of Central Lancashire, UK*

**D-345 Lubricant Viscometric Profile for Optimal Fuel Economy and Wear Performance:** Isabella Goldmints, *Infineum USA, Linden, NJ, U.S.A.*; Simon Chung\*, *Infineum Singapore PTE Ltd, Singapore*

**D-346 Recent Technology of CV Joint Grease:** Shinya Kondo\*, *Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan*; Koji Saito, *Toyota Motor Corporation, Toyota, Aichi, Japan*

**F-31 Manufacturing and Mechanical Components/ Bearings - Ro 1 ling Bearing II**

8:40-10:20, Room F

Session Chair: Christopher DellaCorte, NASA, USA  
Hiroyuki Ohta, Nagaoka University of Technology, Japan

**F-311 Numerical Analysis of Cage Instability in Minimally Lubricated Ball Bearings:** Takashi Nogi\*, *Aerospace Research and Development Directorate, Japan Aerospace Exploration Agency, Chofu, Tokyo, Japan*; Kazuaki Maniwa, Shingo Obara, *Aerospace Research and Development Directorate, Japan Aerospace Exploration Agency, Tsukuba, Ibaraki, Japan*

**F-312 Development of Numerical Method for Coupled Simulation of Starved EHL and Macro Flow:** Kenichi Shibasaki\*, *Department of Mechanical Engineering for Production, Faculty of Engineering, The University of Tokyo, Tokyo, Japan, Basic Technology Research Center, NSK Ltd., Fujisawa-shi, Kanagawa, Japan*; Masato Taniguchi, *Basic Technology Research Center, NSK Ltd., Fujisawa-shi, Kanagawa, Japan*; Marie Oshima, *Department of Mechanical Engineering for Production, Faculty of Engineering, The University of Tokyo, Tokyo, Japan*

**F-313 Simulation of Fretting Fatigue in Conformal and Concentrated Contacts:** Dag Fritzson\*, Jonas Ståhl, *SKF Engineering & Research Centre, MDC RKs-2, 415 50Göteborg, Sweden*; Guillermo Morales-Espejel, *SKF Engineering & Research Centre, Nieuwegein, The Netherlands*

**F-314 CAGEDYN: a Contribution to Roller Bearing Dynamic Calculations:** Luc Houpert, *TIMKEN Europe, Colmar, France*

**F-315 Simulation Support for Rolling Bearings Cage Design:** Iakov Nakhimovski\*, Dag Fritzson, *Modeling & Simulation Department, SKF Engineering & Research Centre, Göteborg, Sweden*; Alexandre Manceau, Thierry Adane, *Development Cluster Ball Bearings, SKF France, St Cyr-sur-Loire, France*

**F-32 Manufacturing and Mechanical Components/ Seals I**

10:50-12:30, Room F

Session Chair: Yuki Sato, NOK CORPORATION, Japan  
Bernard Tournier, University of Poitiers, France

**F-321 Optical Investigations into Dynamic Radial Sealing Contacts With a Special Emphasis on the Application of the Laser Induced Fluorescence Method:**

B. Wennehorst\*, G. W. G. Poll, *Institute for Machine Elements, Engineering Design, and Tribology (IMKT), Leibniz Universitaet Hannover, Hannover, Germany*

**F-322 An analytical Approach of the TEHD Behaviour of Mechanical Face Seals Operating in mixed Friction.:**

Noël Brunetière\*, *Laboratory of Solid Mechanics, University of Poitiers, CNRS SP2MI, Chasseneuil cedex, France*

**F-323 Thermal Mechanical Contact Simulations for Sealing Materials under Rolling Sliding Contacts:** Wei Li\*, *Trelleborg Sealing Solutions UK, West Midlands, UK*

**F-324 Deterministic Simulations of Surface Roughness Effect on Mechanical Face Seals Performance:**

Christophe Minet, Noël Brunetière, Bernard Tournier\*, *Laboratory of Solid Mechanics, University of Poitiers, CNRS SP2MI, BP 30179, France*

**F-325 Friction and Wear Properties of PTFE Sliding Seals:** Chiharu Tadokoro\*, Yasuo Yoshii, Hitoshi Hattori, Daisuke Nishino, *TOSHIBA CORPORATION, Kawasaki, Japan*

**F-33 Manufacturing and Mechanical Components/ Seals II**

15:00-16:40, Room F

Session Chair: Hitoshi Hattori, TOSHIBA CORPORATION, Japan  
Richard F. Salant, Georgia Institute of Technology, USA

**F-331 Sliding Characteristics of Silicon Carbide under Water-Lubricated Conditions:** Masao Oka\*, Masami Miyazawa, Haruhiro Osada, Takao Shimomura, *Eagle Industry Co.,LTD., Sakado-shi, Saitama, Japan;* Yuji Yamamoto, *Professor Emeritus of Kyushu University, Fukuoka-shi, Fukuoka, Japan*

**F-332 Gas Transportation Mechanisms in Radial Lip Seals:** Shinya Nakaoka\*, *Design Department, Gaskets Division, Nihonmatsu Plant, NOK Corporation, Nihonmatsu-shi, Fukushima, Japan;* Yuki Sato, *Engineering Research Department, Corporate Technology office, Shonan R&D Center, NOK Corporation;* Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University*

**F-333 Numerical and Experimental Study of Phase Change in Water Lubricated Mechanical Face Seal:**

Fabien Migout\*, Noël Brunetière, Bernard Tournier, *Laboratory of Solid Mechanics, University of Poitiers, CNRS SP2MI, BP 30179, France*

**F-334 Research on the Fuel Seal of O-Rings for Low-Temperature and High-Pressure Environment :**

Tsuyoshi Takayama\*, Masaya Otsuka, Makoto Hatano, *Design Department of O-rings Division, NOK CORPORATION, Aso-city, Kumamoto, Japan;* Hiroyuki Sano, *Material Engineering Department of Corporate Technology Office, NOK CORPORATION;* Shigenobu Honda, Yuki Sato, *Engineering Research Department of Corporate Technology Office, NOK CORPORATION*

**F-335 Reducing CO2 Emissions - Lubrication and Friction of Modern Crankshaft Seals:** Frank Bauer\*, Werner Haas, *Institute of Machine Components, Universität Stuttgart, Stuttgart/ Germany*

**F-34 Manufacturing and Mechanical Components/ Seals III**

17:10-18:50, Room F

Session Chair: Ken Mao, The University of Warwick, UK  
Shinya Nakaoka, NOK Corporation, Japan

**F-341 Keynote: Recent Research and Future Challenges in Simulating Hydraulic Seals:** Richard F. Salant\*, *George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA*

**F-342 Visualization of Real Contact Area at Conical Inside-Seal Surfaces Using the Thin Au Film:** Yoshio Matsuzaki\*, *Ishikawa National College of Technology, Ishikawa, Japan;* Isami Nitta, *Department of Mechanical and Production Engineering, Niigata University;* Akinori Fuse, *Pacific Industrial CO., LTD.*

**F-343 Investigation of Frictional Behavior of Radial Shaft Seals for Pressurized Applications:** Hiroataka Mizuta\*, *Engineering Research Department, Corporate Technology Office, NOK CORPORATION, Fujisawa-shi, Kanagawa, Japan;* Satoshi Fukuoka, Kaoru Anzue, *Design Department, Oil Seals Division, NOK CORPORATION;* Yuki Sato, *Engineering Research Department, Corporate Technology Office, NOK CORPORATION, Fujisawa-shi, Kanagawa, Japan*

**F-344 The Friction Characteristic Improvement by the Dimple of a Piston Seal for Hydraulic Cylinder.:**

Toshiyuki Maeda\*, Noriyuki Matsui, Yoshiyuki Abe, *GI Design Sect. Design Dept. Plastics&Packings Div. NOK Corporation, Nihonmatsu-City Fukushima, Japan*

**G-31 Micro-, Nano- and Molecular Tribology/ Molecular simulations I**

8:40-10:20, Room G

Session Chair: Momoji Kubo, Tohoku University, Japan  
Hiroshi Matsukawa, Aoyama Gakuin University, Japan

**G-311 Keynote: Dynamic Structure of Boundary Lubricating Water Film on Silanol Covered Surfaces Using Molecular Dynamics Simulation:** Hitoshi Washizu\*, Seiji Kajita, Shi-aki Hyodo, Toshihide Ohmori, *Toyota Central R&D Labs., Inc., Morioka, Iwate, Japan;* Hiroshi Teranishi, Atsushi Suzuki, *Toyota Motor Corp.*

**G-312 Non-Equilibrium Molecular Dynamics Simulations of Shear Characteristics in Dry and Lubricated Contacts:** David M. Heyes\*, Tamer Zaki, Daniele Dini, *Department of Mechanical Engineering, Imperial College London, South Kensington Campus, London, UK*

**G-313 Hybrid molecular-Continuum Simulation for Multiscale Simulations of Dynamic Friction:** Marco Kalweit, Phillip Barton, Dimitris Drikakis, *Aerospace Sciences Department, Fluid Mechanics and Computational Science Group, Cranfield University, United Kingdom*

**G-32 Micro-, Nano- and Molecular Tribology/ Molecular simulations II**

10:50-12:30, Room G

Session Chair: David M Heyes, Imperial College London, UK  
Hitoshi Washizu, Toyota Central R&D Labs., Inc., Japan

**G-321 Large-scale Molecular Dynamics Study on the Shear Response of the Confined Liquid Lubricant:** Ya-Pu Zhao\*, Feng-Chao Wang, *State Key Laboratory of Nonlinear Mechanics, Institute of Mechanics, Chinese Academy of Sciences, Beijing, People's Republic of China*

**G-322 Development of Novel Quantum Chemical Molecular Dynamics Simulator and Its Application to Tribochemistry:** Akira Endou\*, Tasuku Onodera, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Sendai, Japan;* Ai Suzuki, *New Industry Creation Hatchery Center, Tohoku University;* Michihisa Koyama, *INAMORI Frontier Research Center, Kyushu University, Fukuoka, Japan;* Hideyuki Tsuboi, Nozomu Hatakeyama, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University;* Hiromitsu Takaba, *Department of Chemical Engineering, Graduate School of Engineering,*

Tohoku University; Carlos A. Del Carpio, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University*; Momoji Kubo; Akira Miyamoto, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, New Industry Creation Hatchery Center, Tohoku University, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University*

**G-323 Lubrication Phenomena of Nanoscale Liquid Bridges by Molecular Dynamics Method:** Takashi

Tokumasu\*, *Institute of Fluid Science, Tohoku University, Sendai, Miyagi, Japan*; Marie-Hélène Meurisse, Nicolas Fillot, Philippe Vergne, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS, UMR5259, France*

**G-324 Calculation of Viscosities of Complex Lubricants Using Ultra-Accelerated Quantum Chemical Molecular Dynamics:** Ugur Mart\*, Hideyuki Tsuboi, Nozomu

Hatakeyama, Akira Endou, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Sendai, Japan*; Hiromitsu Takaba, *Department of Chemical Engineering, Graduate School of Engineering, Tohoku University*; Carlos A. Del Carpio, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University*; Akira Miyamoto, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, New Industry Creation Hatchery Center, Tohoku University*

**G-325 The Effect of Different Thermostating Techniques on Friction and Dissipation in Molecular Dynamics Simulations of Confined Lubricant Films:**

Hassan Berro\*, Nicolas Fillot, Philippe Vergne, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, France*; Takashi Tokumasu, Taku Ohara, Gota Kikugawa, *Institute of Fluid Science, Tohoku University, Sendai, Japan*

**G-33 Micro-, Nano- and Molecular Tribology/ Molecular simulations III**

15:00-16:40, Room G

Session Chair: Huiqing Lan, *Beijing Jiaotong University, China*  
Jun Shimizu, *Ibaraki University, Japan*

**G-331 Molecular Dynamics Simulations of the Tribological Performance of Model Lubricant Additives:**

Stefan Eder, Georg Vorlaufer, *Austrian Center of Competence for Tribology . AC<sup>2</sup>T research GmbH, Wiener Neustadt, Austria*; Friedrich Franek\*, *Austrian Center of Competence for Tribology . AC<sup>2</sup>T research GmbH, Wiener Neustadt, Austria, Vienna University of Technology, Institute of Sensor and Actuator Systems, Vienna, Austria*; Gerhard Betz, *Vienna University of Technology, Institute of General Physics, Vienna, Austria*

**G-332 Friction on Atomically Clean Substrate:** Hiroshi Matsukawa\*, Toshiya Asakura, *Department of Physics and Mathematics, College of Science and Engineering, Aoyama Gakuin University, Sagamihara, Japan*; Kazuhiro Haraguchi

**G-333 Origins of Kinetic Friction: Energy Dissipation due to Low Frequency Vibration:** Seiji Kajita\*, Hitoshi Washizu, Toshihide Ohmori, *TOYOTA CENTRAL R&D LABS., INC., Nagakute, Aichi, Japan*

**G-334 Molecular Dynamics Simulation of Wetting on Wavelike Nanorough Surfaces:** Claudiu Valentin Suci\*, Hozumi Goto, Naoko Gouya, *Department of Intelligent Mechanical Engineering, Faculty of Engineering, Fukuoka Institute of Technology, Fukuoka, Japan*

**G-335 Molecular Dynamics Simulations of Dissolved Hydrogen Molecules under Shear Condition:** Tetsuya Okumura\*, *Department of Mechanical Systems Engineering, Faculty of Engineering, Nagasaki University, Nagasaki, Japan*; Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University, Hydrogenius, National Institute of Advanced Industrial Science and Technology*; Hirofumi Sentoku,

*Department of Mechanical Systems Engineering, Faculty of Engineering, Nagasaki University, Nagasaki, Japan*

**G-34 Micro-, Nano- and Molecular Tribology/ Molecular simulations IV**

17:10-18:50, Room G

Session Chair: Friedrich Franek, *Vienna University of Technology, Austria*  
Naruo Sasaki, *Seikei University, Japan*

**G-341 Investigation into the Lateral Junction Growth of Single Asperity Contact Using Static Atomistic Simulations:** Yeau-Ren Jeng\*, Shin-Rung Peng, *Department of Mechanical Engineering, National Chung Cheng University, Taiwan*

**G-342 Molecular Dynamics Simulation of Chemical Reactions Assisted Grinding with Control of Interatomic Potential Parameters:** Jun Shimizu\*, Libo Zhou, Takeyuki Yamamoto, *Department of Intelligent Systems Engineering, College of Engineering, Ibaraki University, Ibaraki, Japan*

**G-343 Molecular Dynamics Simulation of the Frictional Behaviors and Graphitization of Diamondlike Carbon Films:** Tian-Bao Ma\*, Yuan-Zhong Hu, Hui Wang, *State Key Laboratory of Tribology, Tsinghua University, Beijing, China*

**G-344 Molecular Dynamics Simulations of Atomic-Scale Tribology between Amorphous SixC1-x Films:** Huiqing Lan\*, *School of Mechanical, Electronic and Control Engineering, Beijing Jiaotong University, Beijing, China*; Tomohisa Kumagai, Takahisa Kato, *Department of Mechanical Engineering, Faculty of Engineering, The University of Tokyo*

**G-345 Extrusion Formation on Crystal Silicon Surface under Sequential Impacts Studied by Molecular Dynamics Simulation:** Ruling Chen, Dan Guo\*, Jianbin Luo, *State Key Laboratory of Tribology, Tsinghua University, Beijing, P.R. China*

**H-31 Tribosystems/ Condition Monitoring II**

8:40-10:20, Room H

Session Chair: Tomomi Honda, *University of Fukui, Japan*  
Xinping Yan, *Wuhan University of Technology, China*

**H-311 Advanced Condition Monitoring to Predict Component Wear Using Multiple In-Line and Off-Line Sensing:** Mark Craig\*, Terry J. Harvey, Robert J.K. Wood, *National Centre of Advanced Tribology at Southampton, UK*; Keisuke Masuda, Masahiko Kawabata, *Tribotex Co. Ltd, Aichi, Japan*; Honor Powrie, *General Electric Aviation, Southampton*

**H-312 Integrated in-Line Detector for Oil Condition Monitoring in Tribosystems:** Nikolai K. Myshkin\*, Liubov V. Markova, *Metal-Polymer Research Institute of Belarus National Academy of Sciences, Gomel, Belarus*; Hosung Kong, Hung-Gu Han, *Korea Institute of Science and Technology, Seoul, Republic of Korea*

**H-313 Measurement of the Real Contact Area by Light Induced Fluorescence:** Masao Eguchi\*, *Department of Mechanical Systems Engineering, Tokyo University of Agriculture and Technology, Tokyo, Japan*

**H-32 Tribosystems/ Biotribology I**

10:50-12:30, Room H

Session Chair: Thomas J Joyce, *University of Newcastle, UK*  
Kiyoshi Mabuchi, *Kitasato University, Japan*

**H-321 Keynote: Computational Modelling of Tribology of Artificial Hip Joints:** Zhongmin Jin\*, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, Leeds, UK*

**H-322 Non-Spherical Bearing Geometry and Elastohydrodynamic Lubrication of Hip Joint**

**Replacements under Transient Walking Conditions :**

Fengcai Wang\*, *School of Mechanical Engineering, Wuhan University of Science and Technology, Wuhan, China, Department of Mechanical Engineering, University of Bath, Bath, UK*; Sanxing Zhao, Quanjie Gao, Qin Fan, Liangcai Zeng, *School of Mechanical Engineering, Wuhan University of Science and Technology, Wuhan, China*; Armando Félix Quiñonez, *IJsselstein, 3401 LL, The Netherlands, Currently at SKF Engineering and Research Centre B.V., Nieuwegein, The Netherlands*; Patrick S Keogh, *Department of Mechanical Engineering, University of Bath, Bath, UK*

