Room 201A

Track1: Science of Tribology
Friction Fundmental I
Chair: Michael URBAKH, *Tel Aviv University, Israel*

13:30-14:00 Keynote
Scale dependence of friction and contact from nanometer to millimeter tip radii
Mark ROBBINS
The Johns Hopkins University, USA

14:00-14:25 Invited
Amontons' law between randomly rough surfaces
Hiroshi MATSUKAWA
Aoyama Gakuin University, Japan

14:25-14:45
Sliding friction of graphene/h-BN heterojunctions: towards robust solid nano-lubrication
Davide MANDELLI, Itai LEVEN, Oded HOD, Michael URBAKH
Tel Aviv University, Israel

14:45-15:05
Friction coefficient measured on a single WS2 nanoparticle: an in situ transmission electron microscope experiment
Fabrice DASSENOY, Istvan JENEI
Ecole Centrale de Lyon, France

15:05-15:25
From the multi-contact to rate-state model
Wengen OUYANG[1], Ming MA[2], Michael URBAKH[1]
[1]Tel Aviv University, Israel; [2]Tsinghua University, China

15:30-15:50
Coffee Break

Room 201A

Track1: Science of Tribology
Friction Fundmental II
Chair: Hiroshi MATSUKAWA, *Aoyama Gakuin University, Japan*

15:50-16:10
Tribochemical wear of bare silicon in humid air and alkali solutions
Cheng CHEN, Peng ZHANG, Chen XIAO, Lei CHEN, Linmao QIAN
Southwest Jiaotong University, China

16:10-16:30
Low-friction characterization of random-textured surface of microcrystalline diamond coatings, thanks to the relaxation tribometer technique
Michel BELIN[1], Hiroyuki MIKI[2], Toshiyuki TAKAGI[2]
[1]CNRS, France; [2]Tohoku University, Japan

16:30-16:50
Numerical prediction of the optimal surface roughness of boundary friction
Xiaogang ZHANG[1], Yali ZHANG[2], Tonghai WU[3], Sangarapillai KANAPATHIPILLAI[1], Zhongxiao PENG[1]
[1]The University of New South Wales, Australia; [2]Southwest Jiaotong University, China; [3]Xi'an Jiaotong University, China

16:50-17:10
Superlubricity of graphene at the microscale
Tianbao MA
Tsinghua University, China

17:10-17:30
A numerical approach to predict tribological behaviour in soft contacts
Qian WANG[1], Tom REDDYHOFF[1], Nicolaas-Alexander GOTZEN[2], Wim BUSEYNE[2], Daniele DINI[1]
[1]Imperial College London, UK; [2]Robert Bosch Produktie N.V., Belgium

17:30-17:50
Numerical analysis of surface forces of diamond-like-carbon surface covered with molecularly thin lubricant film
Kyosuke ONO
Tokyo Institute of Technology, Japan

17:50-18:10
Numerical simulation on the adhesive contact between rough surfaces
Jiunn-Jong WU
Chang Gung University, Taiwan, China

18:10-18:30
Threshold energy for tribochemical removal of silicon surface
Chen XIAO, Lei CHEN, Cheng CHEN, Peng ZHANG, Linmao QIAN
Southwest Jiaotong University, China

Room 201B

Track1 : Science of Tribology
Molecular and Boundary Film Lubrication I
Chair: Yu TIAN, *Tsinghua University, China*

13:30-13:55 Invited
The relationship between wetting and lubrication
Feng ZHOU
Lanzhou Institute of Chemical Physics, China

13:55-14:15
Boundary film formation and competitive adsorption
Sophie CAMPEN, Janet WONG
Imperial College London, UK

14:15-14:35
Asperity scale description of initial stages of a boundary lubricated contact
Peter JACOBS[1], Andrew KONICEK[1],Fang CAO[1], Gary HUNTER[1], Martin WEBSTER[1], Simon MEDINA[1], Daniele DINI[2,3]
[1]ExxonMobil Corporate Strategic Research, USA; [2]Imperial Consultants, UK; [3]Imperial College, UK

14:35-14:55
Liquid/solid interface of ionic liquids: an investigation of molecular behavior
Haoyu LI, Liran MA, Jianbin LUO
Tsinghua University, China

14:55-15:15
Effect of lubricant volume on thin film hydrodynamic lubrication
Liang GUO[1], Patrick WONG[1], Feng GUO[2]
[1]City University of Hong Kong, Hong Kong, China; [2]Qingdao University of Technology, China

15:15-15:50
Coffee Break

Room 201B
Track1: Science of Tribology
Molecular and Boundary Film Lubrication II
Chair: Feng ZHOU, *Lanzhou Institute of Chemical Physics, China*

15:50-16:15 Invited
Excellent lubrication of liquid metal under extremely high load
Yu TIAN
Tsinghua University, China

16:15-16:40 Invited
In-situ tracking of the dynamic structure evolution in nanometer confined liquids by combining X-Ray reflectivity and white light interferometry in a surface forces apparatus
Markus VALTINER[1,3], Sadhanaa BUVANESWARAN[1], Henning WEISS[2], Hsiu-Wei CHENG[1], Claudia MEROLA[1], Julian MARS[2], Markus MEZGER[2]
[1]Max-Planck-Institut f. Eisenforschung GmbH, Germany; [2]Max-Planck-Institut f. Polymerforschung, Germany; [3]Technische Universität Bergakademie Freiberg, Germany

16:40-17:00
Forced oscillations and real-time insights of lubricated interfaces
Malik YAHIAOUI, Emmanuel RIGAUD, Denis MAZUYER, Juliette CAYER-BARRIOZ
Ecole Centrale de Lyon, France

17:00-17:20
Probing the soft spot: fluid confinement in contact
Rok SIMIC, Christian H MATHIS, Nicholas D SPENCER
ETH Zurich, Switzerland

17:20-17:40
A deterministic model for boundary lubrication and flash temperature in a transient elliptical contact
Dichu XU[1], Jiugen WANG[1], Anne NEVILLE[2], Ardian MORINA[2]
[1]Zhejiang University, China; [2]University of Leeds, UK

17:40-18:00
Experimental investigation on the friction modifier effect of vegetable oil derived biodiesels
Siti Hartini HAMDAN[1,3], William Woei Fong CHONG[2]
[1]University of Southampton Malaysia Campus, Malaysia; [2]Universiti Teknologi Malaysia, Malaysia; [3]University Kuala Lumpur, Malaysia

Room 201D
Track 2: Wear & Surface Engineering
Wear I
Chair: Noritsugu UMEHARA, *Nagoya University, Japan*

13:30-14:00 Keynote
Erosion by solid, liquid droplet and micro-jet (due to bubble collapse) impact: the importance of stress waves
Robort JK WOOD
University of Southampton, Unite Kingdom

14:00-14:25 Invited
Erosive, abrasive and sliding wear characteristics of super-hard, ultra-thick nanocomposite coatings
Ronghua WEI
Southwest Research Institute, United States

14:25-14:45
Friction and wear behaviour in dry sliding of hard metals
Andreas BLUTMAGER[1], Markus VARGA[2], Paul Heinz MAYRHOFER[3], Walter FRIESENBICHLER[1]
[1]Montanuniversitaet Leoben, Austria; [2]AC2T research GmbH, Austria; [3]TU Wien, Austria

14:45-15:05
Transition of heat generation behavior during scuffing process of steel
Yasuo MATSUZAKI, Kazuyuki YAGI, Joichi SUGIMURA
Kyushu University, Japan

15:05-15:25
Influence of ceramic tribo-elements on friction and wear of smooth steel surfaces
Andrzej DZIERWA[1], Pawel PAWLUS[1], Rafal REIZER[2]
[1]Rzeszow University of Technology, Poland; [2]University of Rzeszow, Poland

15:25-15:50
Coffee Break

Room 201D
Track 2: Wear & Surface Engineering
Wear II
Chair: Jianhua ZHANG, *Shanghai University, China*

15:50-16:15 Invited
White etching cracks (WECs) in wind turbine bearings
Ling WANG[1], Walter HOLWEGER[2]
[1]nCATS, Faculty of Engineering and the Environment, University of Southampton, UK; [2]Schaeffler Technologies AG & Co. KG, Germany

16:15-16:35
Tribological investigations of particle of phase change reinforced nylon under high load and speed
Bingli PAN
Henan University of Science and Technology, China

16:35-16:55
Influence of different abrasive wear methods on the surface of nanoausferritic ductile iron castings
Dawid MYSZKA[1], Andrzej N. WIECZOREK[2]
[1]Warsaw University of Technology, Poland; [2]Silesian Univeristy of Technology, Poland

16:55-17:15
Tribological behavior of nitrided ductile cast iron D6510 under different contacting conditions
Xueyuan NIE, Chen ZHAO, Ran CAI, Jingzeng ZHANG
University of Windsor, Canada

17:15-17:35
Wear behavior of tetrahedral amorphous carbon nitride sliding against steel and alumina disks under PAO oil lubrication
Xiaoxu LIU, Ryo YAMAGUCHI, Noritsugu UMEHARA, Motoyuki MURASHIMA
Nagoya University, Japan

17:35-17:55
Effect of applied load on wear property of tetrahedral amorphous carbon and hydrogenated amorphous carbon under the oil boundary
Li XIANG[1], Noritsugu UMEHARA[1], Hiroyuki KOUSAKA[2]
[1]Nagoya University, Japan; [2]Gifu University, Japan

17:55-18:15
Tribological behavior of electron beam melting printed Ti-6Al-4V samples
Weiquan TOH[1], Xipeng TAN[1], Erjia LIU[2], Shu Beng TOR[2]
[1]Singapore Center for 3D Printing, Singapore; [2]Nanyang Technological University, Singapore

18:15-18:35
A new methodology to evaluate the abrasion property of polymer surface
Shuai LIU, Vincent LE HOUEROU, Christian GAUTHIER
Iintitut Charles Sadron, France