**H-323 Quantification of Self-Polishing in Vivo from Explanted Metal-on-Metal Total Hip Replacements:**

Thomas Joyce, Harry Grigg\*, *School of Mechanical and Systems Engineering, University of Newcastle, Newcastle upon Tyne, UK*; David Langton, Antoni Nargol, *Joint Replacement Unit, University Hospital of North Tees, Stockton-on-Tees, UK*

**H-324 Effect of Third Body Particles on the Tribology and Surface Finish of Ceramic-on-Metal, Metal-on-Metal and Ceramic-on-Ceramic Hip Replacement Bearings:**

Claire L Brockett, Sophie Williams\*, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, UK*; Graham H Isaac, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, UK, DePuy International Ltd, Leeds, UK*; John Fisher, *Institute of Medical and Biological Engineering, School of Mechanical Engineering, University of Leeds, UK*

**H-33 Tribosystems/ Biotribology II**

15:00-16:40, Room H

Session Chair: Cyril Pailler-Mattei, *Ecole Centrale de Lyon, France*

Yoshinori Sawae, *Kyushu University, Japan*

**H-331 In-Situ Electrochemical Assessment of Biotribocorrosion Behaviour for Artificial Hip Prostheses:**

Yu Yan\*, Anne Neville, Duncan Dowson, Sophie Williams, John Fisher, *School of Mechanical Engineering, Faculty of Engineering, The University of Leeds, Leeds, UK*

**H-332 The Wear of All Cobalt Chrome Couples, With and Without an Amorphous Carbon Coating:**

Thomas Joyce\*, Harry Grigg, *School of Mechanical and Systems Engineering, University of Newcastle, Newcastle upon Tyne, UK*

**H-333 The Effect of Salt on the Normal and Shear Forces between Polyelectrolyte Brush Surfaces:**

Nir Kampf\*, *Department of Materials and Interfaces, Weizmann Institute of Science, Israel*; Jean-François Gohy, Robert Jérôme, *Center for Education and Research on Macromolecules, University of Liège, Liège, Belgium*; Jacob Klein, *Department of Materials and Interfaces, Weizmann Institute of Science, Israel*

**H-334 Tribology of Hetero-Polymeric Conditioning Films: the Role of Vroman Effect.:**

Prashant K. Sharma\*, Henny C. van der Mei, Henk J. Busscher, *Biomedical Engineering, University Medical Center Groningen, Groningen, The Netherlands*; Kota H. Rao, *Mineral processing, Department for Chemical engineering and Geosciences*; Braham Prakash, *Tribolab, Department of Applied physics and Mechanical Engineering, Luleå University of Technology, Luleå, Sweden*

**H-335 Co-Cr-Mo Alloy Passive Film Behaviour under Fretting Conditions:**

Tomasz Liskiewicz\*, Yu Yan, Anne Neville, *Institute of Engineering Thermofluids, Surfaces and Interfaces, School of Mechanical Engineering, University of Leeds, United Kingdom*

**H-34 Tribosystems/ Biotribology III**

17:10-18:50, Room H

Session Chair: Steve Franklin, *Philips Applied Technologies, Netherlands*

Fengcai Wang, *Wuhan University of Science and Technology, China*

**H-341 Mechanical Interaction between Vitamin E-Containing Ultrahigh Molecular Weight Polyethylene and Co-28Cr-6Mo Alloy in Water:**

Shin-ichiro Mori\*, Yasushi Okubo, Koji Yamamoto, Daisuke Hamada, *Graduate school of Engineering, Kyoto University, Kyoto, Japan*; Hiroyuki Kohno, *Yasojima Proceed corporation, Tokyo University of Marine Science and Technology*; Kunihiko Fujiwara, *Nakashima Propeller corporation, Okayama, Japan*; Masato Hashimoto, *Graduate School of Science and Technology, Kyoto Institute of Technology, Kyoto, Japan*; Ken Ikeuchi, *Faculty of Medical Engineering, Suzuka University of Medical Science, Mie, Japan*; Naohide Tomita, *Graduate school of Engineering, Kyoto University, Kyoto, Japan*

**H-342 Failure Criterion of Ultra-High Molecular Weight Polyethylene at High-Stress Contact in a Total Knee Prosthesis:**

Kiyoshi Mabuchi\*, Yasuo Kawasaki, Rina Sakai, *Department of Biomedical Engineering, Graduate School of Medical Science, Kitasato University, Sagamihara, Kanagawa, Japan*

**H-343 Comparative Wear Tests of Ultra High Molecular Weight Polyethylene and Cross-Linked Polyethylene:**

Thomas Joyce, *School of Mechanical and Systems Engineering, University of Newcastle, Newcastle upon Tyne, UK*; Arakere Harsha\*, *Department of Mechanical Engineering, Banaras Hindu University, India*

**H-344 Influence of Microscopic Surface Topography on the Wear Phenomenon in Knee Prosthesis:**

Changhee Cho\*, *Department of Mechanical Systems Engineering, Faculty of Environmental Engineering, The University of Kitakyushu, Fukuoka, Japan*; Teruo Murakami, Yoshinori Sawae, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*

**H-345 Friction of poly(vinyl alcohol) gels prepared by a cast-drying method:**

Shunsuke Sugiura\*, Emiko Otsuka, Daisuke Sakasegawa, Atsushi Suzuki, *Graduate School of Environment and Information Sciences, Yokohama National University, Yokohama, Japan*

**I-31 Tribology Fundamentals/ Contact Mechanics VIII**

8:40-10:20, Room I

Session Chair: Ikram Ul Haq, *University of Peshawar, Pakistan* Joichi Sugimura, *Kyushu University, Japan*

**I-311 Impact Modeling of a Sphere on a Half-Space by a Semi-Analytical Method:**

Thibaut Chaise\*, Daniel Nélías, *Université de Lyon, CNRS, INSA-Lyon, LaMCoS UMR5259, Villeurbanne, France*

**I-312 Fully Coupled Elastic-Plastic Contact With Friction Using Semi-Analytical Methods.:**

Benjamin Fulleringer\*, *SNECMA Engines, Villaroche, France, LaMCoS, INSA-Lyon, CNRS, UMR5259, France*; Daniel Nélías, *LaMCoS, INSA-Lyon, CNRS, UMR5259, France*; Timothy C. Ovaert, *Aerospace and Mechanical Engineering Department, University of Notre Dame, Notre Dame, IN*

**I-313 Study on the Oscillating Sliding Contact Considering Uneven Temperature Distribution:**

Zhong Zhenyuan, *Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China*; Huang Xianhua, *College of Mechanical and Electronic Engineering, Lanzhou University of Technology, Lanzhou, China*; Han Haiyan, Zhang Youyun\*, *Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China*

**I-314 The Influence of the Microscopic Contact Behavior on Energy Dissipation and Hysteretic Response of Frictional Joints for Aeronautical Applications:**

Daniele Dini\*, Simon Medina, Daniela Proppentner, Christoph W. Schwingshackl, Andrew V. Olver, Evgeny Petrov, David J. Ewins, *Department of Mechanical Engineering, Imperial College London, South Kensington*

Campus, London, UK; Daniel Mulvihill, Mehmet Kartal, David A. Hills, David Nowell, *Department of Engineering Science, University of Oxford, UK*

**I-32 Tribology Fundamentals/ Wear I**

10:50-12:30, Room I

Session Chair: Svajus J. Asadauskas, Institute of Chemistry, Lithuania  
Daniele Dini, Imperial College London, UK

**I-321 A New Thermo-Compressed Cross-Linked Polyethylene: Long-Term In-Vitro Wear Performance :** Saverio Affatato\*, Mara Zavalloni, *Department Laboratorio di Tecnologia Medica, Istituto Ortopedico Rizzoli, Bologna, Italy;* Michele Spinelli, *Department Laboratorio di Tecnologia Medica, Istituto Ortopedico Rizzoli, Bologna, Italy, Department DMTI, Florence University, Italy;* Luigi Costa, Pierangiola Bracco, *IFM Chemistry Department, University of Turin, Italy ;* Marco Viceconti, *Department Laboratorio di Tecnologia Medica, Istituto Ortopedico Rizzoli, Bologna, Italy*

**I-322 A Low Conforming, Low Wear Solution in Fixed Bearing Total Knee Replacements:** Louise M Jennings\*, Alison L Galvin, *Institute of Medical and Biological Engineering, University of Leeds, Leeds, UK;* Hannah J M McEwen, *DePuy International, Leeds, UK;* John Fisher, Z M Jin, *Institute of Medical and Biological Engineering, University of Leeds, Leeds, UK*

**I-323 A Study on the Wear Resistance Properties of the Newly Developed Composite Material for Making Artificial Teeth:** Ikram ul Haq\*, Nawshad Muhammad, *National Centre of Excellence in Physical Chemistry, University of Peshawar, Peshawar, Pakistan;* Jamroze Bangash, Saira Ikram, *Khyber College of Dentistry, Khyber Medical University, Peshawar, Pakistan*

**I-324 Studies on Wear Behavior of Particulate Filled Polymer Composites:** Keshavanarayana Gopalakrishna\*, *Centre for Emerging Technologies, SBMJCE, Bengaluru, India;* Canchi Divakar, *Material Science Division, National Aerospace Laboratories, Bengaluru, CSIR, India;* Krishna Venkatesh, Chikmaranahalli B Mohan, Kudinalli G Lakshminarayana Bhatta, *Centre for Emerging Technologies, SBMJCE, Bengaluru, India*

**I-325 Effect of Moisture Content on Wear of PTFE in Hydrogen:** Kazuhiro Nakashima\*, Yoshie Kurono, Yoshinori Sawae, Teruo Murakami, *Department of Mechanical Engineering, Kyushu University, Fukuoka, Japan;* Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University, Fukuoka, Japan, Advanced Industrial Science and Technology, Japan*

**I-33 Tribology Fundamentals/ Wear II**

15:00-16:40, Room I

Session Chair: Jose Daniel B De Mello, Universidade Federal de Uberlândia, Brazil  
Kazuhisa Miyoshi, Nippon Institute of Technology, Japan

**I-331 Experimental Research on Scuffing Behaviour of M50 Steel in Sliding/Rolling:** Bo Peng\*, Liqin Wang, Le Gu, Dezhi Zheng, *School of Mechatronics Engineering, Harbin Institute of Technology, Harbin, China*

**I-332 The Origin of Wear in a Hard Coated Surfaces:** Kenneth Holmberg\*, Anssi Laukkanen, Helena Ronkainen, *VTT Technical Research Centre of Finland, Espoo, Finland;* Kim Wallin, *Academy of Finland, Espoo, Finland*

**I-333 Improvement of Wear Resistance of Carburizing Steels by Heat treatment:** Nobuyuki Mouri\*, Hiromasa Tanaka, Kikuo Maeda, *Elemental Technological R&D Center, NTN corporation, Kuwana, Mie, Japan*

**I-334 Wear Prediction of Revolute Clearance Joints and its Effects on Dynamic Response in Multibody Systems:** Yue-wen Su\*, Wei Chen, Ai-bin Zhu, You-bai Xie,

*Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, Shaanxi, P. R. China*

**I-335 Dynamic Contact Mechanics and Wear Modelling of Hip Joint Replacements with Hard-on-Hard Material Combination under Three-Dimensional Loading and Transient Motion:** Fengcai Wang\*, *School of Mechanical Engineering, Wuhan University of Science and Technology, Wuhan, China, Department of Mechanical Engineering, University of Bath, Bath, UK;* Sanxing Zhao, *School of Mechanical Engineering, Wuhan University of Science and Technology, Wuhan, China;* Hua Xu, Wei Chen, Xuesong Mei, *School of Mechanical Engineering, Xi'an Jiaotong University, Xi'an, China;* Thomas D. Brown, *Department of Orthopaedics and Rehabilitation, University of Iowa, Iowa City, USA*

**I-34 Tribology Fundamentals/ Wear III**

17:10-18:50, Room I

Session Chair: Kenneth G Holmberg, VTT Technical Research Centre of Finland, Finland  
Yoshinori Sawae, Kyushu University, Japan

**I-341 Superimposition of Interactions: a New Approach to Simulating Abrasive Wear Mechanisms:** W. M. da Silva, H. L. Costa, J. D. de Mello\*, *Laboratory of Tribology and Materials, Federal University of Uberlândia, Campus Santa Mônica, Uberlândia, 38400-901, Brazil*

**I-342 Entropy and Dissipative Processes of Friction and Wear:** Michael D. Bryant\*, *Department of Mechanical Engineering, The University of Texas at Austin, Austin, Texas, USA*

**I-343 Wear Morphology of Neolithic Tools: Characterization of Transfer Layers :** Laurence Astruc\*, *Institut Français d'études anatoliennes (IFEA) USR CNRS 3131-Beyoglu/ Istanbul - Turkey;* Roberto Vargiolu, Sandrine Bec, Sophie Pavan, Cyril Pailler-Mattei, Hassan Zahouani, *Laboratoire de Tribologie et Dynamique des Systèmes - UMR CNRS 5513 - Ecole Centrale de Lyon - Ecole Nationale d'Ingénieurs de St Etienne - France*

**I-344 Transfer of Material Between Rolling and Sliding Surfaces:** K L Johnson, *Department of Engineering, Cambridge University, Cambridge, UK.;* J J Kauzlarich, *Department of Mechanical Engineering, University of Virginia, Charlottesville, VA, USA;* J A Williams\*, *Department of Engineering, Cambridge University, Cambridge, UK.*

**I-345 Abrasivity and Adhesivity of Lunar Regolith Simulant:** Kazuhisa Miyoshi\*, Kenichi Ishibashi, *Faculty of Engineering, Nippon Institute of Technology, Saitama, Japan;* Phillip B. Abel, *Glenn Research Center, National Aeronautics and Space Administration, Cleveland, Ohio*

**J-31 Surface Engineering/ Coatings III**

8:40-10:20, Room J

Session Chair: Masahiro Fujii, Okayama University, Japan  
Hiroyuki Kousaka, Nagoya University, Japan

**J-311 Keynote: Friction and Wear Properties of DLC Films - The Environmental and Mechanical Aspects:** Helena Ronkainen\*, Kenneth Holmberg, *VTT Technical Research Centre of Finland, Espoo, Finland*

**J-312 Low Friction Property and its Mechanism of DLC-Si Films under Lubricated Oil :** Hiroyuki Mori\*, Naoko Takahashi, Naohiko Kato, Toshihide Ohmori, *Toyota Central Research & Development Labs., Inc, Aichi, Japan*

**J-313 Role of the Transfer Film on the Friction and Wear of Metal-Doped DLC Coatings during Run-in:** Tom W. Scharf, *The University of North Texas, Department of Materials Science and Engineering, Denton, USA;* Irwin L. Singer\*, *U.S. Naval Research Laboratory, Washington D. C., USA*

**J-314 Tribological and Mechanical Properties of Ultrananocrystalline Diamond/Amorphous Carbon Composite Films:** Gregory Favaro\*, *CSM Instruments SA, Peseux, Switzerland*; Cyril Popov, *Institute of Nanostructure Technologies and Analytics (INA), University of Kassel, Germany*; William Kulisch, *European Commission Joint Research Centre, Institute for Health and Consumer Protection, Ispra*; J.P. Reithmaier, *Institute of Nanostructure Technologies and Analytics (INA), University of Kassel, Germany*

**J-32 Surface Engineering/ Coatings IV**

10:50-12:30, Room J

Session Chair: Junho Choi, *The University of Tokyo, Japan*  
Akira Nakajima, *Saga University, Japan*

**J-321 Tribological Properties of Diamond Like Carbon Coatings:** Takatoshi Shinyoshi\*, *Yoshio Fuwa, Power Train Material Engineering Div., Toyota Motor Corporation, Toyota, Aichi, Japan*

**J-322 Tribological Properties of DLC-Coated Inner Surface of Narrow Metal Tube by Using New-Type Plasma CVD Apparatus for Internal Coating With Microwaves:** Hiroyuki Kousaka\*, *Dept. Mechanical Science and Engineering, Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan*; Noboru Tamura, *Toyohiko Shindo, Contamination Control Services, Inc.; Noritsugu Umehara, Dept. Mechanical Science and Engineering, Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan*; Akihiro Kondo, *Dept. Electrical and Electronic Engineering, Graduate School of Engineering, Gifu University, Japan*

**J-323 Friction and Wear Properties of DLC Coatings under Boundary Lubrication:** Kentaro Yoshida\*, *Takahiro Horiuchi, Makoto Kano, Masao Kumagai, Mechanical and Materials Engineering Division, Kanagawa Industrial Technology Center, Ebina, Kanagawa, Japan*

**J-324 Tribological Behaviour of Metal-DLC Nanocomposite Coatings: the Critical Role of Tribofilm Build-Up:** Julien Fontaine\*, *Laboratoire de Tribologie et Dynamiques des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon, Ecully, France*; Hiroyuki Miki, *Institute of Fluid Science, Tohoku University, Sendai, Japan*; Maxime Ruet, *Laboratoire de Tribologie et Dynamiques des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon*; Toshifumi Sugawara, *Institute of Fluid Science, Tohoku University*; Takanori Takeno, *IAR, Tohoku University International Advanced Research and Education Organization*; Kosuke Ito, *Laboratoire de Tribologie et Dynamiques des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon, Currently at: Department of Mechanical Engineering, College of Engineering, Nihon University, Koriyama, Japan*; Michel Belin, *Laboratoire de Tribologie et Dynamiques des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon*; Koshi Adachi, *Tribology Laboratory, Graduate School of Engineering, Tohoku University*; Toshiyuki Takagi, *Institute of Fluid Science, Tohoku University*

**J-325 Evaluation of Wear Properties of DLC Films by a Micro Slurry-Jet Erosion (MSE) Test:** Yoshiro Iwai\*, *Toshiro Miyajima, Akira Mizuno, Yu Asami, Tomomi Honda, Department of Mechanical Engineering, Faculty of Engineering, University of Fukui, Fukui, Japan*; Tohru Matsubara, *Macoho Co., Ltd., Niigata, Japan*; Sture Hogmark, *The Angstrom Laboratory, Uppsala University, Uppsala, Sweden*

**J-33 Surface Engineering/ Coatings V**

15:00-16:40, Room J

Session Chair: Helena Ronkainen, *VTT Technical Research Centre of Finland, Finland*  
Irwin L. Singer, *U.S. Naval Research Laboratory, USA*

**J-331 Sliding Friction and Wear of DLC Coating Films in Hydrogen Environment:** Hiroyoshi Tanaka\*, *Naoshi Izumi, Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Joichi Sugimura, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Hydrogenius, National Institute of Advanced Industrial Science and Technology*

**J-332 Surface Characteristics of Hard Coated Polycarbonate Proved by Micro-Indentation:** Yoshinori I. Oka\*, *Hidenori Hayashi, Department of Chemical Engineering, Graduate School of Engineering, Hiroshima University, Higashi-Hiroshima, Japan*; Kazufumi Iwai, *Renias Co. Ltd., Japan*

**J-333 Effects of Film Properties on Tribological Performance of TiN Duplex Coating:** Junya Ishii\*, *Machinery and Engineering Group, YKK Corporation, Kurobe, Japan*; Yoshio Haruyama, *Department of Mechanical Systems Engineering, Faculty of Engineering, Toyama Prefectural University*; Shingo Kawamura, *Machinery and Engineering Group, YKK Corporation, Kurobe, Japan*; Noriyo Horikawa, *Department of Mechanical Systems Engineering, Faculty of Engineering, Toyama Prefectural University*; Yoshiro Iwai, *Department of Mechanical Engineering, Faculty of Engineering, University of Fukui*

**J-335 Influence of Thickness of DLC Coating on Tribological Characteristics under Sliding-Rolling Contact Condition:** Masahiro Fujii, *M. Ananth Kumar\*, The Graduate School of Natural Science and Technology, Okayama University, Okayama, Japan*; Akira Yoshida, *Hiroshima International University, Kure, Hiroshima, Japan*

**J-34 Surface Engineering/ Coatings VI**

17:10-19:10, Room J

Session Chair: Julien Fontaine, *Ecole Centrale de Lyon, France*  
Yoshiro Iwai, *University of Fukui, Japan*

**J-341 Microstructure, Strength, Hardness and Tribological Properties of Electrodeposited Ni/Cu Nano-Multilayers:** Tomoya Hattori\*, *Research & Development Center, JTEKT Corporation, Kashiwara, Osaka, Japan*, *Department of Intelligent Materials Engineering, Faculty of Engineering, Osaka City University*; Takaaki Sanda, *Sumio Kotera, Yoshihisa Kaneko, Satoshi Hashimoto, Department of Intelligent Materials Engineering, Faculty of Engineering, Osaka City University*

**J-342 Tribological Study of Alternative CrVI-Free Hard Coatings Sliding against Polymers:** Beatriz Fernandez-Diaz\*, *Amaya Igartua, Xana Fernandez, Gemma Mendoza, TEKNIKER, Tribology Unit, Eibar, Spain*; Anton Straub, *Liebherr-Aerospace Lindenberg GmbH, Landing Gear Division, Lindenberg, Germany*

**J-343 Critical Thickness of Polycrystalline Ag Layers Yielding Friction Reduction due to Tribo-Assisted Reorientation:** Minoru Goto\*, *Department of Mechanical Engineering, Ube National College of Technology, Ube, Japan*; Koichi Akimoto, *Department of Applied Physics, Nagoya University, Nagoya, Japan*

**J-344 Scratch Resistance of Platinum Coatings:** M. Topić, *iThemba LABS, Materials Research Group, Somerset West, South Africa*; G. Favaro\*, *CSM Instruments, Switzerland*; R. Bucher, *iThemba LABS, Materials Research Group, Somerset West, South Africa*; C. I. Lang, *Materials Engineering Department, University of Cape Town, South Africa*

**J-345 Topocomposites are New Class of Tribotechnical Materials:** Nikolay A. Voronin\*, *Department of Tribology, Mechanical Engineering Research Institute of the RAS, Moscow, Russia*

**J-346 The Effect of Unsaturated Fatty Acids on Friction Coefficient of Carbon Nitride Coatings Sliding against Si3N4 Balls:** Takayuki Tokoroyama\*, *Department of*

*Mechanical Science and Engineering, Faculty of Graduate School of Engineering, Nagoya University, Nagoya-shi, Japan; Yuichiro Ogawa, Chita LNG Joint Facility, TOHO Gas; Noritsugu Umehara, Department of Mechanical Science and Engineering, Faculty of Graduate School of Engineering, Nagoya University, Nagoya-shi, Japan; Yoshio Fuwa, Vehicle Engineering Group, TOYOTA Motors Co., Ltd.*

**K-31 Surface Engineering/ Surface Modifications III**

8:40-10:20, Room K

Session Chair: Mohammed Jai, INSA Lyon, France  
Young Shik Pyoun, Sun Moon University, South Korea

**K-311 Keynote: Control of the Sticking of Soft**

**Materials:** Noritsugu Umehara\*, *Dept. Mechanical Science and Engineering, Graduate School of Engineering, Nagoya University, Nagoya, Aichii, Japan*

**K-312 The Methods for Increasing the Durability of Polymer/Metal Friction Pairs:** Jacek Przepiorka\*, *Technical University of Radom, Radom, Poland; Marian Szczerek, Technical University of Radom, Radom, Poland, Tribology Department, Institute for Sustainable Technologies - National Research Institute, Radom, Poland*

**K-313 Frictional Property and Wear Resistance of Cross-linked Polyelectrolyte Brush under Wet**

**Condition:** Motoyasu Kobayashi\*, *JST/ERATO, Fukuoka, Japan, Institute for Materials Chemistry and Engineering, Kyushu University; Masataka Kaido, Atsushi Suzuki, TOYOTA Motor Co.; Kazuhiko Ishihara, Faculty of Engineering, The University of Tokyo; Atsushi Takahara, JST/ERATO, Fukuoka, Japan, Institute for Materials Chemistry and Engineering, Kyushu University*

**K-314 Stone Polishing Techniques during Aegean Prehistory: Texture, Radiance and Tactile Perception :**

Haris Procopiou\*, *Athina Boleti, Protohistoire Egéenne - Université de Paris 1 Panthéon-Sorbonne, UMR CNRS 7041 (ArScAn), Paris, France; Roberto Vargiolu, Laboratoire de Tribologie et Dynamique des Systèmes -UMR CNRS 5513, École Centrale de Lyon - Ecole Nationale d'Ingénieurs de St Etienne; Elise Morero, Protohistoire Egéenne - Université de Paris 1 Panthéon-Sorbonne, UMR CNRS 7041 (ArScAn), Paris, France; Hassan Zahouani, Laboratoire de Tribologie et Dynamique des Systèmes -UMR CNRS 5513, École Centrale de Lyon - Ecole Nationale d'Ingénieurs de St Etienne*

**K-32 Surface Engineering/ Surface Modifications IV**

10:50-12:30, Room K

Session Chair: Sk. Faruque Ahmed, Korea Institute of Science and Technology, Korea  
Thomas G. Mathia, École Centrale de Lyon, France

**K-321 Surface Fatigue Strength of Surface-Modified Steel by Fine Particle Bombarding:** Yuji Ohue\*,

*Department of Intelligent Mechanical Systems Engineering, Faculty of Engineering, Kagawa University, Takamatsu, Kagagwa, Japan*

**K-322 Effect of Cavitation Peening on Tribological**

**Characteristics of Carbon Steel:** Masanori Seki\*, *Department of Mechanical Engineering, Faculty of Engineering, Okayama University, Okayama, Japan; Hitoshi Soyama, Department of Nanomechanics, School of Engineering, Tohoku University; Masahiro Fujii, Department of Mechanical Engineering, Faculty of Engineering, Okayama University; Akira Yoshida, Department of Mechanics and Robotics, Faculty of Engineering, Hiroshima International University*

**K-323 Tribological Properties of Functional Graded**

**Steel Surface by Fine Particle Peening:** Masafumi Ando, *IKK SHOT Co., Ltd., Tokai, Aichi, Japan, Department of Materials Science and Engineering, Faculty of Science and*

*Technology, Meijo University, Aichi, Japan; Hiro-omi Kitano, Hatsuhiko Usami\*, Department of Materials Science and Engineering, Faculty of Science and Technology, Meijo University, Aichi, Japan*

**K-324 Effect of Dispersion Morphology of TiB<sub>2</sub>**

**Particles on Wear Resistance of Hot Forging Die:** Yukio Ito\*, *No.1 Development Sect., Technical Development Div., Aichi Steel Corp., Tokai, Aichi, Japan*

**K-325 Tribotechnical Characteristics of the Modified**

**Surface of the Cutting Tool:** Mars Migranov\*, *Leva Shuster, Serge Minigaleev, Ufa State Aviation Technical University, Ufa, Russia; German Fow-Rabinovich, Department of Mechanical Engineering, McMaster University, Ontario, Canada*

**K-33 Surface Engineering/ Surface Modifications V**

15:00-16:40, Room K

Session Chair: Mars Sh Migranov, Ufa State Aviation Technical University, Russia  
Yuji Ohue, Kagawa University, Japan

**J-131 Keynote: Self-Assembled Monolayers and**

**Polymers as Nano-Lubricants on Si:** Sujeet K. Sinha\*, *Department of Mechanical Engineering, National University of Singapore, Singapore*

**K-331 Investigation of Fluidic Additives on the**

**Nano-Hardness During Polishing:** Marc Christopher Wurz\*, *Florian Pape, Institute for Microtechnology, Leibniz Universität Hannover, Center for Production Technology, Garbsen, Germany ; Michael Wark, Institute of Physical Chemistry and Electrochemistry, Leibniz Universität Hannover, Hannover, Germany ; Hans Heinrich Gatzert, Institute for Microtechnology, Leibniz Universität Hannover, Center for Production Technology, Garbsen, Germany*

**K-332 Crater Wear Volume Analysis by Wavelet**

**Filtering:** Moon-chul Yoon\*, *Department of Mechanical Engineering, Faculty of Engineering, Pukyong National University, Busan, Republic of Korea*

**K-333 Experimental Analysis on the Coefficient of Friction of Disc-on-Disc by the Ultrasonic Nanocrystal**

**Surface Modification:** Young Sik Pyun\*, *Department of Mechanical Engineering, Sun Moon University, Asan, Korea; In Gyu Park, Chang Soon Lee, Department of Hybrid Engineering, Sun Moon University, Asan, Korea; Auezhan Amanov, Department of Mechanical Engineering, Graduate School, Sun Moon University, Asan, Korea; In Shik Cho, Department of Metallurgical and Materials Engineering, Graduate School, Sun Moon University; Alisher Gafurov, Department of Mechanical Engineering, Graduate School, Sun Moon University, Asan, Korea*

**K-34 Surface Engineering/ Surface Modifications VI**

17: 1 0-18:50, Room K

Session Chair: Sujeet K Sinha, National University of Singapore, Singapore  
Hatsuhiko Usami, Meijo University, Japan

**K-341 Shape Optimization of a Dynamically Loaded**

**Hydrodynamic Journal Bearings:** Mohammed Jai\*, *Université de Lyon, ICJ CNRS-UMR 5208, INSA de LYON, Mathématique, Bat Leonard de Vinci, F-69621 Villeurbanne, France; Jean-Paul Cadalen, RENAULT, Direction de l'Ingenierie Mecanique, Service Mecanique des Solides et Thermique (66151) 92508 RUEIL MALMAISON CEDEX; Gustavo Buscaglia, ICMC, Universidade de Sao Paulo, SP, Brazil*

**K-342 Tribology Behavior on PC/ABS Modified by Ar**

**Ion Beam :** Sk. Faruque Ahmed\*, *Jin Woo Yi, Myoung-Woon Moon, Future Fusion Technology Laboratory, Korea Institute of Science and Technology, Cheongryang, Seoul, Republic of Korea.; Yong-Jun Jang, Bong-Hyun Park, Seong-Hoon Lee, Polymeric Materials Research Team, Research & Development Division for Hyundai Motor Company & Kia Motors*

Corporation Kia Motors Corporation, Gyeonggi-Do, Republic of Korea.; Kwang-Ryeol Lee, *Future Fusion Technology Laboratory, Korea Institute of Science and Technology, Cheongryang, Seoul, Republic of Korea.*

**K-343 Overview of 3D Multi Scale Surface's Morphologies Analysis and Perspectives for Tribology:**

Thomas G. Mathia\*, Hassan Zahouani, *Laboratoire de Tribologie et Dynamique des Systèmes - UMR 5513, C.N.R.S. École Centrale de Lyon, ÉCULLY, France*

**Poster Session**

14:00-15:00, Exhibition Hall (Viewing 10:00-17:00)

**Lubrication, Lubricants and Additives/ Hydrodynamic Lubrication**

**P-301 Parallel Optimization of Artificial Neural Networks for Fluid-Film Lubrication Analysis:**

Nenzi Wang, Chia-Wen Chan\*, Chih-Jen Lai, *Department of Mechanical Engineering, Chang Gung University, Taiwan R. O. C.*

**P-302 Comparison of Surrogate Models for Modeling Island-Type Hydrostatic Bearings:** Nenzi Wang, Shih-Hung Chang\*, *Department of Mechanical Engineering, Chang Gung University, Taiwan;* Hua-Chih Huang, *Mechanical and Systems Research Laboratories, Industrial Technology Research Institute, Taiwan*

**P-303 Optimization of Small Size Thrust Air Bearing with the Consideration of Groove Dimensions and Geometry Variables:**

M.Danial Ibrahim\*, Tadashi Namba, *Graduate School of Science and Engineering, Department of Mechanical Engineering, Tokai University, Hiratsuka City, Kanagawa Prefecture, Japan;* Masayuki Ochiai, Hiromu Hashimoto, *Department of Mechanical Engineering, Tokai University*

**P-304 Measurement of Film Thickness of Thrust Air Bearing to Consider an Alteration of Temperature:**

Tadashi Namba\*, M. Daniel Ibrahim, *Graduate School of Science and Engineering, Department of Mechanical Engineering, Tokai University, Hiratsuka City, Kanagawa, Japan;* Masayuki Ochiai, Hiromu Hashimoto, *Department of Mechanical Engineering, School of Engineering, Tokai University*

**P-305 Static Characteristics of Small-Sized Air Foil Thrust Bearings:**

Masaki Sato\*, Shigeoka Yoshimoto, Masaaki Miyatake, *Department of Mechanical Engineering, Tokyo University of Science, Tokyo, Japan*

**P-306 Experimental Study on Static and Dynamic Characteristics of Small Sized Aerostatic Annular Thrust Bearings with Inherently Compensated Restrictors:**

Nozomi Oda\*, Masaaki Miyatake, Shigeoka Yoshimoto, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*

**P-307 Instability of a Rigid Rotor Supported By Aerostatic Journal Bearings with Compound Restrictors:**

Yuta Otsu\*, Shigeoka Yoshimoto, Masaaki Miyatake, *Department of Mechanical Engineering, Tokyo University of Science, Tokyo, Japan*

**P-308 Improvement of Water Lubrication by Using Nanodiamond as an Additive:**

Mayuko Masuda\*, Hidetaka Nanao, Shigeyuki Mori, *Department of Applied Chemistry, Faculty of Engineering, The University of Iwate, Morioka-shi, Iwate, Japan;* Eiji Osawa, *NanoCarbon Research Institute Co., Ltd., AREC, Fac. Textile Sci. Eng., Shinshu University, Ueda, Nagano, Japan*

**P-309 Linear Stability Analysis of the Herringbone Groove Journal Bearings in Microsystems:** Wang-Long Li\*, *Institute of Nanotechnology and Microsystems Engineering,*

*Center for Micro/Nano Science and Technology, National Cheng Kung University, Tainan, Taiwan;* Rui-Wen Shen, *Department of Mechanical Engineering, National Kaohsiung University of Applied Sciences*

**P-310 Study of Journal Bearing with Micro-Textures:**

Syed Ismail, Mihir Sarangi\*, *Department of Mechanical Engineering, Indian Institute of Technology, Kharagpur, India*

**P-311 Whirl Characteristics of Herringbone Grooved Aerodynamic Journal Bearings with Considering Frequency Dependence of External Support Elements:**

Norifumi Miyanaga\*, Jun Tomioka, *Faculty of Science and Engineering, Waseda University, Tokyo, Japan*