Room 203A
Track 2: Wear & Surface Engineering
Coatings I
Chair: Haidou WANG, *Academy of Armored Forces Engineering, China*

13:30-14:00 Keynote
Continuous formation of nanointerface to promote super-low friction of carbon-based coatings
Koshi ADACHI
Tohoku University, Japan

14:00-14:20
Ultralow friction of ZrO_2 ball sliding against DLC films under different testing environments and temperatures
Qunfeng ZENG[1,2], Ali ERDEMIR[2], Osman ERYLIMAZ[2], Giovanni RAMIREZ[2]
[1]Xi'an Jiaotong University, China; [2]Argonne National Laboratory, United States

14:20-14:40
Carbonaceous tribo-layer for the super-low friction of carbon nitride coatings
Naohiro YAMADA, Takanori TAKENO, Koshi ADACHI
Tohoku University, Japan

14:40-15:00
Low friction Induced by 1 nm alternative layer in nanocrystalline multilayer carbon films
Peidong XUE[1], Lei YANG[1], Dongfeng DIAO[2]
[1]Xi'an Jiaotong University, China; [2]Guangdong Provincial Key Laboratory of Micro/Nano Optomechatronics Engineering, China

15:00-15:20
Effect of triboflim's morphology on the tribological properties of DLC: ZnDTP derived tribofilm characterization by 3D SEM observation
Kouami Auxence Melardot ABOUA
Nagoya University, Japan

15:30-15:50
Coffee Break

Room 203A
Track 2: Wear & Surface Engineering
Coatings II
Chair: Dae-Eun KIM, *Yonsei University, Korea*

15:50-16:15 Invited
Surface chemistry and Structural Changes of Compliant Hard Carbon Coatings for achieving superlubricity
Maria Isabel DE BARROS BOUCHET, Jean-Michel MARTIN
Laboratoire de Tribologie et Dynamique des Systèmes, Université de Lyon, France

16:15-16:35
Atmospheric helium plasma irradiation to Si containing DLC surface during sliding against plastic balls
Hiroyuki KOUSAKA[1,2], Shunsuke OKUMURA[2], Noritsugu UMEHARA[2], Motoyuki OKUMURA[2]
[1]Gifu University, Japan; [2]Nagoya University, Japan

16:35-16:55
Tribology of different types of very hard carbon
Volker WEIHNACHT, Stefan MAKOWSKI, Frank SCHALLER, Andreas LESON
Fraunhofer IWS, Germany

16:55-17:15
Tribological study of thick ta-C coating at elevated temperatures prepared under different substrate bias voltages
Woo Young LEE[1], Noritsugu UMEHARA[1], Takayuki TOKOROYAMA[1], Motoyuki MURASHIMA[1], Young Jun JANG[2], Jong Kuk KIM[2]
[1]Nagoya University, Japan; [2]Korea Institute of Materials Science, Korea

17:15-17:35
High-temperature friction coefficients and wear of an amorphous hydrogenated DLC coating
Youfeng ZHANG, Andreas POLYCARPOU
Texas A & M University, United States

17:35-17:55
The effect of penetrated diamond-like carbon overcoat on the fretting wear performance
Zhengqiang TANG, Dongdong ZHOU, Huijie ZHANG
Guizhou University, China

17:55-18:15
Molecular dynamics study on nanoindentation of ultra-thin amorphous carbon films on silicon substrate
Qingkang LIU, Longqiu LI, Guangyu ZHANG, Guangbin SHAO
Harbin Institute of Technology, China

18:15-18:35
Effect of lubricant formulations on the tribological performance of diamond-like carbon (DLC) coated direct-acting valve train components
Rehan ZAHID[1,2], Masjuki HASSAN[1], Abul KALAM[1], Mahendra VARMAN[1], Riaz MUFTI[2], Nurin ZULKIFLI[1], Mubashir GULZAR[1], Usman ABDULLAH[2], Usman BHUTTA[2], Mian ASHFAP[2]
[1]University of Malaya, Malaysia; [2]NUST School, China

Room 203B
Track 2: Wear & Surface Engineering
Texturing I
Chair: Izhak ETSION, *Technion-Israel Institute of Technology, Israel*

13:30-13:50
The tribological performance of roller and ball bearings by direct laser interference patterning
Chia-Jui HSU[1], Carsten GACHOT[2], Andreas STRATMANN[3]
[1]Saarland University, Germany; [2]Vienna University of Technology, Austria; [3]RWTH Aachen University, Germany

13:50-14:10
The combined effects of surface textures and friction modifier MoDDP under flooded and starved lubrication conditions
Linqing BAI[1], Yonggang MENG[1], Varian ZHANG[2]
[1]State Key Laboratory of Tribology, China; [2]Shell (Shanghai) Technology Ltd., China

14:10-14:30
Tribological properties of carbon film with pit-type array fabricated by plasma etching through pre-substrate filter
Sicheng CHEN[1], Lei YANG[1], Dongfeng DIAO[2]
[1]Xi'an Jiaotong University, China; [2]Shenzhen University, China

14:30-14:50
Formation of nanoholes and nanobumps by multiple laser pulses irradiation of silica spheres
Dong FENG, Jiadao WANG, Songling XING
Tsinghua University, China

14:50-15:10
Piston surface textures to improve the lubrication performance of swash plate pump
Xuan MA[1,2], Xiqun LU[1], Viral S. MEHTA[3], Qian Jane WANG[2]
[1]Harbin Engineering University, China; [2]Northwestern University, USA; [3]Caterpillar, USA

15:10-15:30
Patterning on different scales to guide lubricants effectively
Philipp GRÜTZMACHER[1], Andreas ROSENKRANZ[2], Carsten GACHOT[3], Frank MÜCKLICH[1]
[1]Saarland University, Germany; [2]University of California, USA; [3]Vienna University of Technology, Austria

15:30-15:50
Coffee Break

Room 203B
Track 2: Wear & Surface Engineering
Texturing II
Chair: Jiliang MO, *Southwest Jiaotong University, China*

15:50-16:15 Invited
A critical review about past, present and future developments in surface texturing for tribological applications
Gachot CARSTEN
Vienna University of Technology, Austria

16:15-16:35
Design, manufacturing and tribological performance of microtextured bucket tappets for friction reduction in the valve train
Max MARIAN[1], Michael ZAHNER[2], Stephan TREMMEL[1], Kolja ANDREAS[2], Marion MERKLEIN[2], Sandro WARTZACK[1]
[1]Engineering Design, FAU Erlangen-Nuremberg, Germany; [2]Manufacturing Technology, FAU Erlangen-Nuremberg, Germany

16:35-16:55
Effect of microdimple textured surface on friction under elastic dry reciprocating contacts
Muthu Kumar MARIAPPAN, M. S. BOBJI
Indian Institute Of Science, India

17:10-17:30
Thermohydrodynamic lubrication analysis of a surface textured parallel thrust bearings
Tae-Jo PARK, Min-Gyu KIM
Gyeongsang National University, Korea

17:30-17:50
Effect of surface texturing and air-plasma treatment on the adhesive strength of high build epoxy coatings on metallic substrates
Bobby SATHEESAN, Abdul Samad MOHAMMED
King Fahd University of Petroleum and Minerals, Saudi Arabia

17:50-18:10
Influence of internal wall ripple structure on cavitation flow characteristics of organ pipe nozzle
Xiang XU, Jun SUN, Xinze ZHAO, Hongling QIN, Meiyun ZHAO
China Three Gorges University, China

18:10-18:30
Effect of aloe glue on the tribological properties of multi-level textured Mg alloy surface
Dongya ZHANG, Yanfeng GE, Jianlei WANG
Xi'an University of Technology, China

Room 203C
Track3: Lubrication and Lubricants
Chemistry of lubricants I
Chair: W Gregory SAWYER, *University of Florida, USA*

13:30-14:00 Keynote
Moving tribochemistry into the third dimension
Nicholas D. SPENCER
ETH Zurich, Switzerland

14:00-14:25 Invited
Reaction pathway and kinetic modeling of the gas-phase lubrication of copper by dialkyl disulfides
Wilfred TYSOE[1], Heather ADAMS[1], Ashlie MARTINI[2]
[1]University of Wisconsin-Milwaukee, USA; [2]University of California-Merced, USA

14:25-14:45
Effects of temperature on friction and wear properties of poly-alpha-olefin in reciprocating sliding tests
Lichun HAO, He YANG, Ying XUE
RIPP, China

14:45-15:05
Relationships between molecular structure and properties of polyalphaolefin (pao): spectral, thermal and oxidation stabilities
Jiusheng LI, Yuefeng MA, Jian XU
Shanghai Advanced Research Institute, Chinese Academy of Sciences, China

15:05-15:25
Adsorption and thin film lubrication of aqueous tri-block copolymer lubricant on 3D rough TiO2 surfaces
Thi Dinh TA, Anh Kiet TIEU, Hongtao ZHU, Ha Manh LE, Huong Thi Thuy TA
University of Wollongong, Australia

15:25-15:50
Coffee Break

Room 203C
Track3: Lubrication and Lubricants
Rheology of lubricants II
Chair: W Gregory SAWYER, *University of Florida, USA*

15:50-16:15 Invited
Lubricant rheology and lubrication of rough surfaces
Petr SPERKA, Ivan KRUPKA, Martin HARTL
Brno University of Technology, Czech

16:15-16:35
The application of a molecular-continuum coupling strategy for the modelling of liquid lubricants
Fernandez Eduardo RAMOS, Edward SMITH, Daniele DINI
Imperial College London, UK

16:35-16:55
Elastohydrodynamic lubrication and the glass transition: linking experiment and simulation at high rates and pressures
Mark ROBBINS[1], Vikram JADHAO[1,2]
[1]Johns Hopkins University, UK; [2]Indiana University, USA

16:55-17:15
A new rheology model based on the time of recovery and simulations of the rheological behavior for oils with various viscosity
Ping YANG, Jinlei CUI, Xiaoling LIU, Peiran YANG
Qingdao university of technology, China