**P-312 The Effect of Oil Supply Conditions on the Performance of a Hydrodynamic Journal Bearing:**

Sang-Ik Son\*, Kyung-Woong Kim, *School of Mechanical, Aerospace & Systems Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea*

**Lubrication, Lubricants and Additives/ Elasto-hydrodynamic Lubrication**

**P-313 Film Thickness Study for Soft Contacts Using an Optical Interferometric Technique:**

C Myant\*, M Fowell, *Tribology Section, Department of Mechanical Engineering, Imperial College of Science, Technology and Medicine, London, UK;* J Stokes, *Division of Chemical Engineering, School of Engineering, University of Queensland, Brisbane, Australia;* H Spikes, *Tribology Section, Department of Mechanical Engineering, Imperial College of Science, Technology and Medicine, London, UK*

**P-314 Design Method for Rolling Contact with Plastic Deformation:**

Takeshi Yoshimi\*, *Mitsubishi Heavy Industries LTD., Technical Headquarters, Nagasaki, Nagasaki, Japan;* Susumu Matsumoto, Yuko Yasue, *Waseda University, Kitakyushu, Fukuoka, JAPAN;* Yasuyoshi Tozaki, *Mitsubishi Heavy Industries LTD., Technical Headquarters, Nagasaki, Nagasaki, Japan*

**P-315 Oil Film Thickness Measurement between an Automotive Piston Ring and Cylinder using an Ultrasonic Technique:**

Emin Y Avan\*, Robin S Mills, Rob S Dwyer-Joyce, *Department of Mechanical Engineering, The University of Sheffield, Sheffield, UK;* Nizami Akturk, *Department of Mechanical Engineering, Faculty of Engineering and Architecture, Gazi University, Ankara, Turkey*

**P-316 Study on Variation of Refrigerant Concentration in Lubricating Film under High Pressure Atmosphere of CO<sub>2</sub> as a Refrigerant:**

Hiromasa Aritoshi\*, Shinji Tanaka, Tsunamitsu Nakahara, *Department of Mechanical Sciences and Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Tokyo, Japan*

**Lubrication, Lubricants and Additives/ Boundary Lubrication**

**P-317 Lubricating Film Thickness Measurements on Bovine Serum and Simulated Synovial Fluid:**

Aikaterini Mavraki, Philippa Cann\*, *Tribology Section, Department of Mechanical Engineering, Imperial College, London, UK*

**P-318 Understanding of Tribological Behavior of Cast Iron in Boundary Lubrication: Development of a Phenomenological Model:**

Vincent Fridrici\*, Julia Keller-Espinouse, Philippe Kapsa, *Laboratoire de Tribologie et Dynamique des Systèmes, UMR CNRS 5513, Ecole Centrale de Lyon, Ecully cedex, France*

**P-319 Boundary Film Formation from Nano-Size Metallic Detergent during EHL Tests:**

Atsushi Morijiri\*, Hidetaka Nanao, Shigeyuki Mori, *Department of Chemical Engineering, Faculty of Engineering, Iwate University, Morioka, Iwate, Japan*

**P-320 Boundary Lubrication Properties of Cobalt-Containing Diamond-Like Carbon (DLC) Films with Poly Alpha Olefin (PAO) Lubricant:** Yuta Saito\*,

Yasuaki Matsumoto, Shojiro Miyake, *Nippon Institute of Technology, Saitama, Japan*; Yoshiteru Yasuda, Yusuke Okamoto, *Materials Research Lab., Nissan Motor Co., Ltd., Yokosuka, Kanagawa, Japan*

**P-321 The Mechanisms of Wet Clutch Friction:** Marc Ingram\*, Hugh Spikes, *Department of Mechanical Engineering, Imperial College, South Kensington, London, UK*; Joe Noles, Raymond Watts, *Infineum USA LP, Linden, NJ*; Steve Harris, *Infineum UK Ltd, Abingdon, OX*

**P-322 ToF-SIMS Investigations of Tribological Layers:** Heinrich F. Arlinghaus\*, Dieter Lipinsky, A. Assenkamp, *Physikalisches Institut Münster, Westfälische Wilhelms-Universität Münster, Münster, Germany*; Tobias Skubacz, Gerhard Poll, *Institut für Maschinenelemente, Leibniz Universität Hannover*; Christoph Brüning, *Physikalisches Institut Münster, Westfälische Wilhelms-Universität Münster, Münster, Germany*

**P-323 Improvement in the Tribological Properties of Ionic Liquids by Using Additive of Phosphorus Containing Ionic Liquid:** Ai Nakamura\*, Hidetaka Nanao, Ichiro Minami, Shigeyuki Mori, *Department of Chemical Engineering, Iwate University, Morioka, Iwate, Japan*

**P-324 Study on Mechanism of Low Friction in Boundary Condition with Lubricant Containing Oleyl Acid Phosphate:** Takuma Imoto\*, Fumihiko Itoigawa, Takashi Nakamura, *Department of Mechanical Engineering, Nagoya Institute of Technology, Nagoya, Japan*; Takashi Norihisa, *Division of Research and Developed, Okuma Corporation*

**P-325 Analysis of the Role of Residual Films in Boundary Lubrication:** Kazuyoshi Manabe\*, Ken Nakano, *Yokohama National University, Yokohama, Japan*

**P-326 Surface Potential Effects on Friction and Abrasion of Sliding Contacts Lubricated by Bentonite and Polymer Based Solutions:** Mohd Ismail\*, Robert Wood, *national Centre for Advanced Tribology at Southampton (nCATS), School of Engineering Sciences, University of Southampton, Highfield Campus, Southampton, England, UK*; Alan Humphreys, *Schlumberger-Doll Research, Cambridge, Massachusetts, USA*; Julian Wharton, Terence Harvey, *national Centre for Advanced Tribology at Southampton (nCATS), School of Engineering Sciences, University of Southampton, Highfield Campus, Southampton, England, UK*

**Lubrication, Lubricants and Additives/ Lubricating Oil**

**P-327 Oil Degradation Sensing for Engine Oil by Permittivity Measurement:** Yoh Akiyama\*, Akihiko Yano, *Mitsubishi Heavy Industries LTD., Technical Headquarters, Nagasaki, Nagasaki, Japan*; Junichi Kaga, *Mitsubishi Heavy Industries LTD., General Machinery & Special Vehicle Headquarters, Sagami-hara, Kanagawa, JAPAN*

**P-328 Decomposition and Gas Generation of Ionic Liquid on Sliding Metals under Vacuum Condition:** Tsutomu Yagi\*, Shinya Sasaki, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*; Koji Miyake, Miki Nakano, Takao Ishida, *National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan*

**P-329 The Effect of the Soot Contained in Oil on the Wear of the Timing Gear Elements in a Combustion Engine:** Andrzej Mruk\*, Witold Jordan, *Institute of Automobiles and Internal Combustion Engines, Faculty of Mechanical Engineering, Cracow University of Technology, Krakow, Poland*

**P-330 Synchrotron X-Ray Diffraction Analysis of Lubricants under High Pressure:** Koki Kono\*, Susumu

Hayase, Tomoko Hirayama, Takashi Matsuoka, Kazuhiro Hashimoto, *Department of Mechanical Engineering, Doshisha University, Kyoto, Japan*

**P-331 Effect of Pour Point Depressant on Vegetable Oils Based Lubricants:** Lim Wen Hwei\*, Yeong Shoot Kian, *Advanced Oleochemical Technology Division (AOTD), Selangor DE, Malaysia*

**P-332 The Use of Esters in GF-5 Engine Formulations:** Steven James Randles\*, *Global Applications Director, Croda Industrial Specialities Europe, UK*; John Eastwood, *Technical Service Manager, Croda Industrial Specialities Europe*; Josephine Lefevre, *Market Application Specialist, Croda Industrial Specialities Europe*

**P-333 Synergistic Effect of Benzotriazole with ZDDP and its Application Research:** Hailin Wang\*, Wenhao Luo, *Department of Vehicle Engineering, Faculty of Engineering, South China Agricultural University, Tianhe, Guangzhou, P.R. China*

**P-334 Influence of Volatility on the Engine Oil Coking Formation:** Yoshihiro Shinka\*, *Tribology group, Machine Elements Department, Research Laboratory, Corporate Research & Development, IHI Corporation, Yokohama, Japan*; Tadashi Haneishi, *Research Department, Research & Development Division, IHI Inspection & Instrumentation Co., Ltd.*; Fumihiko Yokoyama, Yoshimitsu Matsuyama, *Tribology group, Machine Elements Department, Research Laboratory, Corporate Research & Development, IHI Corporation, Yokohama, Japan*

**P-335 Study of  $\mu$ -V Characteristics Degradation Mechanism for the Start-up Clutch CVTF and the Development of Next Generation CVTF:** Hiroya Miyamoto\*, Isao Kurihara, *Research & Development Division, Lubricants Research Laboratory, Transportation Lubricants R&D Group NIPPON OIL CORPORATION Yokohama, Kanagawa, Japan*; Tamotsu Kotegawa, Satoshi Yamashita, *Honda R&D Co., Ltd, Tochigi R&D Center, Tochigi, JAPAN*

**P-336 Corrosion Wear Phenomenon under Lubrication with Ionic Liquid:** Soutarou Yagi\*, Shinya Sasaki, *Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan*; Koji Miyake, Miki Nakano, Takao Ishida, *National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan*

**P-337 Film Formation of Liquid Crystals in EHD Contacts:** Ken Nakano\*, *Yokohama National University, Yokohama, Japan*; Thomas Reddyhoff, Philippa Cann, Hugh Spikes, *Imperial College, London, UK*

**P-338 A Study on the Tribological Characteristics of Graphite and Silver Nano-Lubricant:** Youngmin Choi\*, Yujin Hwang, Jaekeun Lee, *School of Mechanical Engineering, Pusan National University, Busan, Korea*; Cheol Choi, Mihee Jung, *Advanced Materials Research Group, Korea Electric Power Research Institute, Daejeon, Korea*

**Lubrication, Lubricants and Additives/ Grease**

**P-339 The Effect of Working Parameters upon the Electrical Permittivity of Grease Lubricants in EHD Contacts:** Yuichiro Nagata\*, *School of Engineering and Design, Brunel University, UK*; Joichi Sugimura, *Department of Mechanical Engineering, Kyushu University, Japan*; Romeo Glovnea, *School of Engineering and Design, Brunel University, UK*

**P-340 Tribological Properties of Thermo-Reversible Gel-Lubricants Containing Solid Lubricants:** Kazumi Sakai\*, Yuji Shitara, Kazutoshi Takahashi, Kouichi Yoshida, Takashi Kaimai, *Lubricants Research & Development Center, Japan Energy Corporation, Toda-shi, Saitama, Japan*

**P-341 Fretting Wear Protection Property of Lubricating Grease:** Akihiko Yano, Yoshitomo Noda\*, Yo Akiyama,

*Nagasaki Research & Development Center, Mitsubishi Heavy Industries, Ltd., Nagasaki-shi, Nagasaki, Japan; Naota Watanabe, Teppei Fujitsuka, Nagasaki Shipyard & Machinery Works, Mitsubishi Heavy Industries, Ltd., Nagasaki-shi, Nagasaki, Japan*

**P-342 Development of Noise Reducing Grease (Part 2) - Clarification of Noise Reduction Mechanism -:** Koji Sakakibara\*, Shozo Ikejima, *Material Engineering R&D Department, DENSO CORPORATION, Kariya, Aichi, Japan; Kyosuke Ikuma, Mitsuhiro Kakizaki, Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan; Nobuyoshi Ohno, Department of Mechanical Engineering, Faculty of Science and Engineering, SAGA UNIVERSITY, Saga-shi, Japan*

**P-343 Tribological Behaviour of Thermo-Reversible Gel-Lubricant during Reciprocating Tests with Polyoxymethylene Plate and Bearing Steel Ball.:** Aoi Kanno\*, Shigeyuki Mori, Hidetaka Nanao, *Department of Chemical Engineering, Faculty of Engineering, University of Iwate, Morioka, Iwate, Japan; Yuji Shitara, Lubricants Research & Development Center, Japan Energy Corporation, Toda-shi, Saitama, Japan; Gwidon Stachowiak, School of Mechanical Engineering, University of Western Australia, Crawley Western Australia*

**P-344 About Procedure and Characterization of the Water Dilution Emulsion Grease:** Mitsuru Komachi, Mitsuya Saika\*, Hiroshi Nishimura, Jun Araki, *NIPPON KOYU LTD., Tokyo, Japan; Hideki Akita, Motoshi Suzuki, Technical Research Center, Hitachi Construction Machinery Co., Ltd., Tsuchiura, Ibaraki, Japan*

**P-345 Examination of Practicality for the Water Dilution Emulsion Grease:** Hideki Akita\*, Motoshi Suzuki, *Technical research center, Hitachi Construction Machinery Co., Ltd., Tsukuba, Ibaraki, Japan; Mitsuru Komachi, Mitsuya Saika, Hiroshi Nishimura, Jun Araki, Nippon Koyu Ltd., Tokyo, Japan*

#### Lubrication, Lubricants and Additives/ Solid Lubricants

**P-346 Investigation of Lubricants on Ophthalmic Lens:** Nobuyuki Tadokoro\*, *Lens Technology center, VC Company, HOYA Corporation, Tokyo, Japan; Somprasong Khraikratoke, Parichat Jamnongpian, PL Technical department, HOYA Lens Thailand, Ayutthaya, Thailand; Akihiro Maeda, Yuko Komine, Lens Technology center, VC Company, HOYA Corporation, Tokyo, Japan; Nissorn Pavarinpong, Somjit Suyjantuk, Nobuyoshi Iwata, PL Technical department, HOYA Lens Thailand, Ayutthaya, Thailand*

**P-347 The Development of Single Process Lubricant for Cold Forging:** Masato Otake\*, Masanobu Tanaka, Akio Shimizu, *Chemical Application Laboratory, Product Development Laboratories, Nihon Parkerizing CO., LTD., Kanagawa, Japan*

**P-348 Tribology of Gold and Fluorinate Carbon Nanometer Period Multilayer Films:** Wataru Kurosaka, Leming Tang\*, *Department of Systems Engineering, Faculty of Engineering, Nippon Institute of Technology, Saitama, Japan; Mitsuyoshi Komiya, Honda Motor Co. Ltd; Shojiro Miyake, Department of Systems Engineering, Faculty of Engineering, Nippon Institute of Technology, Saitama, Japan*

**P-349 Frictional Vibration Control of Ball Bearing in X-ray Tube with Tribo-Coated Ag Film:** Yusuke Fujii\*, Koshi Adachi, *Tribology Laboratory, Division of Mechanical Engineering, Tohoku University, Sendai, Japan; Yoshihiko Dan, Yoshitaka Seki, Hitachi Medical Corporation*

**P-350 Tribological Characteristics of Laser Clad Molybdenum Disulfide / Tungsten Disulfide Composite Layers:** Takahiro Katoh\*, *Department of Mechanical Engineering, Akashi National College of Technology, Akashi-shi, Hyogo, Japan; Masayoshi Abo, Mechanical and System*

*Engineering, Graduate School of Engineering, University of Hyogo*

#### Lubrication, Lubricants and Additives/ Additives

**P-351 Lubricating and Rheological Properties of Sodium Hyaluronate under Physiological Conditions:** Shuhai Liu, Dan Guo\*, Jianbin Luo, Chenhui Zhang, *State Key Laboratory of Tribology, Tsinghua University, Beijing, China*

**P-352 Synthesis and Evaluation of Some Polymers as Lubricating Oil Additives :** Nehal S. Ahmed\*, Amal M. Nassar, Rabab M. Nasser, *Department of Petroleum Applications, Egyptian Petroleum Research Institute, Cairo, Egypt; Ahmed F. Khattab, Faculty of Science, Minufiya University, Egypt; Abdel-Azim A. Abdel- Azim, Department of Petroleum Applications, Egyptian Petroleum Research Institute, Cairo, Egypt*

**P-353 Computational Chemistry Study on Tribocchemistry of Additive-Based Solid Lubrication:** Tasuku Onodera\*, *Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Sendai, Japan; Takanori Kuriaki, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University; Yusuke Morita, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University; Ai Suzuki, New Industry Creation Hatchery Center, Tohoku University; Michihisa Koyama, INAMORI Frontier Research Center, Kyushu University, Fukuoka, Japan; Hideyuki Tsuboi, Nozomu Hatakeyama, Akira Endou, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University; Hiromitsu Takaba, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University; Carlos A. Del Carpio, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University; Clotilde Minfray, Laboratory of Tribology and Dynamical Systems, Ecole Centrale de Lyon, ECULLY Cedex, France; Momoji Kubo, Fracture and Reliability Research Institute, Graduate School of Engineering, Tohoku University; Jean-Michel Martin, Laboratory of Tribology and Dynamical Systems, Ecole Centrale de Lyon, ECULLY Cedex, France; Akira Miyamoto, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University, Department of Chemical Engineering, Graduate School of Engineering, Tohoku University, New Industry Creation Hatchery Center, Tohoku University*

**P-354 Friction and Wear Properties of Bismuth Dialkyldithiocarbamate in Greases under Sliding Contacts :** Kanako Akazawa\*, Hiroki Iwamatsu, Masashi Mitsuoka, Hiroshi Komiya, *Technical Research Laboratory, Nippon Grease Co., Ltd., Kobe City, Japan*

**P-355 Improvement in Tribological Characteristics of Polymer by using Supercritical Carbon Dioxide:** Toshihiko Sekine\*, *Engineering Dept., Division 1, OILES Corporation, Fujisawa-shi, Kanagawa, Japan ; Takashi Yamamoto, Division of Advanced Mechanical Systems Engineering, Institute of Symbiotic Science and Technology, Tokyo University of Agriculture & Technology*

**P-356 Application of Metal Nanoparticles as Modifiers of Lubricants Tribological Behaviour:** Andrzej Kotnarowski\*, *Institute of Vehicles and Machines Maintenance, Faculty of Mechanical Engineering, Technical University of Radom, Radom, Poland*

**P-357 Mechanisms to Induce Extreme-Pressure Effects of Additives in Metalworking Fluids:** Takeshi Nogami\*, *Palace Chemical Co., Ltd., Yokohama, Japan; Ken Nakano, Yokohama National University*

**P-358 Mechanical Stability of Thermal Films Formed on Bearing Steel in the Presence of Environmentally Friendly Additives: an XPS Analytical Study:** Filippo Mangolini\*, *Department of Materials, ETH Zurich, Switzerland; Antonella Rossi, Department of Materials, ETH Zurich,*

Switzerland, Dipartimento di Chimica Inorganica e Analitica, Università degli Studi di Cagliari, Cittadella Universitaria di Monserrato, Cagliari, Italy; Nicholas D. Spencer, Department of Materials, ETH Zurich, Switzerland

#### Tribosystems/ Automobiles

**P-359 Vibrostability Calculation of Disk Brakes of Vehicles:** Albert Pogosian\*, Artak Bakhshyan, Araik Tamrazov, Graduate Division, State Engineering University of Armenia, Yerevan, Armenia

**P-360 Correlation between Laboratory Small Scale Pin on Disc and Full Scale Bench Tests of Dry Automotive Clutches:** G. P. Fernandes\*, Haertel Jr. W., Zanotto P S, Gregori I. R.S, Department of Research and Development of Friction Materials, ZF Brazil - Division Sachs, Jordanopolis, SBC - São Paulo, Brazil; de Mello JDB, Laboratory Tribology of Materials, School of Mechanical Engineering, Federal University of Uberlândia, Uberlândia - Minas Gerais, Brazil

**P-361 The Characterisation of Automotive Engine Oil Misting and the Implications for Tribological Performance:** Christopher J Dyson\*, Martin Priest, Peter M Lee, iETSI, School of Mechanical Engineering, University of Leeds, UK

**P-362 Friction Characteristics of Magnetic Clutch Used in Automotive Air Conditioning System:** Dong-Wook Kim\*, Kyung-Woong Kim, School of Mechanical, Aerospace & Systems Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea

**P-363 Study on the ATF Distribution Rates through the Oil holes in the Main Shaft of the Automatic Transmission:** Junsu Park, Graduate School of Automotive Engineering, Kookmin University, Korea; Siyoul Jang\*, School of Mechanical and Automotive Engineering, Kookmin University

#### Tribosystems/ Railways

**P-364 Nanotribology Bases of Frictional Interaction of Wheels of Locomotives with Rails :** Luzhnov Yu. M.\*, WNIIZHT, h. 10, ul. 3-th Mytischenskay, Moscow, Russia; Romanova A. T., Moscow State University of Railway Transport. MIIT, Obraztsova, RUSSIA; Shoh D. A., WNIIZHT, h. 10, ul. 3-th Mytischenskay, Moscow, RUSSIA

#### Tribosystems/ Aerospace

**P-365 Lubrication Performance of a Small Quantity of Ionic Liquids Evaluated with a Reciprocating Tribometer under High Vacuum:** Shigeru Iijima\*, Masabumi Masuko, Akihito Suzuki, Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Tokyo, Japan; Takashi Nogi, Aerospace Research and Development Directorate, Japan Aerospace Exploration Agency; Shingo Obara,

**P-366 Measurement of Lubricant Film Thickness on Rolling Contact Track:** Naohide Miyamoto\*, Hiroyuki Takeuchi, Satoshi Momozono, Keiji Kyogoku, Tsunamistu Nakahara, Tokyo Institute of Technology, Tokyo, Japan; Shingo Obara, Japan Aerospace Exploration Agency, Ibaraki

**P-367 Management of Thermal Effects for a porous self-circulating hydrodynamic bearing:** Ana M. Balasoio, Stefan I. Moldovan, Minel J Braun\*, Department of Mechanical Engineering, University of Akron, Akron, OH, USA

#### Tribosystems/ Hard Disk Drives

**P-368 Optimal Design of Surface Structure of a Magnetic Head:** Yazhen Wang\*, School of Mechanical and Automotive Engineering, South China University of Technology,

China, Guangdong College of Industry and Commerce, Guangzhou, China; Rongjun Niu, Ping Huang, School of Mechanical and Automotive Engineering, South China University of Technology, China

**P-371 The Critical Conditions for Tribo-Demagnetization of Perpendicular Magnetic Recording Disk Under Sliding Contact:** Weifeng Jiang\*, Dongfeng Diao, Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Xi'an Jiaotong University, Xi'an, China

**P-372 Study of Gas Lubricated Spindle Motor Bearings in Application to Hard Disk Drives:** Mari Nagata\*, Kazuhiko Kawaike, CENTRAL R&D, DAIDO METAL CO., LTD., Inuyama, Japan

#### Tribosystems/ Heavy Machinery

**P-373 Evaluation of Wear Resistance Properties of Hardfacing Weld Overlays Containing Metal Carbides:** Naoya Hasegawa\*, Kazuo Matsuda, Department of Systems Engineering, Nippon Institute of Technology, Saitama, Japan; Hiroaki Fukumoto, Welding Alloys Japan Ltd., Saitama, Japan; Masahito Ban, Department of Systems Engineering, Nippon Institute of Technology, Saitama, Japan

**P-374 A Model for Calculating the Oil Churning, the Bearing and the Tooth Friction Losses Generated in Planetary Gears:** Attila Csobán\*, Mihály Kozma, Department of Machine and Product Design, Budapest University of Technology and Economics, Budapest, Hungary

#### Tribosystems/ Manufacturing Equipment

**P-375 Development of New Type Linear Drive Unit - Linear Drive Unit Having Two Step Operation Systems -:** Takeshi Nakatsuji\*, Shin-ichi Yamamoto, Department of Mechanical Engineering, Kobe City College of Technology, Kobe, Hyogo, Japan; Yoshio Murao, Scientific Technologies Ltd., Kobe, Hyogo, Japan; Naomi Tanabe, Shigeru Ogiso, Taro Nagai, Ogiso Kogyo Co., Ltd., Nagoya Aichi, Japan; Hiroshi Kodaira, Katsuya Kikuta, Micro Tech Co., Ltd., Funabashi, Chiba, Japan; Go Abe, Takashi Ando, Masatoshi Aritoshi, Hyogo Prefectural Institute of Technology, Kobe, Hyogo, Japan; Jyuichi Yamaguchi, Toshio Atsuta, The New Industry Research Organization, Kobe, Hyogo, Japan

#### Tribosystems/ Maintenance

**P-376 Evaluation of Rolling and Lubricating Behavior in Ball Bearings by Ultrasonic Technique:** Zen Kawanoue\*, Yuki Toba, Hiroaki Edamatsu, Toshiaki Wakabayashi, Kagawa University, Takamatsu, Japan

**P-377 Topography of Spunbond Fabric and Filter Tribology:** Andrej Zatvarnický\*, Faculty of Mechanical Engineering, Department of Design and Machine Elements, University of Zilina, Žilina, Slovakia; Marián Dzimko, Marián Leitman, Faculty of Mechanical Engineering, Department of Design and Machine Elements, University of Zilina, Žilina, Slovakia; Yoshinori Takeichi, Department of Mechanical Engineering, Toyohashi University of Technology, Toyohashi, Aichi, Japan

**P-378 Friction and Wear Properties of Inorganic-Organic Hybrid Coatings under Dry Conditions:** Masahiro Suzuki\*, Toshiyuki Saito, JTEKT CORPORATION, Osaka, Japan; Fumio Akiyoshi, Norikazu Sakuma, ATOMIX CO., LTD., Tokyo, Japan

#### Tribosystems/ Condition Monitoring

**P-379 Complex Monitoring of Technical State of Reducers in Terms of Tribological and Vibration Parameters:** Uladzimir Leonidovich Basiniuk, *The Joint Institute of Machine Building of Belarus National Academy of Sciences, Minsk, Belarus*; Liubov Vasilievna Markova, *Metal-Polymer Research Institute of Belarus National Academy of Sciences, Gomel, Belarus*; Alena Ivanovna Mardasevich\*, *The Joint Institute of Machine Building of Belarus National Academy of Sciences, Minsk, Belarus*

**P-380 Tapered Roller Bearing Condition Monitoring Using Data Fusion Techniques:** Su L. Chen\*, Ling Wang, Robert J.K. Wood, *national Centre for Advanced Tribology at Southampton (nCATS), University of Southampton, Southampton, UK*; Rob Callan, Honor E.G. Powrie, *GE Aviation, Digital Systems, School Lane, Chandlers Ford, UK*

### Tribosystems/ Biotribology

**P-381 Medical Device Simulations :** Jack Mao\*, *School of Medical Sciences, University of Bristol, Bristol, UK*

**P-382 Influence of Temperature on the Friction Characteristics in Artificial Hip Joints:** Koichi Otsuka\*, *Department of Mechanical Engineering, Yonago National College of Technology, Yonago-shi, Tottori, Japan*; Hidehiko Higaki, *Department of Biorobotics Engineering, Faculty of Engineering, Kyushu Sangyo University*; Shigeru Ohtsuka, *Department of Mechanical Engineering, Yonago National College of Technology, Yonago-shi, Tottori, Japan*; Yoshitaka Nakanishi, *Department of Mechanical Engineering, Faculty of Engineering, Kumamoto University*

**P-383 A 2D Model Analysis of Artificial Knee Joint during Squatting:** Michihiko Fukunaga\*, Jin Kawanoya, *Department of Intelligent Machinery and Systems, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Shunji Hirokawa, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*

**P-384 Friction Properties of PVA-H / Steel Ball Contact:** Keisuke Mamada\*, Hiroyuki Kosukegawa, *Graduate School of Biomedical Engineering, Tohoku University, Sendai, Miyagi, Japan*; Vincent Fridrici, Philippe Kapsa, *Laboratory of Tribology and Systems Dynamics, UMR CNRS 5513, Ecole Centrale de Lyon, France*; Mahoto Ohta, *Institute of Fluid Science, Tohoku University*

**P-385 Experimental Researches on Mechanical and Tribological Properties of Elytra of Beetles:** Min Yu\*, *Institute of Bio-inspired Structure and Surface Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing, China*; Ilja Hermann, Norm Gitis, *Center for Tribology, Inc., Campbell, CA, USA*; Zhendong Dai, *Institute of Bio-inspired Structure and Surface Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing, China*

**P-386 Shear and Wavelength Effects on Vibrotactile Sensation of Human Skin in Sliding Contact:** Toshiharu Soneda\*, Ken Nakano, *Yokohama National University, Yokohama, Japan*

### Friday 11th, September

#### B1-41 Mini-symposium/ Tribology in information storage systems I

8:40-10:40, Room B-1

Session Chair: Youichi Kawakubo, Shinshu University, Japan  
Bo Liu, Data Storage Institute, Singapore

**B1-411 Lubricant Treatments for Head Wear Reduction on Thin-Film Disks (Invited):** Youichi Kawakubo\*, Osamu Kitamura, Toshihito Hiraide, Masaki Kamijo, Koji Ikeda, *Department of Mechanical Systems Engineering, Faculty of Engineering, Shinshu University, Naganoshi, Nagano, Japan*

**B1-412 The Head/Disk Interaction at Near Contact Regime (Invited):** Paul H. Kasai\*, Akinobu Wakabayashi, *MORESCO (Matsumura Oil Research Corp.), Kobe, Japan*

**B1-413 Advanced Head Disk Interface (HDI) System Assisted by Gas PFPE Lubrication (Invited):** Hiroyuki Matsumoto\*, *Advanced Storage Research Department, Central Research Laboratory, Hitachi, Ltd., Odawara-shi, Kanagawa, Japan*; Hiroshi Tani, *Department of Mechanical Engineering, Kansai University*

**B1-414 Characteristics of New PFPE Lubricants with Phenoxy Groups:** Akinobu Wakabayashi\*, Paul H. Kasai, *Matsumura Oil Research Corp. (MORESCO), Kobe, Hyogo, Japan*

**B1-415 Study of Slider-Lube Contact and Slider-Lube-Disk Interactions (Invited):** Bo Liu\*, Yansheng Ma, *Spintronics, Media and Interfaces, Data Storage Institute, Singapore*

**B1-416 Chemical Analysis of Carbon Overcoat and Lubricant Films for Magnetic Disks Using Ultra-high Sensitive Molecular Sensor with Plasmon Antenna:** Masahiro Yanagisawa\*, *Institute for Biomedical Engineering, Waseda University, Tokyo, Japan*; Naonobu Shimamoto, *Nanotechnology Research Laboratory, Waseda University*; Toshiyuki Aida, *Institute for Biomedical Engineering, Waseda University, Tokyo, Japan*; Mikiko Saito, *Nanotechnology Research Laboratory, Waseda University*; Atsushi Sugiyama, *Institute for Advanced Study, Waseda University*; Masahiro Yoshino, Tetsuya Osaka, *Faculty of Science and Engineering, Waseda University*

#### B1-42 Mini-symposium/ Tribology in information storage systems II

10:50-12:30, Room B-1

Session Chair: Vedantham Raman, Hitachi Global Storage Technologies, USA

Norio Tagawa, Kansai University, Japan

**B1-421 Dynamic Rheological Properties of Molecularly Thin Lubricant Film Measured by Fiber Wobbling**

**Method:** Yuya Hamamoto\*, Shintaro Itoh, Kenji Fukuzawa, *Department of Micro-Nanosystems Engineering, Nagoya University, Nagoya, Japan*; Hedong Zhang, *Department of Complex Systems Science, Nagoya University, Nagoya, Japan*

**B1-422 Different Rheological Behaviors of PFPE Film on Hard Disk Surfaces in Spin-Off and Diffusion:** Bo Zhang\*, *Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University, Saga-shi, Saga, Japan*; Hiroshi Chiba, *Fujitsu Laboratories LTD, Atsugi, Japan*; Akira Nakajima, *Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University, Saga-shi, Saga, Japan*

**B1-423 Improvements of Volumetric Recording Density of Tape Storage Systems from Tribology Point of View (Invited):** Hiroyuki Osaki\*, *Recording Media Division, Chemical & Energy Business Group, Sony Corporation, Sendai Technology Center, Miyagi, Japan*

**B1-424 Reliability Issues in Magnetic Recording Hard Disk Drives at Nanometer Spacing (Invited):** Vedantham Raman\*, Thomas Nguyen, Keith Conard, *Hitachi Global Storage Technologies, San Jose, USA*

**B1-425 Bit Pattern Media Recording System at 10 Tb/in<sup>2</sup> (Invited):** Zhi-Min Yuan\*, Bo Liu, Choon Min Cheong, Chun Lian Ong, Tiejun Zhou, *Data Storage Institute, A-Star, Singapore*

#### B1-43 Mini-symposium/ Tribology issues in novel field

14:00-15:40, Room B-1

Session Chair: Akira Iwabuchi, Iwate University, Japan  
Masanori Iwaki, Japan Aerospace Exploration Agency, Japan

**B1-431 Tribological Properties of Solid Lubricants in Moon Dust Environment (Invited):** Koji Matsumoto\*, Mineo Suzuki, *Aerospace Research and Development Directorate, Japan Aerospace Exploration Agency (JAXA), Chofu, Tokyo, Japan*; Shin-ichiro Nishida, Sachiko Wakabayashi, *JAXA Space Exploration Center, Japan Aerospace Exploration Agency (JAXA)*

**B1-432 Lubrication Mechanism of Strain Wave Gearing in Thermal Vacuum Environment (Invited):** Kazuaki Maniwa\*, Shingo Obara, *Aerospace Research and Development Directorate, Japan Aerospace Exploration Agency, Tsukuba-shi, Ibaraki-ken, Japan*

**B1-433 Importance of Web Handling Technology:** Hiromu Hashimoto\*, *Department of Mechanical Engineering, Tokai University, Hiratsuka City, Kanagawa, Japan*

**B1-434 Advanced Tribology Field with Surface Texturing:** Xiaolei Wang\*, *College of Mechanical & Electrical Engineering, Nanjing University of Aeronautics & Astronautics Nanjing, China*

**B1-435 New Analytical Methods for the Surface/Interface Structures by Synchrotron Radiation (Invited):** Katsuhiko Nakamae\*, J. Matsui, *Hyogo-Prefectural Synchrotron Radiation Nanotechnology Laboratory, Hyogo, Japan*; S. Komiya, *Hyogo-Prefectural Synchrotron Radiation Nanotechnology Laboratory, Hyogo, Japan, Japan Synchrotron Radiation Research Institute*; I. Hirose, E. Ikenaga, *Japan Synchrotron Radiation Research Institute*; K. Yokoyama, Y. Urushihara, S. Kuwamoto, L. Li, *Hyogo-Prefectural Synchrotron Radiation Nanotechnology Laboratory, Hyogo, Japan*