17:15-17:35
Study on the development of oil film state in a rotating disk
Dingming WANG, Bo CHEN, Zhongtao GU
Southwest University of Science and Technology, China

17:35-17:55
Inhomogeneous film formation of solidified lubricant in elastohydrodynamic lubrication conditions
Kazuyuki YAGI, Kazuki NISHIDA, Joichi SUGIMURA
Kyushu University, Japan

17:55-18:15
New mensuration of high pressure density upto 1.2 GPa for Lubricants
Bo ZHANG, Yohei SAKAMOTO, Toshifumi MAWATARI
Saga University, Japan

Room 305A
Track3: Lubrication and Lubricants
Additives I
Chair: Janet WONG, *Imperial College London, UK*

13:30-13:55 Invited
Tribological behavior of industrial WS2 nanoparticles in PAO base oil on smooth and rough surfaces
Fabrice DASSENOY[1], Paula USSA[1,2], Thierry LE MOGNE[1], Béatrice VACHER[1], Benoit THIEBAUT[2]
[1]Ecole Centrale de Lyon, France; [2]TOTAL, France

13:55-14:15
Influences of sulfur-containing additives on grease decomposition by nascent metal surface
Peng YAO[1], Tomoya UETA[1], Kyoji KONDO[1], Toshiaki WAKABAYASHI[1], Yasuha TOKUMO[2], Yusuke AYAME[2], Yuji SHITARA[2]
[1]Kagawa University, Japan; [2]JX Nippon Oil & Energy Corporation, Japan

14:15-14:35
The study of quantitative structure tribo-ability relationship for organic compounds as lubricant additives
Xinlei GAO[1], Kang DAI[2], Zhan WANG[1], Tingting WANG[1]
[1]Wuhan Polytechnic University, China; [2]South-Central University for Nationalities, China

14:35-14:55
The importance of spectrum or actual loading in milled MoS_2 powder greases using four ball wear test
Gabi NEHME
University of Balamand, Lebanon

14:55-15:15
Effect of fatty acid additives on viscoelastic properties of poly-alfa-olefin lubricants confined and sheared in nanometer-sized gap
Shintaro ITOH, Kento KAMIYA, Kenji FUKUZAWA, Hedong ZHANG
Nagoya University, Japan

15:15-15:35
The size effect on the tribological properties of few-layer graphene oxide sheets as water-based lubricant additives
Zhe CHEN, Yuhong LIU, Jianbin LUO
Tsinghua University, China

15:35-15:50
Coffee Break

Room 305A
Track3: Lubrication and Lubricants
Additives II
Chair: C.H. VENNER, *University of Twente, Netherland*

15:50-16:10
Adsorption behaviour and nanotribological property of sodium carboxylate on Fe substrate in water
Naoki AKAMATSU, Tomoko HIRAYAMA, Takashi MATSUOKA, Hideaki HATTORI, Fumiaki TAKAGI, Norifumi YAMADA
Doshisha University, JST Presto, Idemitsu Kosan Co. Ltd., KEK, Japan

16:10-16:30
Microencapsulation of additives
Stephen HSU, Fei ZHAO, Sulaksha PARAB
George Washington University, United States

16:30-16:50
Interactions of IF-MeS_2 (Me=Metal) nanoparticle additives with lubricant co-additives
Fabrice DASSENOY[1], Paula USSA[1], Pierre RABASO[3], Fabrice VILLE[3], Michel BELIN[1], Thierry LE MOGNE[1], Béatrice VACHER[1], Jérome CAVORET[3], Moussa DIABY[4], Benoit THIEBAUT[2]
[1]Ecole Centrale de Lyon, France; [2]TOTAL, France; [3]INSA de Lyon, France; [4]PSA, France

16:50-17:10
Effect of addition of ceramic-based particles with friction modifier additive in base oil on tribological behaviour of steel – steel contacts
Pushkar DESHPANDE, Clotilde MINFRAY, Fabrice DASSENOY, Benoit THIEBAUT, Frederic JARNIAS, Thierry LE MOGNE, Beatrice VACHER
Laboratoire de Tribologie et Dynamique des Système, France

17:10-17:30
Ideal organic friction modifier solutions
Ben FRY, Sophie CAMPEN, Hugh SPIKES, Janet WONG
Imperial College London, United Kingdom

17:30-17:50
Effect of additives on load capacity improvement of DLC coated sliding surface
Kimio IMAI[1], Fumihiro ITOIGAWA[1], Atsushi AKAMATSU[2], Akira WATANABE[2], Takashi NAKAMURA[1]
[1]Nagoya Institute of Technology, Japan; [2]Cosmo Oil Lubricants CO.,LTD., Japan

17:50-18:10
The preparation of nano-PVDF and its tribological properties as lubricant additives
Xing LI, Hailin LU, Guangneng DONG
Key Laboratory of Modern Design and Rotor-Bearing System of Education Ministry, Xi'an Jiaotong University, China

18:10-18:30
Preparation and tribological properties of water-soluble copper/silica nanocomposite as a water-based lubricant additive
Tiantian LIU
National & Local Joint Engineering Research Center for Applied Technology of Hybrid Nanomaterials, China

Room 305C
Track4: Biotribology & Biomimetics
Biomimics I
Chair: Zhiwu HAN, *Key Laboratory of Bionic Engineering, Ministry of Education, Jilin University, China*

13:30-13:55 Invited
Biomimetics on gecko locomotion: mechanism, dynamics and gecko-inspired robots
Zhendong DAI, Yi SONG, Zhouyi WANG
Nanjing University of Aeronautics and Astronautics, China

13:55-14:15
An experimental based analytical model for the effect of counter-face roughness on the friction of gecko-like biomimetic microstructure
Haytam KASEM[1], Yossi COHEN[2]
[1]Azrieli College of Engineering, Jerusalem Israe; [2]Tribology Labs. Israel Institute of Metals, Israel

14:15-14:35
Robust self-cleaning and micromanipulation capabilities of gecko spatulae and their bio-mimics
Quan XU[1], Yiyang WAN[3], Dashuai TAO[2], Yu TIAN[2], Zhenhai XIA[3]
[1]China University of Petroleum (Beijing), China; [2]Tsinghua University, China; [3]University of North Texas, USA

14:35-14:55
Fish drag-reducing mechanism based on the bioelectricity effect
Na SUN[1], Shiqing SUN[1], Bao WANG[2], Dangguo LI[2], Darong CHEN[2], Lina SI[1], Xiaoli WANG[1]
[1]Beijing Institute of Technology, China; [2]Tsinghua University, China

14:55-15:15
Investigation of drag reduction performance of micro-trapezoidal groove surfaces
Xiuqin BAI, Linshan ZHAO, Yifeng FU, Chengqing YUAN, Xinping YAN
Wuhan University of Technology, China

15:15-15:35
Development of clean biomimetic dry adhesive
Peter BREITMAN[1], Yuri KLIGERMAN[1], Michael VARENBERG[2]
[1]Technion - Israel Institute of Technology, Israel; [2]Georgia Institute of Technology, America

15:35-15:50
Coffee Break

Room 305C
Track4: Biotribology & Biomimetics
Biomimics II
Chair: Zhendong DAI, *Nanjing University of Aeronautics and Astronautics, China*

15:50-16:15 Invited
Bioinspiration on eccentric structure characteristics and mechanical properties of tamarisk (Tamarix Aphylla)
Zhiwu HAN, Yin WEI, Junqiu ZHANG, Luquan REN
Key Laboratory of Bionic Engineering, Ministry of Education, Jilin University, China

16:15-16:35
Adhesion characteristics of polymeric plants leaf replicas: influence of micro-structuring, morphology, and intricacy
Charchit KUMAR[1], Thomas SPECK[1], Holger F. BOHN[1], Vincent LE HOUEROU[2]
[1]University of Freiburg, Gemmany; [2]University of Strasbourg, Frence

16:35-16:55
Surface contact characteristics of banana Leaves
Mariyam Jameelah GHAZALI[1], Hasrawati Abu HASSAN[1], Che Husna AZHARIL[1], Cevdet MERIC[2]
[1]Universiti Kebangsaan Malaysia, Malaysia; [2]Fatih university, Turkey

16:55-17:15
Taro-leaf-inspired patterning of Oleophobic surfaces with high wear resistance
Hiroshi TANI, Naoya YAMASHITA, Shinji KOGANEZAWA, Norio TAGAWA
Kansai University, Japan

17:15-17:35
A Study on the wettability of sphagnum moss surface
Tianchi CHEN, Hongtao LIU
China University of Mining and Technology, China

17:35-18:15
Revealing secrets of staying on water surface based on shadow method
Hongyu LU, Wei YIN, Yelong ZHENG, Dashuai TAO, Yu TIAN
Tsinghua University, China

18:15-18:35
Oleophilicity behaviour of fresh and dry pistia stratiotes
Salmiah KASOLANG[1], Najibah AB. LATIF[1]
[1]University Teknologi Mara, Mara; [2]Malaysian Tribology Society Mytribos, Maraa

Room 303
Track5: Tribology in Manufacturing
Machining I
Chair: Braham PRAKASH, *Lulea University of Technology, Sweden*

13:30-14:00 Keynote
Extreme surface layers – a concept for future tribology
Mitjan KALIN
University of Ljubljana, Slovenia

14:00-14:20
Development of an ultra-high speed air bearing spindle for micro-milling
Takuya AOTSUKA, Masaaki MIYATAKE, Shigeka YOSHIMOTO
Tokyo University of Science, Japan

14:20-14:40
Cutting tools and wear protection through nickel bonded Niobium Carbide (NbC) as a substitute for cobalt bonded tungsten carbide (WC)
Mathias WOYDT[1], Shuigen HUANG[2], Jef VLEUGELS[2], Hardy MOHRBACHER[3]
[1]Federal Institute for Materials Research and Testing BAM, Germany; [2]Katholieke Universiteit Leuven, The Kingdom Of Belgium; [3]NiobelCon bvba, The Kingdom of Belgium

14:40-15:00
Machining influence on cemented tungsten carbide (WC-CoNi) by ultra-short pulse laser
Shiqi FANG[2,3,4], Chia-Jui HSU[5], Sven KLEIN[4], Luis LLANES[2,3], Dirk BÄHRE[4], Frank MÜCKLICH[5]
[1]CIEFMA-Departament de Ciència del Materials i Enginyeria Metal.lúrgica, Spain; [2]CIEFMA – Dept.Materials Science and Engineering, Universitat Politècnica de Catalunya, EEBE-Campus Diagonal Besòs, Spain; [3]Barcelona Research Center in Multiscale Science and Engineering, Universitat Politècnica de Catalunya, Spain; [4]Institute of Production Engineering, Saarland University, Germany; [5]Institute of Functional Materials, Saarland University, Germany

15:00-15:20
Development of tapping tool coated with nickel/abrasive particle composite film for preventing chip snarling
Yasuyoshi SAITO[1], Takeshi YAMAGUCHI[1], Ryo ITAGAKI[1], Kei SHIBATA[1], Takeshi KUBO[2], Wataru WATANABE[2], Satoru OYAMA[2], Kazuo HOKKIRIGAWA[1]
[1]Tohoku University, Japan; [2]MIYAGITANOI MFG. CO., LTD, Japan

15:20-15:50
Coffee Break

Room 303
Track5: Tribology in Manufacturing
Machining II
Chair: Mitjan KALIN, *University of Ljubljana, Slovenia*

15:50-16:15 Invited
High temperature tribology in metalworking processes
Braham PRAKASH
Lulea University of Technology, Sweden

16:15-16:35
Contact deformation behavior of silicone/SiC soft elastic abrasive in grinding and polishing progress
Ning LI
Zhejiang Normal University, China

16:35-16:55
Study on cryogenic and high speed grinding manufacturing method for high-precision flexible polymer film
Shangxiong ZHANG[1], Ying YAN[1], Xiaoguang GUO[1], Ping ZHOU[1], Huiping WANG[2]
[1]Dalian University of Technology, China; [2]Dalian Jiaotong University, China

16:55-17:15
Effect of surface texturing on tribological performance and lubricant infiltration at tool-chip interface
Jiaxin YE, Xiaojun LIU, Minghua PANG, Kun LIU
Hefei University of Technology, China

17:15-17:35
The lubricity of organic phosphate esters type additives on titanium alloys
Yan WANG, Chenhui ZHANG, Ye YANG, Jianbin LUO
State Key Laboratory of Tribology, Tsinghua University, China

Room 305E
Track6: Engine and Transmission Tribology
Rolling Bearings I
Chair: Xiaoyang CHEN, *Shanghai University, China*

13:30-14:00 Keynote
Trend of rolling machine elements for automotive transmission
Hirotoshi ARAMAKI
NSK, Japan

14:00-14:20
Evolution of microstructure formed from nitrocarburizing of bearing cage and its countermeasures
Bin LIU, Changjian GUO
C&amp U GROUP CO.LTD., China

14:20-14:40
Effect of the defects in races on the dynamic behavior of ball bearing
Ziqiang ZHAO, Xuebin YIN, Wenzhong WANG
Beijing Institute of Technology, China

14:40-15:00
The influence of tribolayer development on micropitting in bearing contacts
Victor BRIZMER[1], Christine MATTA[1], Ileana NEDELCU[1], Bo HAN[2], Guillermo Enrique MORALES-ESPEJEL[1,3]
[1]SKF B.V., Netherlands; [2]SKF Global Technical Center China, China; [3]Université de Lyon, INSA-Lyon, CNRS LaMCoS , France

15:00-15:20
Formation of white etching cracks in rolling bearing steel: root causes and their relationship to premature bearing failures
Francesco MANIERI, Amir KADIRIC
Imperial College, UK

15:20-15:50
Coffee Break

Room 305E
Track6: Engine and Transmission Tribology
Rolling Bearings II
Chair: Ning REN, *Valvoline Co., USA*

15:50-16:10
Effect of residual stress on the damage accumulation evolution of M50 steel during rolling contact fatigue
Jian GUAN, Liqin WANG, Xinxin MA
Harbin Institute of Technology, China

16:10-16:30
Evolution of rolling contact fatigue microstructure alterations in 100Cr6 martensitic bearings
Viktorija SMELOVA[1], Alexander SCHWEDT[2], Ling WANG[1], Joachim MAYER[2], Walter HOLWEGER[1,3]
[1]University of Southampton, UK; [2]RWTH Aachen University, Germany; [3]Schaeffler Group, Germany

16:30-16:50
Experimental investigations of rolling element bearings exposed to centrifugal load at a centripetal acceleration up to 3000 times gravity
David HOCHREIN[1], Stephan TREMMEL[1], Oliver GRAF-GOLLER[2], Sandro WARTZACK[1]
[1]Lehrstuhl für Konstruktionstechnik, Germany; [2]Schaeffler Technologies AG & Co.KG, Germany

16:50-17:10
Propagation of surface initiated rolling contact fatigue cracks in bearing steels
Amir KADIRIC, Pawel RYCERZ
Imperial College London, UK

17:10-17:30
Influencing factors on rolling contact fatigue life in hydrogen gas
Yuanlin KOU, Hao YAO, Hiroki YAMADA, Hideyuki UYAMA
NSK, Japan

17:30-17:50
Hydrogen embrittlement in rolling bearing steel and its protection: application case study
Xiaobo ZHOU
SKF, Netherlands

17:50-18:10
An experimental study into the mechanism of false brinelling contact damage and potential preventative measures
Rachel JANUSZEWSKI, Amir KADIRIC
Imperial College, UK

18:10-18:30
Simulation on the influence of prestress on the fatigue life of flexible bearing in harmonic drive
Yazhen WANG[1], Yi JIANG[1], Qun TONG[2], Dashi SU[2], Li SONG[2]
[1]Shanghai University, China; [2]Technology Centre of Cixing Bearing GROUP CO. LTD, China

Room 307
Track6: Engine and Transmission Tribology
Fluid-film Bearings I
Chair: Michel FILLON, *University of Poitiers, France*

13:30-13:55 Invited
Hydro dynamic bearings with soft textured layers: Effects on oscillating motion and start stop conditions
BJØRN HAUGEN
Norwegian University of Technology and Science, Norway

13:55-14:20 Invited
On lubricating film building by limited lubricant supply (LLS) and interface effect
Feng GUO[1], Shuyan ZANG[1], Pat Lam WONG[2], Chao LI[1]
[1]Qingdao University of Technology, China; [2]City University of Hong Kong, China

14:20-14:40
Research of oil film incremental effect by truncating the surface roughness under EHL conditions
Hiroaki TAKEUCHI
Mitsubishi Heavy Industries, Japan

14:40-15:00
Effect of Reynolds number on the static characteristics of fully textured journal bearings
Hiroo TAURA, Hiyoyuki YAMADA, Satoru KANEKO
Nagaoka University of Technology, Japan

15:00-15:20
A large-scale simulation of elastohydrodynamic lubrication in journal bearings with many-core architectures
Hiroki FUKAGAWA, Kazuyuki YAGI
Kyushu University, Japan

15:20-15:50
Coffee Break

Room 307

Track6: Engine and Transmission Tribology

Fluid-film Bearings II

Chair: Benyebka BOU-SAID, *INSA Lyon, France*

15:50-16:10

Investigation of textured bearings effects on vibrations of small-sized rotors

Jocelyn REBUFA[1], Fabrice THOUVEREZ[1], Erick LE GUYADEC[2], Denis MAZUYER[1]

[1]Ecole Centrale de Lyon, France; [2]CEA, DEN - DTEC, France

16:10-16:30

An experimental investigation of the influence of lubricant supply parameters and groove geometry on the performance of circumferential groove journal bearings

Alex-Florian CRISTEA[1], Jean BOUYER[2], Michel FILLON[2], Mircea PASCOVICI[3]

[1]Tecnitas SAS, France; [2]University of Poitiers, France; [3]University Politehnica of Bucarest, Romania

16:30-16:50

Load capacity and stability analysis of partial slip texture multi-lobe journal bearings

T. V. V. L. N. RAO[1], A. M. A. RANI[2], N. M. MOHAMED[2], H. H. YA[2], M. AWANG[2], F. M. HASHIM[2]

[1]The LNM Institute of Information Technology, India; [2]Universiti Teknologi PETRONAS, Malaysia

16:50-17:10

Effects of the recess geometry on flow characteristics of cryogenic hybrid journal bearings for rocket turbopumps

Mamoru OIKE[1], Masataka KIKUCHI[2], Satoshi TAKADA[2], Takayuki SUDO[2], Tomoyuki TAKANO[3]

[1]Ishinomaki Senshu University, Japan; [2]Japan Aerospace Exploration Agency, Japan; [3]Japan Aerospace Technology, Japan

17:10-17:30

Journal bearing with a double conical form – a numerical and experimental study

Balint PAP[1], Michel FILLON[1], Patrice GÉDIN[2], Guillaume BECK[2]

[1]University of Poitiers, France; [2]Safran Transmission Systems, France

17:30-17:50

Characteristics of non-contact handling equipment using ultrasonic levitation

Kentaro MITA[1], Masaaki MIYATAKE[1], Mark ATHARTON[2], Cristinel MARES[2], Shigeka YOSHIMOTO[1], Tadeusz STOLARSKI[2]

[1]Tokyo University of Science, Japan; [2]Brunel University London, UK

17:50-18:10

Investigation of the effect of a non-isothermal flow of the non-newtonian fluid in the thin layer on the dynamics of the flexible rotor of the turbo-machinery