**B2-41 Mini-symposium/ Innovative study of lubricating grease I**

8:40-10:40, Room B-2

Session Chair: Ichiro Minami, Iwate University, Japan  
Kunio Takemura, Nippon Koyu Ltd., Japan

**B2-411 Keynote Speech: Global Grease Industry Trends and Future Technology Needs:** Matthew R. Sivik\*, Gareth Fish, Ping Y. Zhu, *The Lubrizol Corporation, Wickliffe, Ohio, USA*

**B2-412 Keynote Speech: The Recent Trend of Urea Greases:** Toshiaki Endo\*, Masayoshi Sakakibara, *Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan*

**B2-413 Lubricating Properties of Silica Nanoparticles as a Fluorinated Grease Additive:** Michita Hokao\*, Atsushi Yokouchi, *NSK Ltd., Fujisawa-shi, Kanagawa, Japan*

**B2-414 Frictional Investigations on Ball Bearings Lubricated Using Greases with Polymer Additives:** M. M. Gatzen\*, *Institute for Machine Elements, Engineering Design, and Tribology (IMKT), Leibniz Universitaet Hannover, Hannover, Germany*; F. Pape, H. H. Gatzen, *Institute for Microtechnology (imt), Leibniz Universitaet Hannover, Garbsen, Germany*; G. W. G. Poll, *Institute for Machine Elements, Engineering Design, and Tribology (IMKT), Leibniz Universitaet Hannover, Hannover, Germany*

**B2-415 A Proposal of New Interim Grease Supply Method for Induction Traction Motors:** Sumiko Hibino\*, Kazuo Nakamura, Tetsuya Hosoya, *Lubricating Materials Laboratory, Materials Technology Division, Railway Technical Research Institute, Tokyo, Japan*; Koichi Matsuoka, *Transportation Vehicle Systems Engineering Dept. Transportation Systems Div., Toshiba Corporation*; Takashi Nagayama, Teruhiko Sunohara, Minoru Kitamura, *Transportation Systems Dept. Fuchu Complex, Toshiba Corporation*

**B2-42 Mini-symposium/ Innovative study of lubricating grease II**

10:50-13:20, Room B-2

Session Chair: Ichiro Minami, Iwate University, Japan  
Kunio Takemura, Nippon Koyu Ltd., Japan

**B2-421 Fretting of a Steel Surface in the Presence of Grease Compounded with Boron Nitride (h-BN):** Zenon Pawlak\*, *Tribochemistry Consulting, Salt Lake City, USA, University of Economics, Biotribology Laboratory, Bydgoszcz, Poland*; Tadeusz Kaldonski, *Military University of Technology, Warsaw, Poland*; Michal Lisewski, *University of Economics, Biotribology Laboratory, Bydgoszcz, Poland*; Adekunle Oloyede, *Queensland University of Technology, Brisbane, Australia*

**B2-422 A Study on Properties of Pre-Made Urea Greases at High Temperature:** Kenji Yuki\*, Kengo Kinoshita, Yasuhiro Miyamoto, Hiroki Iwamatsu, Seiji Okamura, *Technical research laboratory, Nippon Grease Co., Ltd., Kobe City, Japan*

**B2-423 Investigation of Tribological System Surfaces of High-Speed Rolling Element Bearings by AES, XPS and SIMS:** Ullrich Gunst\*, *Physikalisches Institut, Münster, Germany*; Jérôme Guillot, Nathalie Valle, *CRP Gabriel Lippmann, Département SAM, Luxembourg*; Wolf-Rüdiger Zabel, *IMKT, Welfengarten 1A, Universität Hannover, Hannover, Germany, now at: Schaeffler KG, Georg-Schäfer-Str. 30, Schweinfurt, Germany*; Henri-Noël Migeon, *CRP Gabriel Lippmann, Département SAM, Luxembourg*; Gerhard Poll, *IMKT, Welfengarten 1A, Universität Hannover, Hannover, Germany*; Heinrich Franz Arlinghaus, *Physikalisches Institut, Münster, Germany*

**B2-424 Hydrogen Generation by Reaction of Greases with Nascent Clean Surface of a Steel:** Yasuha Higashine\*, Junichi Shibata, Hirotsugu Kinoshita, Kiyomi Sakamoto, *Lubricants Research Laboratory, Nippon Oil Corporation, Yokohama, Japan*; Masaki Yoshioka, Toshiaki Wakabayashi, *Department of Advanced Materials Science, Faculty of Engineering, Kagawa University*

**B2-425 Formation of Thick EHL Film with Grease at Low Speeds:** Daming Dong\*, Toshiaki Endo, *Kyodo Yushi Co., Ltd., Fujisawa-shi, Kanagawa, Japan*; Yoshitsugu Kimura, *University of Tokyo, Kagawa University*

**B2-426 The Effects of Atmospheric Gas and Molecular Structure on Pyrolysis of Urea Compounds:** Yusuke Ayame\*, Eiji Akiyama, Hiroshi Kinoshita, Kiyomi Sakamoto, *Lubricants Research Laboratory, Nippon Oil Corporation, Yokohama, Japan*

**B2-427 Influence of Grease Additive on Bearing Brittle Flaking under Passing Electric Current:** Takayuki Kawamura\*, Hidenobu Mikami, *Elemental Technological R&D Center, NTN Corporation, Kuwana, Mie, Japan*

**C1-41 Lubrication, Lubricants and Additives/ Boundary Lubrication I**

8:40-10:20, Room C-1

Session Chair: Nicolas Fillot, INSA Lyon, France

Satoshi Ogano, Exxonmobil Yugen Kaisha, Japan

**C1-411 The Auto-Reconditioning Protective Layer on Worn Metal Surface Generated by Internal Oxidation under Serpentine Action:** Yuansheng Jin\*, *State Key Laboratory of Tribology, Tsinghua University, Beijing, P R China*; Juan Li, Ling Chen, Fei Yu, *King's Art Novel Materials R&D Co., Ltd., Zhongguancun Development Building, Beijing, P R China*

**C1-412 Understanding of the Tribochemistry of Organo-Sulphur Compounds:** Johnny Tannous, Maria Isabelle De Barros Bouchet, Thieryy Le-Mogne\*, *LTDS-Ecole Centrale de Lyon, Ecully, France*; Patrick Charles, *ARKEMA-France-Lacq France*; Jean-Michel Martin, *LTDS-Ecole Centrale de Lyon, Ecully, France*

**C1-413 Measuring the Interactions between Lubricious, Water-Soluble Polymer Brushes:** Jarred Clasohm\*, Nicholas D. Spencer, *Laboratory for Surface Science and*

Technology, Department of Materials, ETH Zurich, Zurich, Switzerland

**C1-414 Zinc Polyphosphates Used as ZDDP Tribofilm**

**Models:** Fabrice Dassenoy\*, Mélanie Gauvin, Clotilde Minfray, Michel Belin, Beatrice Vacher, Jean-Michel Martin, *Laboratoire de Tribologie et Dynamique des Systèmes, Ecole Centrale de Lyon, Ecully, France*; Gilles Montagnac, Bruno Reynard, *Laboratoire des Sciences de la Terre, Ecole Normale Supérieure de Lyon, Lyon, France*

**C1-42 Lubrication, Lubricants and Additives/ Boundary Lubrication II**

10:50-12:30, Room C-1

Session Chair: Jarred N Clasohm, ETH Zurich, Switzerland  
Shigeyuki Mori, Iwate University, Japan

**C1-421 Keynote: Complementary Scales and Models to Better Describe Lubricated Contacts:**

Nicolas Fillot\*, Hassan Berro, *Université de Lyon, CNRS INSA-Lyon, LaMCoS, UMR5259, Villeurbanne, France*; Wassim Habchi, *Lebanese American University (LAU), Department of Industrial and Mechanical Engineering Byblos, Lebanon*; Philippe Vergne, *Université de Lyon, CNRS INSA-Lyon, LaMCoS, UMR5259, Villeurbanne, France*

**C1-422 Tribological Behaviors of Nanocrystalline and Coarse-Grained Nickel Coatings on Phosphor Bronze Substrates:**

Yanqiu Xia\*, Feng Zhou, Liping Wang, Wei Hong, *State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, The Chinese Academy of Science, Lanzhou, China*

**C1-423 Comparison of Friction Characteristics of Phosphorous Ion Implanted Steels with Different Phosphorous Distribution Profiles:**

Saiko Aoki\*, *Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Tokyo, Japan*; Kazuyoshi Teranishi, Masahiro Kawaguchi, Atsushi Mitsuo, *Tokyo Metropolitan Industrial Technology Research Institute*; Akihito Suzuki, Masabumi Masuko, *Department of Chemical Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology*

**C1-424 In-Situ Observation of Phase Transition Behavior of n-Alkane Molecules Induced by Friction Motion on Metal Interface:**

Keiji Sasaki\*, Naruhiko Inayoshi, *Material Engineering R&D Department, Denso Corporation, Kariya, Aichi, Japan*; Kohji Tashiro, *Department of Future Industry-Oriented Basic Science and Materials, Toyota Technological Institute, Nagoya, Aichi, Japan*

**C1-43 Lubrication, Lubricants and Additives/ Boundary Lubrication III**

14:00-15:40, Room C-1

Session Chair: Saiko Aoki, Tokyo Institute of Technology, Japan  
Yanqiu Xia, Lanzhou Institute of Chemical Physics, China

**C1-431 Keynote: The Critical Load for Formation of Nascent Steel Surface as an Activator for Tribochemical Decomposition of Lubricants:**

Shigeyuki Mori\*, Renguo Lu, Hidetaka Nanao, Kimihiro Kobayashi, *Department of Chemical Engineering, Iwate University, Morioka, Japan*

**C1-432 Tribological Properties of Tribofilm Derived from Overbased Calcium-Containing Detergents on DLC:** Hidetaka Nanao\*, Eri Oikawa, Tomoki Murayama, Tomoo Kubo, Shigeyuki Mori, *Department of Chemical Engineering, Faculty of Engineering, Iwate University, Morioka, Iwate, Japan*

**C1-433 Fundamental Study on Friction Reducing Effect of Multiply Adsorptive Organic Polymer:** Mamoru Tohyama\*, Toshihide Ohmori, Atsushi Murase, *Tribology Laboratory, Toyota Central R&D Labs., Inc., Nagakute, Aichi,*

*Japan*; Masabumi Masuko, *Department of Chemical Engineering, Tokyo Institute of Technology*

**C2-41 Lubrication, Lubricants and Additives/ Lubricating Oil VI**

8:40-10:20, Room C-2

Session Chair: Husnawan Mutiara, University of Malaya, Indonesia

Yuichi Nakamura, Mie University, Japan

**C2-411 Cracking of Hydrocarbon by Spark Discharge:**

Takayuki Takehi\*, Yuichi Nagai, *Department of Mechanical Engineering College of Engineering, Nihon University, Koriyama-city, Fukushima, Japan*; Akira Sasaki, Shinji Uchiyama, *Kleentek Corporation, Japan*; Kosuke Ito, Koji Kato, *Department of Mechanical Engineering College of Engineering, Nihon University, Koriyama-city, Fukushima, Japan*

**C2-412 The Performance of RBD Palm Stearin as Lubricant in Plane Strain Extrusion Process:**

Samion Syahrullail\*, M. Jamir M. Ridzuan, *Department of Thermofluids, Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia*; Shunpei Kamitani, Kenji Nakanishi, *Department of Mechanical Engineering, Kagoshima University, Kagoshima, Japan*

**C2-413 Study of Tribological Properties of Lubricant-Oils Based upon Microbial Oils Modified with Schiff Base Complex:**

Xinlei Gao\*, *School of Chemical and Environmental Engineering, Wuhan Polytechnic University, Wuhan, Hubei Province, P.R. China*; Wuhan Research Institute of Materials Protection, Wuhan, Hubei Province, P.R. China; Jian Li, *Wuhan Research Institute of Materials Protection, Wuhan, Hubei Province, P.R. China*; Ye Liu, *School of Chemical and Environmental Engineering, Wuhan Polytechnic University, Wuhan, Hubei Province, P.R. China*; Li Wu, *Wuhan Research Institute of Materials Protection, Wuhan, Hubei Province, P.R. China*; School of Chemical Engineering and Pharmacy, Wuhan Institute of Technology, Wuhan, Hubei Province, P.R. China

**C2-414 Development of the Ultra Low SAPS Heavy Duty Diesel Engine Oil:**

Kiyoshi Hanyuda\*, Norihiko Kagiwata, Eiji Nagatomi, Noriaki Shinoda, *Central Research & Development Laboratory, Showa Shell Sekiyu K.K., Kanagawa, Japan*

**C2-415 The Durability of Traction Fluid in Full-Toroidal Traction Drives under Extreme High-Temperature Conditions:**

Stephen Evans, *Shell Global Solutions (UK), Shell Technology Centre Thornton, Chester, UK*; Adrian Lee, Andrew Hillsden, *Torotrak (Development) Ltd., Leyland, UK*; Eiji Nagatomi\*, *Showa Shell Sekiyu K.K., Central R&D Laboratory (ARL), Kanagawa, Japan*

**C2-42 Lubrication, Lubricants and Additives/ Lubricating Oil VII**

10:50-12:30, Room C-2

Session Chair: Artur Krol, Military University of Technology, Poland

Nobuyoshi Ohno, Saga University, Japan

**C2-421 Rheological Study of Solidified Lubricant Oils under Very High Pressure by Observing Microsphere Deformation and Viscosity Prediction:**

Yuichi Nakamura\*, *Division of Physics Engineering, Graduate School of Engineering, Mie University, Tsu-shi, Mie, Japan*; Akira Takimoto, *Student, Graduate School of Engineering, Mie University*; Masahito Matsui, *Division of Physics Engineering, Graduate School of Engineering, Mie University, Tsu-shi, Mie, Japan*

**C2-422 Efficient Tribology Testing of Lubricating Oils and Greases:**

Norm V. Gitis\*, Jun Xiao, *CENTER FOR TRIBOLOGY, INC., USA*

**C2-423 Additive Interactions in Engine Oils:** Shinichi Shirahama\*, *Lubricants Research Laboratory, Nippon Oil Corporation, Yokohama, Japan*

**C2-424 A Comparative Study of Novel Synthetic Hydraulic Fluids for Hydraulic Equipment:** Sahar F. E. Houssamy\*, *Egyptian Petroleum Research Institute, Cairo, Egypt*

**C2-43 Lubrication, Lubricants and Additives/  
Lubricating Oil VIII**

14:00-15:40, Room C-2

Session Chair: Xinlei Gao, *Wuhan Polytechnic University, China*  
Norm Gitis, *Center for Tribology, Inc., USA*

**C2-432 Effect of Lubricant Parameter on Oil Pit Formation:** Nobuyoshi Ohno\*, Tomoya Kimura, Sobahan Mia, Shigeki Morita, *Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University, Saga-shi, Saga, Japan*

**C2-433 The Research of PFPE and Mineral Oils under Stand Durability Tests of The Porous Sliding Bearings:** Artur Krol\*, Tadeusz Kaldonski, Boleslaw Giemza, *Institute of Transport and Mechanical Vehicles, Faculty of Mechanical Engineering, Military University of Technology, Warsaw, Poland*

**C2-434 Study on Boundary Film Formation and Adsorption Effect Derived from EP and AW Additives:** Shozaburo Konishi\*, Soichiro Konno, *Research & Development Division, Nippon Oil Corporation, Yokohama, Japan*

**D-41 Mini-symposium/ Science of friction I**

8:40-10:20, Room D

Session Chair: Hiroshi Matsukawa, *Aoyama Gakuin University, Japan*  
Kouji Miura, *Aichi University of Education, Japan*

**D-411 Precursor Events and the Onset of Frictional Sliding (Invited):** K. Michael Salerno, *Department of Physics and Astronomy, Johns Hopkins University, Baltimore, USA*; Andras Libal, *Department of Physics and Astronomy, Johns Hopkins University, Baltimore, USA, Physics Department, University of Antwerpen, Antwerpen, Belgium*; Mark O. Robbins\*, *Department of Physics and Astronomy, Johns Hopkins University, Baltimore, USA, Department of Mechanical Engineering, Johns Hopkins University, Baltimore, USA*

**D-412 Granular Friction and Microearthquakes (Invited):** Takahiro Hatano\*, *Earthquake Research Institute, University of Tokyo, Tokyo, Japan*

**D-413 Non-Slip Sliding Friction of a Sticky Gel-Sheet (Invited):** Tetsuo Yamaguchi\*, Masao Doi, *Department of Applied Physics, Faculty of Engineering, The University of Tokyo, Tokyo, Japan*

**D-414 Influence of Ultrasonic Oscillations on Static and Sliding Friction (Invited):** Valentin L Popov\*, Jasminka Starcevic, *Institute of Mechanics, Faculty of Mechanical Engineering and Transport systems, Berlin University of Technology, Berlin, Germany*

**D-42 Mini-symposium/ Science of friction II**

10:50-12:55, Room D

Session Chair: Mark O Robbins, *Johns Hopkins University, USA*  
Tetsuo Yamaguchi, *The University of Tokyo, Japan*

**D-421 Why is Ice Slippery? (Invited):** Tomoko Ikeda-Fukazawa\*, *Department of Applied Chemistry, Meiji University, Kawasaki, Japan*