Elena ZADOROZHNAYA, Igor LEVANOV, Nadezhda KHOZENIUK, Vlad HUDYAKOV

South Ural State University, Russia

Room 308

Track7: Industrial Tribo-systems

Hard Disk Drives and Microsystems I

Chair: Takashi NAKAMURA, *Nagoya Institute of Technology, Japan*

13:30-13:55 Invited

A review of tribology in hard drives

Min YANG

Bruker Corporation, United States

13:55-14:15

Nitrogen plasma treatment for continuous ultra-thin carbon nitride film on magnetic hard disk

Wah Lawrence NG[1,2], Amalina Balqis BINTI ABU BAKAR[1], Mohammad Azrul Firdhaus BIN AZMI[1], Wee Shen KHOO[1], Yonggang MENG[2]

[1]Fuji Electric (Malaysia) Sdn. Bhd., Malaysia; [2]Tsinghua University, China

14:15-14:35

Transport of hydrocarbon and organic contamination to the head-disk interface in magnetic recording devices

Raman VEDANTHAM

Western Digital Corporation, United States

14:35-14:55

Study of the formation and break of lubricant bridge in the head disk interface using molecular dynamic method

Xiangyu DAI[1], Hui LI[1], Shengnan SHEN[1], Xiao LEI[1], Sen LIU[1], Hejun DU[2]

[1]Wuhan University, China; [2]Nanyang Technology University, China

14:55-15:15

Heat transfer in the air bearing film in magnetic disk drive with a void on the slider surface

Yaru SUN[1], Baojun SHI[1], Cancan JI[1], Zisen HUA[2], Chuanwei ZHANG[3]

[1]Shandong Jianzhu University, China; [2]Shandong University, China; [3]Harbin Institute of Technology, China

15:30-15:50

Coffee Break

Room 308

Track7: Industrial Tribo-systems

Hard Disk Drives and Microsystems II

Chair: Min YANG, *Bruker Corporation, United States*

15:50-16:10

Influence of accommodation coefficients on thermo-molecular gas-film lubrication (t-MGL) characteristics -analysis in the free molecular limit-

Shigehisa FUKUI, Shoma SHIMIZU, Ryota ASADA, Fumiya SHINOHARA, Satoru MAEGAWA, Hiroshige MATSUOKA

Tottori University, Japan

16:10-16:30

Modification of friction surface of piezoelectric actuators

Raimundas RUKUIZA[1], Juozas PADGURSKAS[1], Valentin MIHAILOV[2], Audrius ZUNDA[1], Albinas ANDRIUSIS[1]

[1]Aleksandras Stulginskis University, Lithuania; [2]Institute of Applied Physics, Republic of Moldova

16:30-16:50
Detection and classification of magnetic disk surface defects using a contact sensor integrated into a magnetic head in a hard disk drive
Ning LI[1], Saurabh DEORAS[1], Shunji KATSUMI[2], Jorge ESCOBAR[1], Mitchell POURROY[1], Abhishek SRIVASTAVA[1], Vedantham RAMAN[1]
[1]Western Digital Corporation, United States; [2]Western Digital Corporation, Japan

16:50-17:10
Numerical and experimental study of the head/disk interface in heat assisted magnetic recording using tip enhanced Raman spectroscopy
Longqiu LI[1,2], Qingkang LIU[1], Benjamin SUEN[2], Kaipeng LIU[1], Andrew KING[3], Frank E. TALKE[2]
[1]Harbin Institute of Technology, China; [2]University of California, USA; [3]Renishaw Inc., USA

17:10-17:30
Ultra-sensitive contact detection for hard disk drives
Shaomin XIONG, Erhard SCHRECK
Western Digital Company, United States

17:30-17:50
Modified model of molecular gas film lubrication equation for simulating ultra-thin gas film lubrication
Kai GUO, Baojun SHI, Shipeng HAO, Yaru SUN, Yujie FENG
Shandong Jianzhu University, China

Room 311A
Track 8: Tribotest and Monitoring
Tribotest I
Chair: Yuanqiang TAN, *Huaqiao University, China*

13:30-14:00 Keynote
Experimental rigs for testing components of advanced industrial applications
Enrico CIULLI
University of Pisa, Italy

14:00-14:20
Positron annihilation studies of subsurface zones created during friction in metals and their alloys
JerzyJerzy DRYZEK
Institute of Nuclear Physics Polish Academy of Scinces, Poland

14:20-14:40
Friction dissipation under tangential high frequency excitation
Per LINDHOLM[1], Krystof KRYNISKI[1], Su ZHAO[1], Åsa Kassman RUDOLPHI[2]
[1]ABB, Sweden; [2]Uppsala University, Sweden

14:40-15:00
Tribology with Extended Stribeck Curves: Lubes, Cosmetics, Food and Beverages
Kartik PONDICHERRY, Charlotte REPPICH, Florian RUMMEL
Anton Paar GmbH, Austra

15:00-15:20
Simulation of initial conformability and seizure on tribo-test machine
Kotaro OKUSHI, Patrick BONNAU, Ryuji MIURA, Ai SUZUKI, Naoto MIYAMOTO, Nozomu HATAKEYAMA, Akira MIYAMOTO, Tomomi HOND
Tohoku University, Japan

15:20-15:50
Coffee Break

Room 311A
Track 8: Tribotest and Monitoring
Tribotest II
Chair: George TY WAN, *Fuchs Lubricants (China) Ltd*

15:50-16:15 Invited
Benchtop brake material screening: can we ever correlate with full-scale results?
Steve SHAFFER[1], Peter FILIP[2], Chuck GREENING[3]
[1]Bruker - TSOM, United States; [2]Southern Illinois University, United States; [3]Greening Test Labs, United States

16:15-16:35
Study of surface roughness and surface orientation on friction in rolling/sliding contacts: barrel-on-disc versus twin-disc
Bergseth ELLEN[1], Söderberg ANDERS[1], ZhuYI[2], Olofsson ULF[1]
[1]KTH Royal Institute of technology, Sweden; [2]Zhejiang University, China

16:35-16:55
The influence of crystallographic orientation on triboluminescence properties
Kuifang WANG, Liran MA
Tsinghua University, China

16:55-17:15
Comparison of wear methods based on AFM: Line-scanning and area-scanning
Peng ZHANG, Cheng CHEN, Chen XIAO, Lei CHEN, Linmao QIAN
Southwest Jiaotong University, China

17:15-17:35
Estimation of lubricity of green and commercial cutting fluid using tool chip tribometer
Suvin P S, V.Kailas SATISH
Indian Institute of Science, India

17:35-17:55
Study on mechanical properties of interface between silicate glass and stainless steel based on nanoindentation
Haosheng PANG, Chenghui GAO, Ming LIU
Fuzhou University, China

17:55-18:15
Experimental study into the influence of contact conditions and lubricant properties on the onset of scuffing using a new contra-rotation test method
Bo PENG, Guoquan HUANG, Amir KADIRIC
Imperial College London, United Kingdom

18:15-18:35
Tribo-test of high speed ball bearings under the cryogenic environment for turbo pump of liquid rocket engine
Yongbok LEE[1], Wonil KWAK[2], Bokseong CHOE[1]
[1]Korea Institute of Science and Technology, Seoul, Korea; [2]Korea Institute of Science and Technology-UST, Seoul, Korea

Room 201A
Track1: Science of Tribology
Friction Fundmental III
Chair: Mark ROBBINS, *The Johns Hopkins University, USA*

10:10-10:35 Invited
Electrotunable friction with ionic liquid nanoscale films
Michael URBAKH[1], Oscar FAJARDO[1], Fernando BRESME[2], Alexei KORNYSHEV[2]
[1]Tel Aviv University, Israel; [2]Imperial College, UK

10:35-11:00 Invited
Theory and simulation of nanoscale dissipation and friction
Erio TOSATTI
SISSA, Italy

11:00-11:20
Friction of textured surfaces in dry elastic contacts
M. S. BOBJI, Muthu Kumar MARIAPPAN
Indian Institute of Science, India

11:20-11:40
Generation of friction anisotropy by surface texturing under boundary lubrication
Shota ITO, Yuki HIRATA, Shinya, SASAKI
Tokyo University of Science, Japan

11:40-12:00
Modeling interlayer interactions in layered materials
Oded HOD
Tel Aviv University, Israel

12:15-13:30
Lunch

Room 201A
Track1: Science of Tribology
Friction Fundmental IV
Chair: Nir KAMPF, *Weizmann Institute of Science, Isreal*

13:30-14:00 Keynote
Modeling of energy dissipation due to adhesion in normal and sliding contacts
Irina G. GORYACHEVA
Institute for Problems in Mechanics, Russian Academy of Science, Russia

14:00-14:30 Keynote
Sliding bearings in wind turbines
Georg JACOBS[1], Ralf SCHELENZ[1], Dennis WITTER[2], Dennis BOSSE[1], Tim SCHRÖDER[1]
[1]RWTH Aachen University, Germany; [2]IME Aachen GmbH, Germany

14:30-14:50
Simulation of compliant third-bodies with a multibody meshfree approach
Guilhem MOLLON
INSA-Lyon, France

14:50-15:10
Fundamental simulations and experiments on tribological systems with partially filled gaps
Michael MUELLER, Georg-Peter OSTERMEYER
Braunschweig University of Technology, Germany

15:10-15:30
Scientific scaling-up from molecular dynamics simulation to friction behavior prediction
Shuaihang PAN[1], Nian YIN[2], Zhinan ZHANG[2]
[1]University of California-Los Angeles, USA; [2]Shanghai Jiao Tong University, China

15:30-16:30
Coffee Break & Poster Time

Room 201A
Track1: Science of Tribology
Friction Fundmental V
Chair: Erio TOSATTI, *SISSA, Italy*

16:30-16:55 Invited
Nanotribology of cationic surfactants
Nir KAMPF
Weizmann Institute of Science, Isreal

16:55-17:15
Real time TEM observation of metallic nano-asperity friction
Takaaki SATO, Menon VIVEK, Hiroyuki FUJITA
University of Tokyo, Japan