**D-422 The Role of Nanostructures on Metallic Friction: Fundamental Understanding from Studies on Single Crystals (Invited):** Somuri V. Prasad\*, Joseph R. Michael, Corbett C. Battaile, Paul G. Kotula, *Materials Science & Engineering Center, Sandia National Laboratories, Albuquerque,*

*NM, USA*; Bhaskar S. Majumdar, *Material Department, New Mexico Institute of Mining and Technology, Socorro, NM, USA*

**D-423 Criteria for the Validity of Amontons-Coulomb law -Study of Friction Using Dynamics of Driven Vortices of Superconductor- (Invited):** Atsutaka Maeda\*, Daisuke Nakamura, Yoshinori Imai, *Department of Basic Sciences, the University of Tokyo, Tokyo, Japan*; Ichiro Tsukada, *Central Research Institute, Electric Power Industry, Kanagawa, Japan*

**D-424 Sliding Friction of Multilayer Helium Films (Invited):** Masaru Suzuki\*, *Department of Applied Physics and Chemistry, University of Electro-Communications, Tokyo, Japan*  
**D-425 World of Ultralow Friction Created by Carbon Family (Invited):** Kouji Miura\*, *Department of Physics, Aichi University of Education, Kariya, Japan*

**D-43 Micro-, Nano- and Molecular Tribology/  
Superlubricity**

14:00-15:40, Room D

Session Chair: Ali Erdemir, *Argonne National Laboratory, USA*  
Kouji Miura, *Aichi University of Education, Japan*

**D-431 Keynote: How to Design and Control Superlubric Molecular Bearings:** Naruo Sasaki\*, *Department of Materials and Life Science, Seikei University, Musashino-shi, Tokyo, Japan*

**D-432 Correlation between Superlow Friction and Electrical Resistance in a Steel on Steel Contact Lubricated by Glycerol:** Fangnien Bavouzet\*, Jean-Michel Martin, Juliette Cayer-Barrioz, Denis Mazuyer, Michel Belin, *Laboratoire de Tribologie et Dynamique des Systemes, Ecole Centrale Lyon, Ecully Cedex, France*

**D-433 Control of Chaos and Nonlinearity of Pico-Force Detection in Vertical- and Lateral-Mode Atomic Force Microscopy :** Naruo Sasaki\*, *Department of Materials and Life Sciences, Faculty of Science and Engineering, Seikei University, Musashino-shi, Tokyo, Japan*; Shigeki Kawai, *Institute of Industrial Science, The University of Tokyo and CREST, Japan Science and Technology Agency, Tokyo, Japan, Department of Physics, University of Basel, Basel, Switzerland*; Hideki Kawakatsu, *Institute of Industrial Science, The University of Tokyo and CREST, Japan Science and Technology Agency, Tokyo, Japan*; Kouji Miura, *Department of Physics, Aichi University of Education, Kariya, Aichi, Japan*

**F-41 Manufacturing and Mechanical Components/  
Tribology in Machine Element I**

8:40-10:20, Room F

Session Chair: Tomas Beno, *University West, Sweden*  
Takashi Nakamura, *Nagoya Institute of Technology, Japan*

**F-411 High Performance Friction System with Advanced Ceramics for Automotive Purposes:** Albert Albers, Michael N. Mitariu\*, Sascha Ott, *IPEK - Institute of Product Development, University of Karlsruhe (TH) Research University founded 1825, Karlsruhe, Germany*

**F-412 Effects of Stress Ratio on the Fatigue Strength of Silicon Nitride Balls under Cyclic Pressure Loads :** Junnosuke Koga\*, Katsuyuki Kida, Edson Costa Santos, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Takuya Fujii, *Department of Manufacturing Technologists, Fuji Heavy Industries Ltd.*

**F-413 Effects of Ball Diameters on the Fatigue Strength of Silicon Nitride Balls under Cyclic Pressure Loads:** Katsuyuki Kida\*, Junnosuke Koga, Edson Costa Santos, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan*; Takuya Fujii, *Department of Manufacturing Technologists, Fuji Heavy Industries Ltd.*

**F-414 Evaluation of Ceramics Bearings Used in Electric Water Pumps :** Akihiro Hirao\*, Yukio Shibuya, Masayuki Sekine, Akio Takayama, *Minebea Co., Ltd., Tokyo, Japan*

**F-415 Analysis of Design Parameters for Low Current Electrical Sliding Contacts:** Hiroyuki Yoshida\*, *Technical Development Department, MITSUBA Corporation, Kiryu, Gunma, Japan*; Satoru Kaneko, Hiroo Taura, *Department of Mechanical Engineering, Nagaoka University of Technology*

**F-42 Manufacturing and Mechanical Components/ Tribology in Machine Element II**

10:50-12:30, Room F

Session Chair: Fumihito Itoigawa, Nagoya Institute of Technology, Japan

Katsuyuki Kida, Kyushu University, Japan

**F-421 Determining Power and Energy Limits of Friction Systems for Automatic Transmissions; Test Equipment and Methods:**

Martin Lund, *Department of Applied Physics and Mechanical Engineering, Division of Machine Elements, Luleå University of Technology, Sweden*; Joakim Lundin, *Volvo Construction Equipment AB, Drivetrain Development*; Rikard Mäki\*, *Volvo Construction Equipment AB, Advanced Engineering*

**F-422 Drag Torque Researches in Wet Clutches:** Hideki Tabata\*, Yuzuru Sambongi, Jin Takahashi, *Dynax Corporation, Research & Development Headquarters, Tomakomai, Hokkaido, Japan*

**F-423 Consideration on Piston and Cylinder Liner Friction - Effect of 'Soft' Skirt:**

Jun Hoshikawa\*, Hirofumi Higashi, Kazushi Miyamoto, Kiminari Kato, *Mitsubishi Motors Corporation, Okazaki-city, Aichi, Japan*; Akira Mikita, *Mitsubishi Automotive Engineering Co., Ltd.*; Masaaki Takiguchi, *Tokyo City University*

**F-424 Dynamic Modeling of Roller Screws:** Lars-Erik Stacke\*, Dag Fritzon, Jakov Nakhimovski, *SKF Engineering & Research Centre, Goteborg, Sweden*; Gerard Buvril, Jean-Paul Giraudeau, *SKF Transrol, Chambéry Cedex, France*

**F-425 Thermo-Mechanical Coupling Behavior and Friction Investigation of Solid and Ventilated Disc Brake Based on 3D Finite Element Model:**

Pyung Hwang\*, *School of Mechanical Engineering, Yeungnam University, Gyongbuk, Korea*; Xuan Wu, Young-Bae Jeon, *Department of Mechanical Engineering, Graduate School, Yeungnam University, Gyongbuk, Korea*

**F-43 Manufacturing and Mechanical Components/ Tribology in Machine Element III**

14:00-15:40, Room F

Session Chair: Fumihito Itoigawa, Nagoya Institute of Technology, Japan

Katsuyuki Kida, Kyushu University, Japan

**F-431 Torque Transference Analysis for Pulley with One-Way Clutch at Low Temperature:**

Norikazu Gouda\*, Hideki Fujiwara, *JTEKT Corporation Unitized Product Development Dept., Kashiwara-shi, Osaka, Japan*

**F-432 Linear Motion Actuator for Electromechanical Brake:**

Tatsuya Yamasaki\*, Masaaki Eguchi, *Automotive Module Product Development Dept., New Product Development R&D Center, NTN Corporation, Iwata, Shizuoka, Japan*; Yusuke Makino, *Mechatronics Research Department, New Product Development R&D Center, NTN Corporation, Iwata, Shizuoka, Japan*

**F-433 Influence of Friction Plate Groove Cross Sectional Shape on Friction Characteristics:**

Yuji Azuma\*, Norio Takakura, Jin Takahashi, *Research and Development Headquarters, Dynax Corporation, Tomakomai, Hokkaido, Japan*

**F-434 Dynamic Friction Characteristics between Tennis String and Tennis Ball during Impact:**

Koji Ikeda\*, Hironobu Ito, *Division of Mechanical Systems Engineering, Institute of Symbiotic Science and Technology, Tokyo University of Agriculture and Technology, Koganei-shi, Tokyo, Japan*

**F-435 Study of Self-Locking Mechanism of Belt Buckle:**

Keiji Imado\*, Atsuyoshi Miura, Ryuji Abe, *Department of Assistive Technology, Faculty of Engineering, Oita University, Oita-shi, Oita, Japan*; Takahiro Watanabe, Yukiyooshi Uchida, Yuuji Narumiya, Yasuaki Yamaguchi, *Logistics Engineering Division, Toshiba Logistics Corporation*

**G-41 Micro-, Nano- and Molecular Tribology/ Microtribology V**

8:40-10:20, Room G

Session Chair: Daniel J Dickrell, University of Florida, USA

M. H. Zhu, Southwest Jiaotong University, China

**G-411 Multiscale Structure of Entropy During Wear and Self-Healing:**

Michael Nosonovsky\*, *Department of Mechanical Engineering, College of Engineering & Applied Science, The University of Wisconsin at Milwaukee, Milwaukee, WI, USA*

**G-412 Shape Memory Effect of UV-Patterned Nanometer-Thick Liquid Lubricant Films against Contact Sliding:**

Hedong Zhang\*, *Department of Complex Systems Science, Nagoya University, Nagoya, Japan*; Taiki Takimoto, Kenji Fukuzawa, Shintaro Itoh, *Department of Micro-Nano Systems Engineering, Nagoya University, Nagoya, Japan*

**G-413 Shear-Thinning Behavior of Confined Lubricants Measured by Fiber Wobbling Method:**

Shintaro Itoh\*, Kenji Fukuzawa, Yuya Hamamoto, *Department of Micro-Nanosystems Engineering, Nagoya University, Nagoya, Japan*; Hedong Zhang, *Department of Complex Systems Science, Nagoya University, Nagoya, Japan*

**G-414 Adhesion Characteristics of UV Curable Resins for Nanoimprint Lithography Application:**

Jung-Chul Heo\*, *School of Mechanical, Aerospace & Systems Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea*; Kwang-Seop Kim, *Department of Nano Mechanics, Nano-Mechanical Systems Research Division, Korea Institute of Machinery & Materials (KIMM), Daejeon, Republic of Korea*; Kyung-Woong Kim, *School of Mechanical, Aerospace & Systems Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea*

**G-415 Applying Novel Nano-Patterned Surfaces to Macro-Tribology Testing:**

Yasuhisa Ando\*, Miki Nakano, Atsushi Korenaga, Koji Miyake, Yuko Hibi, Hiroki Mano, Takashi Murakami, Akihiro Tanaka, *National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan*

**G-42 Micro-, Nano- and Molecular Tribology/ Microtribology VI**

10:50-12:30, Room G

Session Chair: Yasuhisa Ando, National Institute of Advanced Industrial Science and Technology, Japan

Jeffrey L Streator, Georgia Institute of Technology, USA

**G-421 The Influence of Adhesive Friction under Extreme Low Pressure and Sliding Speed Conditions:**

Werner F. Stehr\*, *Dr. Tillwisch GmbH Werner Stehr, Germany*

**G-422 Solution Matters and the Friction of Hydrogels:**

Daniel J. Dickrell III\*, Alina Kozinda, W. G. Sawyer, *Department of Mechanical and Aerospace Engineering, University of Florida, Gainesville, FL, USA*

**G-423 Theory of Scaling Laws for the Jamming Transition of Granular Particles:**

Michio Otsuki\*, *Department of Physics and Mathematics, Aoyama Gakuin University, Sagami-hara, Kanagawa, Japan*; Hisao Hayakawa, *Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan*

**G-424 Particle Based Numerical Simulation for Meniscus Bridge Formation and Breakage:**

Kentarō

Tanaka\*, Katsumi Iwamoto, *Department of Marine Electronics and Mechanical Engineering, Faculty of Marine Technology, Tokyo University of Marine Science and Technology, Japan*

**G-425 Experimental Investigation and Simulation on Torsional Fretting Corrosion of Titanium Alloys in Saline Solution:**

X. Z. Lin, M. H. Zhu\*, P. D. Ren, Z. B. Cai, Z. R. Zhou, *Tribology Research Institute, Laboratory of Advanced Technologies of Materials of Education Ministry, Southwest Jiaotong University, Chengdu, China*

**G-43 Micro-, Nano- and Molecular Tribology/ Microtribology VII**

14:00-15:40, Room G

Session Chair: Michael Nosonovsky, *The University of Wisconsin at Milwaukee, USA*  
Kentaro Tanaka, *Tokyo University of Marine Science and Technology, Japan*

**G-431 Triboemission and X-Rays:** Thomas Prevenslik\*, *Consultant, Discovery Bay, Hong Kong, China*

**G-432 Two-Dimensional Distribution and Photon Energy of Triboplasma Generated Under Different Combinations of Sliding Partners:** Keiji Nakayama\*, *General Research Institute, Chiba Institute of Technology, Narashino-shi, Chiba, Japan, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan*

**G-433 Numerical Analysis of Contact Mechanics between Spherical Slider and Disk Considering Small Roughness and Intermolecular Forces:** Kyosuke Ono\*, *Mechanical Engineering Research Laboratory, Hitachi Ltd., Fujiwara-shi, Kanagawa-ken, Japan*

**G-434 Electrical Contact Resistance of Metallic Rough Surfaces: Modeling and Experiment:** Dinesh G. Bansal, Jeffrey L. Streater\*, *George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, USA*

**G-435 Study on the Influence of Temperature on Micro Friction in Point Contacts:** Lingyun Ding, Yazhen Wang, Zhongliang Gong, Ping Huang\*, *School of Mechanical and Automotive Engineering, South China University of Technology, Guangzhou, China*

**H-41 Tribosystems/ Biotribology IV**

8:40-10:20, Room H

Session Chair: Yoshitaka Nakanishi, *Kumamoto University, Japan*  
Zenon Pawlak, *Tribochemistry Consulting, USA*

**H-411 Keynote: Some Medical Applications of Tribology:** Ken Ikeuchi\*, *Department of Clinical Engineering, Faculty of Medical Engineering, Suzuka University of Medical Science, Suzuka-shi, Mie, Japan*

**H-412 Effects of Lubricant Lipid Concentration on Wear Rate of UHMWPE and Characteristics of Wear Particle in Multidirectional Sliding Wear Test:** Yoshinori Sawae\*, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan;* Takayuki Saruwatari, *Graduate School of Systems Life Sciences, Kyushu University;* Seido Yarimitsu, *Graduate School of Engineering, Kyushu University;* Teruo Murakami, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*

**H-413 Contact Stress Analysis for Artificial Knee Joints during Gait and Flexional Motions:** Mitsugu Todo\*, Yuji Takahashi, *Research Institute for Applied Mechanics, Kyushu University, Fukuoka, Japan;* Ryuji Nagamine, *Department of Orthopedics, Yoshizuka Hayashi Hospital;* Shunji Hirokawa, *Department of Mechanical Engineering, Kyushu University*

**H-414 Applications of the Variance Orientation Transform Method to the Multiscale Characterization of Surface Roughness and Anisotropy:** Marcin Wolski\*, Pawel Podsiadlo, Gwidon W. Stachowiak, *Tribology Laboratory,*

*School of Mechanical Engineering, Faculty of Engineering, Computing and Mathematics, The University of Western Australia, Crawley, Western Australia, Australia*

**H-42 Tribosystems/ Biotribology V**

10:50-12:30, Room H

Session Chair: Steve Franklin, *Philips Applied Technologies, Netherlands*  
Ken Ikeuchi, *Suzuka University of Medical Science, Japan*

**H-421 Formation of Boundary Film for Friction Reduction of Artificial Articular Cartilage Material under Coexistence of Proteins and Phospholipid:**

Seido Yarimitsu\*, *Department of Intelligent Machinery and Systems, Graduate School of Engineering, Kyushu University, Fukuoka, Japan;* Kazuhiro Nakashima, Yoshinori Sawae, Teruo Murakami, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*

**H-422 Effect of Tape Stripping on Skin Surface Biotribological Behaviour:**

Cyril Pailler-Mattei\*, *Laboratory of Tribology and System Dynamics UMR-CNRS 5513, Ecole Centrale de Lyon, University of Lyon, France, Department of biophysics, ISPB, University of Lyon, France;* Christelle Guerret, *Laboratory of Tribology and System Dynamics UMR-CNRS 5513, Ecole Centrale de Lyon, University of Lyon, France;* Sara Nicoli, *Department of Pharmacy, University of Parma, Parma, Italy;* Roberto Vargiolu, Hassan Zahouani, *Laboratory of Tribology and System Dynamics UMR-CNRS 5513, Ecole Centrale de Lyon, University of Lyon, France*

**H-423 Biphasic lubrication of Cartilage Tissue Evaluated from the Observation of Depth-Dependent Compressive Behavior:**

Nobuo Sakai\*, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan;* Natsuko Hosoda, Makoto Ueno, *Department of Systems Life Sciences, Graduate School of System Life Science, Kyushu University;* Kazuhiro Nakashima, Yoshinori Sawae, Teruo Murakami, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu University*

**H-424 Influence of Molecular Weight of Hyaluronic Acid on Its Viscosity and Lubricating Ability:** Hidehiko Higaki, *Department of Mechanical Engineering, Faculty of Engineering, Kyushu Sangyo University, Fukuoka, Japan;* Yoshitaka Nakanishi\*, *Graduate School of Science and Technology, Kumamoto University;* Hiromasa Miura, Yukihide Iwamoto, *Graduate School of Medical Science, Kyushu University*