17:15-17:35
Temperature and velocity dependences in the prandtl/tomlinson model for atomic sliding friction
Wilfred TYSOE[1], Octavio FURLONG[2], Sergio MANZI[2]
[1]University of Wisconsin-Milwaukee, USA; [2]National University of San Luis, Argentina

17:35-17:55
Evolution of wear and roughness in mixed lubrication regime
Nilanjan DAS CHAKLADAR[1], Leiming GAO[2], Richard M HALL[1], Rob HEWSON[2]
[1]University of Leeds, UK; [2]Imperial College London, UK

17:55-18:15
Liquid-infused surface in active controlled patterned microfluidic device
Yongjian LI, Yang GAO, Haosheng CHEN
Tsinghua University, China

18:15-18:35
Microstructure evolution of impact contact surface layer in quasi-nanometer wear mechanisms
Xianghong REN[1,2]
[1]Xi'an Jiaotong University, China; [2]Xi'an Research Inst. of High-tech., China

Room 201B
Track1: Science of Tribology
Elastohydrodynamic Lubrication I
Chair: Markus VALTINER, *Max-Planck-Institut f. Eisenforschung GmbH, Germany*

10:10-10:40 Keynote
Dimensionless parameters in lubrication
Antonius LUBRECHT
INSA-Lyon, France

10:40-11:00
Variation of surface dimple in EHL contacts by the effect of oil starvation
Jing WANG[1], Xianghua MENG[1], Shun CUI[1], Binbin ZHANG[2]
[1]Qindao Technological University, China; [2]University of Twente, Netherlands

11:00-11:20
Film formation and friction in grease lubricated contacts
Yuta KANAZAWA, Richard S SAYLES, Amir KADIRIC
Imperial College London, UK

11:20-11:40
Experimental study on singular EHL behavior of grease at low speeds
Masataka SAKAI[1], Tsuyoshi KOCHI[1], Daming DONG[1], Yoshitsugu KIMURA[2,3]
[1]Kyodo Yushi CO., LTD, Japan; [2]University of Tokyo, Japan; [3]Kagawa University, Japan

12:00-13:30
Lunch

Room 201B
Track1: Science of Tribology
Elastohydrodynamic Lubrication II
Chair: Roland LARSSON, *Lulea University of Technology, Sweden*

13:30-13:50
High pressure and high shear rate contribution on the limiting shear stress of lubricants in EHL
Laetitia MARTINIE[1], Serigne NDIAYE[1], Jérémie MARGUERITAT[2], David PHILIPPON[1], Philippe VERGNE[1]
[1]LaMCoS - INSA de Lyon, France; [2]Université de Lyon, France

13:50-14:10
A method for solving the equivalent viscosity of non-Newtonian fluid and its application in thermal EHL considering spinning
Xiaoling LIU, Mingming MA, Peiran YANG
Qingdao University of Technology, China

14:10-14:30
Theoretical modelling of film forming mechanisms under transient conditions: application to deceleration and experimental validation
Juliette CAYER-BARRIOZ, Denis MAZUYER, André ERNESTO
Ecole Centrale de Lyon - LTDS - CNRS, France

14:30-14:50
Measurements of lubricant and surface temperatures within an elastohydrodynamic contact
Jia LU, Thomas REDDYHOFF, Daniele DINI
Imperial College London, UK

14:50-15:10
Boundary slippage induced elastohydrodynamic lubrication under zero entrainment velocity
Yang ZHAO[1,2], Pat Lam Patrick WONG[2], Junhong MAO[1]
[1]Xi'an Jiaotong Univeristy, China; [2]City University of Hong Kong, China

15:10-15:30
Understanding EHL friction through nonequilibrium molecular dynamics simulations and tribology experiments
James EWEN[1], Chiara GATTINONI[3], Neal MORGAN[2], Hugh SPIKES[1], Daniele DINI[1]
[1]Imperial College London, UK; [2]Shell Global Solutions, UK; [3]ETH Zurich, Switzerland

15:30-16:30
Coffee Break & Poster Time

Room 201B
Track1: Science of Tribology
Elastohydrodynamic Lubrication III
Chair: Xiaoli WANG, *Beijing Institute of Technology, China*

16:30-16:50
Effect of groove topography on the contact behavior in EHL and mixed lubrication. Part 1: experimental
Denis MAZUYER[1], Thomas TOUCHE[1], Tomasz WOLOSZYNSKI[2], Pawel PODSIADLO[2], Gwidon STACHOWIAK[2], Juliette CAYER-BARRIOZ[1]
[1]Ecole Centrale de Lyon, France; [2]Curtin University, Australian

16:50-17:10
Effect of groove topography on the contact behavior in EHL and mixed lubrication. Part 2: numerical simulations
Tomasz WOLOSZYNSKI[1], Thomas TOUCHE[2], Pawel PODSIADLO[1], Gwidon STACHOWIAK[1], Juliette CAYER-BARRIOZ[2], Denis MAZUYER[2]
[1]Curtin University, Australia; [2]Ecole Centrale de Lyon, France

17:10-17:30
A thermal and transient lubrication model for EHL contacts
Bilel MEZIANE[1], Nicolas FILLOT[1], Guillermo E. MORALES-ESPEJEL[2,1]
[1]INSA Lyon, France; [2]SKF Engineering and Research Centre, Netherlands

17:30-17:50
A molecular dynamics study of the limiting shear stress phenomenon in an EHD contact
Alejandro PORRAS-VAZQUEZ, Laetitia MARTINIE, Philippe VERGNE, Nicolas FILLOT
Université de Lyon, INSA Lyon, CNRS, LaMCoS UMR5259, France

17:50-18:10
Behaviour of entrapped oil film in point contact EHL
Hiroshi NISHIKAWA[1], Yuma MITA[1], Nobuyoshi OHNP[2]
[1]Kyushu Institute of Technology, Japan; [2]Saga University, Japan

18:10-18:30
Grease distribution under sliding reciprocating motions
Shanshan WANG

Room 201D
Track 2: Wear & Surface Engineering
Wear III
Chair: Ling WANG, *University of Southampton, UK*

10:10-10:40 Keynote
Design and application of friction pair surface modification coating for remanufacturing
Haidou WANG
Academy of Armored Forces Engineering, China

10:40-11:00
Effects of lay direction and crossing angle on friction and wear behavior of winding hoist rope in ultra-deep coal mine hoist
Xiangdong CHANG[1], Yuxing PENG[1], Zhencai ZHU[1], Xiansheng GONG[2], Shengyong ZOU[3,4], Shisheng SUN[1], Wenxue XU[1]
[1]China University of Mining and Technology, China; [2]Chongqing University, China; [3]CITIC Heavy Industries Co. Ltd, China; [4]Luoyang Mining Machinery Engineering Design Institute, China

11:00-11:20
Study on out-of-roundness wear of wheels of high-speed trains
Guangxiong CHEN
Southwest Jiaotong University, China

11:20-11:40
Dynamic Numerical Model for Adhesive Wear in Heavy-loaded Herringbone Gears with Clearance Grooves
Hongbing WANG[1], Changjiang ZHOU[1,2], Yuying LEI[1]
[1]Hunan University, China; [2]Central South University, China

11:40-12:00
The influence of abrasive debris on the wear of equipment
Zhihong HU
Tsinghua University, China

12:00-12:20
Wear protection in rolling bearings by targeted generation of tribological boundary layers
Gero BURGHARDT, Georg JACOBS, Andreas STRATMANN
RWTH Aachen University, Germany

12:00-13:30
Lunch

Room 201D
Track 2: Wear & Surface Engineering
Wear IV
Chair: Robert JK WOOD, *University of Southampton, Unite Kingdom*

13:30-13:55 **Invited**
Exploring carbon-based nanomaterials for enhancing tribological behaviors and mechanical properties
Yeau-Ren JENG
Chung Cheng University, Taiwan, China

13:55-14:15
Tribo-investigations of "size effect" of particles of mica in PAEK based short glass fiber reinforced solid lubricated composites
Jitendra Narayan PANDA, Jayashree BIJWE, Steven SHAFFER
IIT Delhi, India

14:15-14:35
Numerical investigation on wear and wet-skid resistance of nano-silicon reinforced tread rubber
Jian WU, Youshan WANG, Chuanbing ZHANG, Benlong SU
Harbin Institute of Technology, China

14:35-14:55
Abrasive wear resistance of polymers and polymer compounds
Helena RONKAINEN, Mikko KARTTUNEN, Jani PELTO, Simo VARJUS, Lauri KILPI
VTT Technical Research Centre of Finland, Finland

14:55-15:15
Influence of the type of abrasive particle and abrasive slurry concentration on the micro-abrasive wear behaviour of an iron aluminide alloy
Felipe CASTILHO[1], Ronaldo COZZA[1,2], Gustavo DONATO[1], Claudio SCHOEN[3]
[1]University Center of FEI, Brazil; [2]State Center of Technological Education "Paula Souza", Brazil; [3]University of Sao Paulo, Brazil

15:20-16:30
Coffee Break & Poster Time

Room 201D
Track 2: Wear & Surface Engineering
Wear V
Chair: Jian LI, *Wuhan Research Institute of Materials Protection, China*

16:30-16:50
Dry sliding wear and friction behavior of self-lubricating polymer composite bearing materials under extreme operating conditions
Maria RODIOUCHKINA, Kim BERGLUND, Nazanin EMAMI, Roland LARSSON
Luleå University of Technology, Sweden

16:50-17:10
Fast calculation method for predicting the risk of surface initiated damage in rolling bearings
Bernd VIERNEUSEL
Schaeffler Technologies AG Co., KG, Germany

17:10-17:30
Model of contact and wear between high-speed moving parts of piezo-drives
Yuri KLIGERMAN, Eido ZELIKOV, Haytam KASEM
Technion - Israel Institute of Technology, Israel

17:30-17:50
Anti-adhesive properties of hierarchical structures and insulating liquid media
Weixu YANG, Xiaoli WANG, Xintao SONG
Beijing Institute of Technology, China

17:50-18:10
The wear behavior between marine corroded Al/BN seal coating and Ti-alloy blade under high-speed rubbing condition
Jiaping ZHANG[1,2], Deli DUAN[1]
[1]Institute of Metal Research, China; [2]Shenyang Liming Aero-Engine Group Corporation LTD., China

18:10-18:30
Localized fretting corrosion behavior of micro-arc oxidation coating on AZ31 alloy in simulated body fluid
Yanhong GU, Huijuan MA
Beijing Institute of Petrochemical Technology, China

Room 203A
Track 2: Wear & Surface Engineering
Coatings III
Chair: Huaiyuan WANG, *Northeast Petroleum University, China*

10:10-10:35 **Invited**
Effect of ceramic counterpart material on wear properties of a-C:H coating under dry condition at various temperatures
Noritsugu UMEHARA
Nagoya University, Japan

10:35-10:55
Control of surface temperature during runing-in for low friction of carbon nitride coatings under room temperature in air
Mamoru MIURA[1], Naohiro YAMADA[1], Tomomi WATARI[2], Takanori TAKENO[1], Koshi ADACHI[2]
[1]Tohoku University, Japan; [2]Shimadzu Corporation, Japan

10:55-11:15
DLC deposited onto nitrided gray and nodular cast iron substrates: an unexpected tribological behaviour
Renan GIACOMELLI, Diego SALVARO, Cristiano BINDER, Aloisio N. KLEIN, Jose Daniel DE MELLO
Universidade Federal de Santa Catarina, Brazil

11:15-11:35
Effects of oxygen and water on friction and wear of DLC slid against pure metals
Keisuke MANABE, Hiroyoshi TANAKA, Joichi SUGIMURA
Kyushu University, Japan

11:35-11:55
Frictional behavior of oxygen doped carbon films prepared by ion irradiation assisted sputtering deposition
Meiling GUO[1], Dongfeng DIAO[2], Lei YANG[3]
[1]Xi'an University of Technology, China; [2]Shenzhen University, China; [3]Xi'an Jiaotong University, China

11:55-12:15
Investigation on influences of diarmond-like carbon coatings and oughness on fretting behaviors of Ti6Al4V material in modular hip implants
Haohao DING, Vincent FRIDRICI, Philippe KAPSA
Laboratoire de Tribologie et Dynamique des Systemes, France

12:15-12:35
Dependence of tribology behavior of carbon films on orientation of graphene nanocrystallites controlled by directional electron beam irradiation
Wencong CHEN, Dongfeng DIAO
Institute of Nanosurface Science and Engineering, China

12:35-13:30
Lunch

Room 203A
Track 2: Wear & Surface Engineering
Coatings IV
Chair: Koshi ADACHI, *Tohoku University, Japan*

13:30-13:55 Invited
Roles of MoS_2, DLC coatings and graphene in reducing adhesion under different atmospheres and temperatures
Guanhong SUN, Z. YANG, Sukanta BHOWMICK, Ahmet ALPAS
University of Windsor, Canada

13:55-14:15
Experiment Study on effects of graphene on tribological properties of MoS_2 coating
Huali HAN, Fanming MENG, Chengzhang YANG, Ziqi ZHENG
Chongqing University, China

14:15-14:35
Preparation and tribological performance of bonded solid lubrication coating used on spherical plain bearings
Ming QIU[1,2], Rui ZHANG[1], Yingchun LI[1], Hui DU[1], Xiaoxu PANG[1]
[1]Henan University of Science and Technology, China; [2]Collaborative Innovation Center of Machinery Equipment Advanced Manufacturing of Henan Province, China

14:35-14:55
Solid-liquid complex lubrication based on novel graphene-MoS2 coatings with 3D oil reservoir structure
Jinqing WANG[1,2], Kaiming HOU[1,2,3], Shengrong YANG[1,2]
[1]Lanzhou Institute of Chemical Physics, China; [2]Chinese Academy of Sciences, China; [3]University of Chinese Academy of Sciences, China

14:55-15:15
Frictional behavior and lubricant mechanism of nanostructural Mo-S-C films in different sliding conditions
Jiao XU, Tengfei He, Liqiang CHAI, Qiao LI, Xiaoqin ZHANG, Peng WANG
Chinese Academy of Sciences, China

15:15-15:35
Tribological properties of Ni-based composite coatings containing silver vanadate at elevated temperatures
Jun WANG, Jianliang LI, Dangsheng XIONG, Xuejun WANG, Hang LI
Nanjing University of Science and Technology, China

15:35-16:30
Coffee Break & Poster Time

Room 203A
Track 2: Wear & Surface Engineering
Coatings V
Chair: Fei ZHOU, *Nanjing University of Aeronautics and Astronautics, China*

16:30-16:50
Effect of self-lubricating coating on the performance of finger seal
Yanchao ZHANG, Chenguang SI, Yahui CUI, Dongya ZHANG, Jianlei WANG
Xi'an University of Technology, China

16:50-17:10
Friction and wear of Ag-doped nanocomposite coatings in wide temperature range
Andrey BONDAREV, Philipp KIRYUKHANTSEV-KORNEEV, Mehran GOLIZADEH, Dmitry SHTANSKY
National University of Science and Technology MISiS, Russia

17:10-17:30
Development of a robust and intelligent nickel composite with self-lubrication, wear resistance and health diagnosis via one-pot electrodeposition
Nan ZHOU[1], Shuncai WANG[1], Frank WALSH[2]
[1]National Centre for Advanced Tribology at Southampton, University of Southampton, UK; [2]Research Institute for Industry, University of Southampton, UK

17:30-17:50
New development and in-situ analysis of a multi-hydrophobic coating methodology
Helen WANG[1,3], Michael FIIEDNER[2], Thomas OBERBILLING[2], Wolfgang WEINHOLD[3]
[1]AMT China Co. Ltd., China; [2]COTEC GmbH, China; [3]Innowep GmbH, Germany

17:50-18:10
A universal model for an elastic-plastic coated spherical contact with moderate to large coating thicknesses
Zhou CHEN, Roman GOLTSBERG, Izhak ETSION
Technion, Israel

18:10-18:30
Effect of silicon content on the microstructure and wear resistance of FeCoCrNiMoSix high entropy alloy coatings
Yanwen TIAN, Hong WU
Central South University, China

Room 203B
Track 2: Wear & Surface Engineering
Texturing III
Chair: Gachot CARSTEN, *Vienna University of Technology, Austria*

10:10-10:30
The effect of surface texture on the oil film forming in journal bearings
Jaroslaw SEP[1], Lidia GALDA[1], Leszek TOMCZEWSKI[1,2]
[1]Rzeszow University of Technology, Poland; [2]The Jan Grodek State Vocational Academy, Poland

10:30-10:50
Visualising cavitation in a piston ring-liner type contact to understand surface texture behaviour
Sorin-Cristian VLADESCU[1], Khizer TUFAIL[2], Arup GANGOPADHYAY[3], Tom REDDYHOFF[1]
[1]Imperial College London, United Kingdom; [2]Ford Motor Company, United Kingdom; [3]Ford Motor Company, United States of America

10:50-11:10
Study on the effects of surface texture on lubrication performance of water lubricated rubber bearing
Jian WANG[1], Zhenglin LIU[1], Yangwu OU[1], Haojiang LIU[2], Xingxin LIANG[1]
[1]Wuhan University of Technology, China; [2]The NO.713 Research Institute of CSIC, China

11:10-11:30
Coupled tribological effects of laser surface texturing and lubrication
Shuwen WANG, Feiyan YAN, Ao CHEN
University of Shanghai for Science and Technology, China

11:30-11:50
Multi-scale identification of contact parameters across the 3D texture of the finish by honing
Hassan Zahouani & Mohamed El Mansori
Laboratory of Tribology and Dynamics of Systems, University of Lyon, France

11:50-12:10
The use of surface texturing for friction control
Ping LU
University of Southampton, United Kingdom

12:10-12:30
Experimental study of oil spreading characteristics on laser textured substrates at high temperature
Rong WANG, Shaoxian BAI
Zhejiang University of Technology, China

12:30-13:30
Lunch

Room 203B
Track 2: Wear & Surface Engineering
Texturing IV
Chair: Kenneth Holmberg VTT, *Finland*

13:30-13:50
Tribological behavior of the textured surfaces lubricated with esterified bio-oil with MoS_2 microsheets
Yufu XU, Jian GENG, Tao YOU, Yubin PENG, Karl DEARN, Xianguo HU
Hefei University of Technology, China

13:50-14:10
Computational simulation of frictional temperature rise of textured surfaces under dry sliding condition
Wei WU[1,2], Guiming CHEN[2], Tianmin SHAO[1]
[1]Tsinghua University, China; [2]Xi'an Research Institute of High Technology, China

14:10-14:30
Optimizition of irregular texture shape contour based on Genetic Algorithm under unidirectional sliding
Hui ZHANG[1], Guangneng DONG[1], Liguo QIN[1], Meng HUA[2]
[1]Xi'an Jiaotong University, China; [2]City University of Hong Kong, China

14:30-14:50
Friction increasing of bionic convex bumps on flexible surfaces
Xuli ZHU, Nannan LIU, Liang LI, Jiefeng MU, Linjing XIAO
Shandong University of Science and Technology, China

14:50-15:10
The effects of surface texture on the start-up behaviors of plain journal bearings
Shuhui CUI, Le GU, Chuanwei ZHANG
Harbin Institute of Technology, China

15:10-15:30
Improving the friction-induced vibration performance by using grooved damping component
Dongwei WANG[1], Jiliang MO[1], Qi ZHANG[1], Huajiang OUYANG[2], Minhao ZHU[1], Zhongrong ZHOU[1]
[1]Southwest Jiaotong University, China; [2]University of Liverpool, England

15:30-16:30
Coffee Break & Poster Time

Room 203B
Track 2: Wear & Surface Engineering
Texturing V
Chair: Liping WANG, *Ningbo Institute of material Research, Chinese Academy of Sciences, China*