**H-43 Tribosystems/ Biotribology VI**

14:00-15:40, Room H

Session Chair: Tomasz W Liskiewicz, *University of Leeds, UK*  
Mitsugu Todo, *Kyushu University, Japan*

**H-431 The Influence of Surface Interfacial Forces and Hydrophobicity on the Biolubrication of Articular Cartilage:**

Zenon Pawlak\*, *Tribochemistry Consulting, Salt Lake City, USA and University of Economics, Biotribology Laboratory, Bydgoszcz, Poland;* Aneta D. Petelska, *Institute of Chemistry, University of Bialystok, Bialystok, Poland;* A. Oloyede, *Queensland University of Technology, School of Engineering Systems, Brisbane, Australia*

**H-432 Friction Behaviour of Textured Silicone Rubber against Human Skin:** Steve E. Franklin\*, *Philips Applied Technologies, Eindhoven, The Netherlands, The University of Sheffield, Leonardo Centre for Tribology and Surface Technology, Sheffield, UK;* Pawel Kochmański, *West Pomeranian University of Technology, Institute of Materials Science and Engineering, Szczecin, Poland*

**H-433 Vibration of the Stratum Corneum During a Tribological Test of Human Skin *In vivo*:** Hassan Zahouani\*, Roberto Vargiolu, Saber Mezghani, Gaetan Boyer, Cyril Pailler-Mattei, *Laboratory of Tribology and Dynamic of*

*Systems, University of Lyon, UMR-CNRS 5513. ENISE-ECL, Ecullly, France*

**H-434 A Portable Apparatus for Friction Measurement and the Frictional Characteristics of Human Skin:**

Juanqin Gong\*, *Institute of Dermatology, Peking Union Medical College, Chinese Academy of Medical Science, Nanjing, China;* Hongkai Li, Mingming Fan, Zhendong Dai, *Institute of Bio-inspired structure and surface engineering, Nanjing University of Aeronautics and Astronautics, Nanjing, China*

**H-435 Redundancy Closed Frictional Force**

**Generated among Toes of Gecko:** Zhendong Dai\*, Zhouyi Wang, Jintong Wang, Hongkai Li, Hao Zhang, Qiang Xing, Wenhua Gu, *Institute of Bio-inspired structure and surface engineering, Nanjing University of Aeronautics and Astronautics, Nanjing, China;* Jiurong Sun, *College of Life Science, Beijing University, Beijing, China*

**I-41 Tribology Fundamentals/ Wear IV**

8:40-10:20, Room I

Session Chair: Dae-Eun Kim, Yonsei University, South Korea  
Fengcai Wang, Wuhan University of Science and Technology, China

**I-411 Wear Modes of Copper in ECMP:** Dedy Ng, Hong Liang\*, *Department of Mechanical Engineering, Texas A&M University, USA*

**I-412 Surface Chemical Effects on the Mechanical Response of 304L Stainless Steel to Tribocorrosion:** Julien Perret\*, Stefano Mischler, *Laboratory of Metallurgical Chemistry, Material Institute, Swiss Federal Institute of technology, Lausanne, Switzerland;* Anne Beaudouin, Walter J Chitty, J.Ph Vernot, *AREVA NP Technique Center, Le Creusot, France*

**I-413 Study on Wear Mechanism of Metal Materials under H<sub>2</sub>O<sub>2</sub> Lubricant:** Chengqing Yuan\*, Li Yu, *Reliability Engineering Institute, School of Energy and Power Engineering, Wuhan University of Technology, Wuhan, P. R. China, Key Laboratory of Marine Power Engineering & Technology (Ministry of Communications), Wuhan University of Technology, Wuhan, P. R. China;* Jian Li, *Wuhan Research Institute of Materials Protection, Wuhan, P. R. China;* Xiping Yan, *Reliability Engineering Institute, School of Energy and Power Engineering, Wuhan University of Technology, Wuhan, P. R. China, Key Laboratory of Marine Power Engineering & Technology (Ministry of Communications), Wuhan University of Technology, Wuhan, P. R. China*

**I-414 Synergistic Erosion-Corrosion Behavior of 316 Stainless Steel in H<sub>2</sub>SO<sub>4</sub> Aqueous Environment :** H. M. Ghasemi\*, M. Karimi, *School of Metallurgy and Materials Engineering, University of Tehran, Tehran, Iran;* A. Pasha, *School of Metallurgy and Materials Engineering, University of Tehran, Tehran, Iran, Corrosion Department of Iranian Research Institute of Petroleum Industry, Tehran, Iran*

**I-415 Magnetization Phenomenon of Surfaces through a Generation of Single-Magnetic-Domain Particles by Friction between Ferromagnetic Materials:** Hiroshi Mishina\*, Masato Dohi, Hayato Iwase, *Department of Artificial System Science, Graduate School of Engineering, Chiba University, Chiba, Japan;* Alan Hase, *Department of Mechanical Engineering, Faculty of Engineering, Saitama Institute of Technology, Fukaya, Saitama, Japan*

**I-42 Tribology Fundamentals/ Wear V**

10:50-12:30, Room I

Session Chair: Michael D Bryant, University of Texas at Austin, USA  
Hiroshi Mishina, Chiba University, Japan

**I-421 Friction and Wear Behavior of Structural Ceramics Sliding Against M50 Bearing Steel Under Vacuum Condition :** Tong Yongxing\*, *The School of*

*Mechanical and Electronic Engineering, Harbin Institute of Technology, Harbin, China, The School of Measurement-Control Tech & Communications Engineering, Harbin University of Science and Technology;* Wang Liqin, Gu Le, Peng Bo, Sun Jianwei, *The School of Mechanical and Electronic Engineering, Harbin Institute of Technology, Harbin, China*

**I-422 Influence of Environment on Wear of Al-Si Alloys:**

Francis E. Kennedy\*, Ian Baker, Ye Sun, *Thayer School of Engineering, Dartmouth College, Hanover, NH USA;* Paul R. Munroe, *University of New South Wales, Sydney, NSW, Australia*

**I-424 Relation between the Pattern Abrasion and Crack Growth Rate of Isoprene Rubber in Vacuum:** Yoshitaka Uchiyama\*, *Graduate School of Natural Science and Technology, Kanazawa University, Kanazawa-shi, Ishikawa, Japan*

**I-425 Study on the Tribological Properties of Three Types of Engineering Ceramics in Hydrogen Peroxide Solution with High Concentration:** Jian Li\*, Sheng Hu, Jihui Wang, Ding Wang, Yalin Zhao, *Wuhan Research Institute of Materials Protection, Wuhan, China*

**I-43 Tribology Fundamentals/ Wear VI**

14:00-15:40, Room I

Session Chair: Francis E Kennedy, Dartmouth College, USA  
Seh-Chun Lim, National University of Singapore, Singapore

**I-431 Erosion Wear Mechanism of SiCf/SiC Composites by Solid Particles:** Min-Soo Suh\*, *Graduate School of Energy Science, Kyoto University, Uji, Kyoto, Japan;* Akira Kohyama, *Institute of Advanced Energy, Kyoto University, Uji, Kyoto, Japan*

**I-432 The Control of Pipe Wall Abrasion in Pneumatic Transport Installations Through Fluid Velocity Control by Inducing a Vortex Flow :** Dorina Ionescu\*, *Department of Mechanical Engineering Technology, Faculty of Engineering, University of Johannesburg, South Africa*

**I-433 Influence of Anti-Wear Additives on Surface Conformity Development During Running-in of Steel Surfaces:** Agnieszka Karpinska\*, Andrew V. Olver, *Department of Mechanical Engineering, Faculty of Engineering, Imperial College, London, United Kingdom*

**I-434 Effects of Suspended Iron Particles on Tribologic Properties of Mineral and Vegetable Oils:** Svajus J. Asadauskas\*, Dalia Bražinskienė, *Tribology Group, Dept. of Material Science and Corrosion Research, Institute of Chemistry, Vilnius, Lithuania;* Juozas Padgurskas, Vytenis Jankauskas, Raimondas Kreivaitis, *Lithuanian University of Agriculture, Lithuania*

**I-435 The Effect of the Concentration of AW/EP Additives on Scuffing Resistance of the a-C:H/W/Steel Tribosystem:** Remigiusz Michalczewski\*, *Tribology Department, Institute for Sustainable Technologies - National Research Institute, Radom, Poland;* Czeslaw Kajdas, *Institute for Fuels & Renewable Energy, 55 Jjagiellońska, 03-301 Warsaw and Warsaw University of Technology, Institute of Chemistry in Plock, Plock, Poland;* Witold Piekoszewski, Marian Szczerek, Mihaela Vlad, *Tribology Department, Institute for Sustainable Technologies - National Research Institute, Radom, Poland*

**J-41 Surface Engineering/ Coatings VII**

8:40-10:20, Room J

Session Chair: Ian Sherrington, University of Central Lancashire, UK  
Aleksandar Vencl, University of Belgrade, Yugoslavia

**J-411 Keynote: Solid Lubricants for Advanced Foil Gas Bearings:** Christopher DellaCorte\*, *National Aeronautics and Space Administration, Glenn Research Center, Ohio, USA*

**J-412 Tribological Analysis of DLC Clutch Plate:** Satoshi Yoshida\*, Kazumi Ogawa, Atsushi Takahashi, *Honda R&D Co., Ltd., Automobile R&D Center, Tochigi, Japan*

**J-413 Sliding Contact Analysis between a Spherical Elastic Particle and Rubber Seal, and Surface Coated Steel Counterface:** Tae-Jo Park, *School of Mechanical and Aerospace Engineering, ERI, Gyeongsang National University, Jinju, Korea*; Hyeon-Dong Jo\*, *Graduate School of Mechanical & Aerospace Engineering, Gyeongsang National University*; Hyun-Gi Jung, *Agency for Defense Development, Jinhae, Korea*  
**J-414 Exposure Test in ISS's Orbit on Lubricative Coatings:** Masahiro Tosa\*, Akira Kasahara, Masahiro Goto, *Micro-nano Materials Engineering Group, Materials Reliability Center, National Institute for Materials Science, Tsukuba-shi, Ibaraki, Japan*

#### J-42 Surface Engineering/ Coatings VIII

10:50-12:50, Room J

Session Chair: Christopher DellaCorte, NASA, USA  
 Masahiro Tosa, National Institute for Materials Science, Japan

**J-421 Possibility of Adhesion/Cohesion Bond Strength Evaluation of the Thick Plasma Sprayed Coatings with Scratch Tester:** Aleksandar Vencl\*, *Tribology Laboratory, Mechanical Engineering Faculty, University of Belgrade, Serbia, Yugoslavia*; Saioa Arostegui, Gregory Favaro, *CSM Instruments SA, Switzerland*

**J-422 Effects of Substrate Hardness and Coating Thickness on Durability of Thermally Sprayed WC Cerment Coating under Dry Rolling/Sliding Contact Conditions:** Akira Nakajima\*, Toshifumi Mawatari, *Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University, Saga-shi, Saga, Japan*

**J-423 Finite Element Modelling of Surface Stresses in Coatings Under Single Particle Impact:** Ashutosh Dubey, *Department of Mechanical Engineering, MNNIT, Allahabad, India*; S. B. Mishra\*, *Department of Mechanical Engineering, MNNIT, Allahabad, India*

**J-424 Microstructure and Mechanical Properties of  $\kappa$ -Al<sub>2</sub>O<sub>3</sub>/TiCN Coatings Prepared by MTCVD:** Zheng Bing Qi\*, Zhou-Cheng Wang, *Department of Chemical and Biochemical Engineering, College of Chemistry and Chemical Engineering, Xiamen University, Xiamen, China*

**J-425 Tribology of UHMWPE / PFPE Film on AI Substrate:** Sujeet K. Sinha, Seh-Chun Lim\*, *Department of Mechanical Engineering, National University of Singapore, Singapore*

**J-426 Sliding Friction Behaviour of Bonded Solid Lubricant coatings - Effect of Contact Pressure, Counterface Roughness and Sliding Speed:** David Burke, *School of Engineering, Design and Manufacturing Systems, Faculty of Technology, Innovation and Development, Birmingham City University, Birmingham, UK*; Ian Sherrington\*, *Jost Institute for Tribotechnology, Department of Technology, University of Central Lancashire, Preston, UK*

#### K-41 Tribology Fundamentals/ Friction V

8:40-10:20, Room K

Session Chair: Wilfred T Tysoe, University of Wisconsin Milwaukee, USA  
 Takeshi Yamaguchi, Tohoku University, Japan

**K-411 Influence of Normal Force Dynamics on Transient Friction in a Fractal Asperity-Creep Friction Model:** Andreas Goedecke\*, *Institute of Technical Mechanics, Johannes Kepler University, Linz, Austria, Actuators and Control, Siemens Corporate Technology, Munich, Germany*; Randolph Mock, *Actuators and Control, Siemens Corporate Technology, Munich, Germany*

**K-412 Interfacial Sliding as Complicated Fractal Movement:** Roman V Riznychuk\*, *Lviv, Ukraine*  
**K-413 The Mechanical Quantum of Dissipative Friction Structures is the Elementary Tribonanostructure:** Sergey Vasilii Fedorov\*, *Department of Theory of Mechanisms and Machines and Machines Parts, Faculty of Mechanics and Technology, Kaliningrad State Technical University, Kaliningrad, Russia*

**K-414 Thermal and Physical Processes in Metal-Polymeric Tribosystems:** Vladimir I. Kolesnikov\*, *Rostov-on-Don state university of transport communications*; Alexei T. Kozakov, *Scientific research institute of Physics of Southern federal university, Russia*; Andrei V. Sidashov, *Rostov-on-Don state university of transport communications*

#### K-42 Tribology Fundamentals/ Friction VI

10:50-12:30, Room K

Session Chair: Kenichi Hiratsuka, Chiba Institute of Technology, Japan  
 Yonggang Meng, Tsinghua University, China

**K-421 Study on Velocity-Dependent Friction of Low Friction Coating for Fasteners:** Satoshi Koganemaru\*, *Material Engineering Department, Development Engineering Office, Mitsubishi Motors Corporation, Okazaki city, Aichi, Japan*; Haruo Hayashi, *Prototype Department, Development Engineering Office, Mitsubishi Motors Corporation*; Kazuhiro Fujimura, Yoichi Taniguchi, *Material Engineering Department, Development Engineering Office, Mitsubishi Motors Corporation, Okazaki city, Aichi, Japan*

**K-422 Tribological Properties of Thin Inorganic Films on Metals Surfaces:** Wilfred T. Tysoe\*, *Department of Chemistry and Laboratory for Surface Studies, University of Wisconsin Milwaukee, Milwaukee, USA*

**K-423 Effect of Oxygen Content on Tribological Behaviors of Chromium Steel under Dry Sliding Conditions:** Ming Qiu\*, Long Chen, *School of Mechatronic Engineering, Henan University of Science and Technology, Luoyang, P.R. China*; Yongzhen Zhang, *School of Materials Science and Engineering, Henan University of Science and Technology*

**K-424 The Surface Energy Effects on Static Friction for Soft and Hard Materials at Low Loads:** Myo Minn, Sujeet K. Sinha\*, *Department of Mechanical Engineering, National University of Singapore, Singapore*

**K-425 The Capillary Effect about Adhesion and Friction for Rough Surfaces:** Andrei Tudor\*, Gheorghe Soare, *The Polytechnic University of Bucharest, Romania*; Emil Stepan, *The National Chemistry Institute ICECHIM of Bucharest, Romania*; Monica Vlase, *The Building Technical University of Bucharest, Romania*

#### K-43 Tribology Fundamentals/ Friction VII

14:00-15:40, Room K

Session Chair: Ming Qiu, Henan University of Science and Technology, China  
 Sujeet K Sinha, National University of Singapore, Singapore

**K-431 Investigation of the Effects of Surface Chemistry and Surface Morphology on Adhesion and Friction by Means of a Gradient Substrate:** Lucy Y. Clasohm\*, Nicholas D. Spencer, *Laboratory for Surface Science and Technology, Department of Materials, ETH Zurich, Zurich, Switzerland*

**K-432 Third-Body's Friction and Tribo-fluctuations of Mechanochemistry Nature Create the Exergetical Dissipation Wrong Named Friction Coefficient:** Pedro Sario, Rodrigo Bulnes\*, *Department of Mechanical Engineering, Faculty of Engineering, Technical University*

*Federico Santa María, Avenida España 1680, Casilla 110-V,  
Valparaíso, Chile*

**K-433 Tribochemical Decomposition of Nitrous Oxide:**

*Ken'ichi Hiratsuka\*, Masato Miwa, Chiba Institute of  
Technology, Dept. Mechanical Science and Engineering, Japan;  
Czeslaw Kajdas, Warsaw University of Technology, Institute of  
Chemistry in Plock, Poland, Institute for Fuels and Renewable  
Energy, Warsaw, Poland*

**K-434 Friction and Wear properties of SiC in Water from**

**Tap, River and Sea:** *Mitsuo Matsuda\*, Graduate school of  
Engineering, Mechanical Engineering, Nihon University, Japan;  
Atsushi Hashimoto, Koji Kato, Department of Mechanical  
Engineering, College of Engineering, Nihon University,  
Koriyama, Japan*

**K-435 Discussion on the Mechanism of**

**Potential-Controlled Friction of Metals in Aqueous**

**Solutions:** *Yonggang Meng\*, Siqing He, Yu Tian, State Key  
Laboratory of Tribology, Tsinghua University, Beijing, China*