16:30-16:50
Effect of surface texture on formation of carbon film by adding carbon nanohorns on interface of silicon carbide sliding in water
Xinmei LIU, Hirotsuna SATO, Koshi ADACHI
Tohoku University, Japan

16:50-17:10
The effect mechanism of goove-textured surfaces in reducing the friction-induced vibration and noise
Jiliang MO[1], Dongwei WANG[1], Huajiang OUYANG[2], Guangxiong CHEN[1], Minhao ZHU[1], Zhongrong ZHOU[1]
[1]Southwest Jiaotong University, China; [2]University of Liverpool, England

17:10-17:30
Improvement in slip resistance of rubber sole on oil-lubricated surface by controlling height and orientation of tread block
Takeshi YAMAGUCHI, Yu KATSURASHIMA, Kazuo HOKKIRIGAWA
Tohoku University, Japan

17:30-17:50
Thermoelastohydrodynamic behaviour comparisons of different textured gas face seals at low pressure
Shaopeng DING, Shaoxian BAI
Zhejiang University of Technology, China

17:50-18:10
Tribological properties of alloying techniques to deposit coating on laser texturing surface
Yi WAN[1], Dangsheng XIONG[2], Jianliang LI[2]
[1]Nanjing University of Aeronautics and Astronautics, China; [2]Nanjing University of Science and Technology, China

18:10-18:30
The effect of tooth topography on the tribo-dynamic characteristics of spur gears
Zhi LI, Jian CHEN, Xiaojun LIU, Kun LIU
Hefei University of Technology, China

Room 203C
Track3: Lubrication and Lubricants
Chemistry of lubricants II
Chair: Wilfred TYSOE, *University of Wisconsin-Milwaukee, USA*

10:10-10:35 Invited
The mechanochemistry of ultra low wear fluoropolymers
W Gregory SAWYER[1], Angela A PITENIS[1], Kathryn L HARRIS[2], Brandon A KRICK[3]
[1]LuleUniversity of Florida, USA; [2]Kungliga Tekniska Högskolan (KTH), Sweden; [3]Lehigh University, Bethlehem, USA

10:35-10:55
Tribochemical reactions of alkali metal phosphate with iron oxide surfaces from quantum mechanics molecular dynamics QM/MM Level
Thuy Huong TA, Anh Kiet TIEU, Hongtao ZHU, Haibo YU, Dinh Thi TA, Manh Ha LE
University of Wollongong, Australia

10:55-11:15
Tribological characteristic and mechanism analysis of borate ester as a lubricant additive in different base oils
Guangbin YANG, Shengmao ZHANG, Pingyu ZHANG
Henan University, China

11:15-11:35
Influence of the structure of hydrocarbon radicals on the adsorption parameters for lubricant
Lgor MUKCHORTOV, Elena ZADOROZHNAYA, Lgor LEVANOV, Yury ROZHDESTVENSKY
South Ural State University, Russia

11:35-11:55
Lubricant influences on the formation of white etching cracks (WEC)
Christoph MAYER, Balasubramaniam VENGUDUSAMY, Adam ORENDORZ, Stefan GRUNDEI, Claus ENEKES, Reiner SPALLEK
Klüber Lubrication München SE & Co. KG

11:55-12:15
Comparison between Langmuir-Blodgett films made from additive molecules and adsorbed additive layers from the viewpoint of nanotribological property
Koki Shinohara[1], Tomoko Hirayama[1,2], Takashi Matsuoka[1]
[1]Doshisha University; [2]JST Presto

12:30-13:30
Lunch

Room 203C
Track3: Lubrication and Lubricants
Solid lubricants I
Chair: Junyan ZHANG, *Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China*

13:30-14:00 Keynote
In situ created 2D Turbostratic Graphite: A new way to obtain high performance self lubricating composites
José Daniel Biasoli de Mello
Universidade Federal de Uberlândia, Brazil

14:00-14:20
Low friction mechanism of diamond-like carbon in water: a theoretical study
Shandan BAI[1], Jingxiang XU[2], Yusuke OOTANI[2], Yuji HIGUCHI[2], Nobuki OZAWA[2], Momoji KUBO[2]
[1]Kyocera Corporation, Japan; [2]Tohoku University, Japan

14:20-14:40
The synthesis of MoS2 particles with different morphologies for tribological applications
Meirong YI, Chenhui ZHANG
Tsinghua University, China

14:40-15:00
From nanoscal to macroscal friction reducing enabled by in-suit multilayers graphene formation
Wenbo QIN, Wen YUE, Chengbiao WANG
China University of Geosciences (Beijing), China

15:00-15:20
Study of frictional behaviors of vertically oriented graphene sheets fabricated by electrophoretic deposition
Bin SHEN, Sulin CHEN, Hong HONG
Shanghai Jiao Tong Univeristy, China

15:30-16:30
Coffee Break & Poster Time

Room 203C

Track3: Lubrication and Lubricants

Solid lubricants II

Chair: Ning REN, *Valvoline Co., USA*

16:30-16:55 Invited

Engineering scale superlubricity of carbon films

Junyan ZHANG

Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China

16:55-17:15

Run-in behavior of DLC film at nano scale

Pengfei SHI

Southwest University, China

17:15-17:35

Self-assembled graphene film as low friction solid lubricant in macroscale contact

Pu WU[1], Xinming LI[2], Chenhui ZHANG[1], Xinchun CHEN[1], Shuyuan LIN[1], Zefeng CHEN[2], Hongyan SUN[3,4], Hengte LIN[3], Hongwei ZHU[1], Jianbin LUO[1]

[1]Tsinghua University, China; [2]The Chinese University of Hong Kong, China; [3]Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; [4]Hunan University, China

17:35-17:55

Effect of multilayer structure of a C/Si film on its tribological properties in solid-liquid composite lubrication system under high temperature

Bing LI, Yujuan ZHANG, Shengmao ZHANG, Pingyu ZHANG

National & Local Joint Engineering Research Center for Applied Technology of Hybrid Nanomaterials, China

Room 305A

Track3: Lubrication and Lubricants

Additives III

Chair: Hugh SPIKES, *Imperial College London, UK*

10:10-10:30

Tribochemistry of molybdenum based additives using Raman microscopy on steel/steel and steel/DLC coatings

Cayetano ESPEJO[1], Catherine CHARRIN[2], Benoît THIéBAUT[2], Denis LANçON[2], Anne NEVILLE[1], Ardian MORINA[1]

[1]University of Leeds, UK; [2]TOTAL. Solaize Researcher Center, France

10:30-10:50

Mechanism of fretting wear reduction using magnesium stearate as lubricant additive under oil lubrication

Taisuke MARUYAMA, Michita HOKAO

NSK Ltd., Japan

10:50-11:10

The effect of UV irradiation to a-C:H on friction and wear properties under PAO oil lubrication including MoDTC and ZnDTP

Mohd Taugik BIN TAIB, Noritsugu UMEHARA, Motoyuki MURASHIMA

Nagoya University, Japan

11:10-11:30

Effect of water-based lubricants on multi-degradation of austenitic stainless steel

Amin HOSSEIN ZAVIEH, Nuria ESPALLARGAS

Norwegian university of science and technology, Norway

11:30-11:50

The tribological properties of sulfur-and-phosphorus-free organic molybdenum compounds as additives in oil

Wenjuan HUAI, Yanxu WANG, Yuanjing DAI, Jiping ZHANG, Chenhui ZHANG

Tianjin Research Institute for Advanced Equipment, Tsinghua University, China

11:50-12:10

Effect of graphene as oil additives on the frictional behavior of GCr15 steel during sliding contact

Lupeng WU, Chuanwei ZHANG, Zhijie XIE, Le GU

Harbin Institute of Technology, China

12:10-12:30

New sight into the tribological mechanism of cerium oxide nanoparticles

Lili WU, Shengmao ZHANG, Pingyu ZHANG

National & Local Joint Engineering Research Center, China

12:30-13:30

Lunch

Room 305A

Track3: Lubrication and Lubricants

Additives IV

Chair: Petr SPERKA, *Brno University of Technology*

13:30-13:50

Microstructure and antioxidant behavior of mesoporous silica nanospheres as potential antioxidant of synthetic ester lubricant oil

Lina HUANG, Shengmao ZHANG, Pingyu ZHANG

National & Local Joint Engineering Research Center for Applied Technology of Hybrid Nanomaterials, China

13:50-14:10

Tribological properties of tungsten disulfide nanoparticles surface-capped by oleylamine and maleic anhydride dodecyl ester as additive in diisooctylsebacate

Zhengquan JIANG, Shengmao ZHANG, Pingyu ZHANG

Henan University, China

14:10-14:30

The graphene as friction reduction and antiwear additive in polyphosphate lubricant for elevated rubbing surfaces

Ning KONG, Shanshan LIU, Hongbo LI, Jie ZHANG

University of Science and Techonlogy Beijing, China

14:30-14:50

Study of the tribological behavior and the adsorption mechanism of fatty amines and derivatives

Toni MASSOUD[1], Rafael PEREIRA DE MATOS[1], Thierry LE MOGNE[1], Manuel COBIAN[1], Michel BELIN[1], Benoît THIéBAUT[2], Sophie LOEHLé[2], Franck DAHLEM[1], Clotilde MINFRAY[1]

[1]CNRS-UMR 5513, France; [2]Total-Centre de Recherche de Solaize, France

14:50-15:10

Stress-induced reticulation of unsaturated fatty acid fuel additives under boundary lubrication

Jean Michel MARTIN[1], Maria Isabel DE BAFFOS BOUCHET[1], Cyrielle FOREST[1], Jose AVILA[2], Michaël MAZARIN[3], Maria Carmen ASENSIO[2]

[1]University of Lyon, France; [2]University Paris-Saclay,France; [3]TOTAL, France

15:10-15:30
Inorganic nano/submicrospheres grown by in-situ laser irradiation for enhanced tribology performance
Ting LUO, Bingqiang CAO
University of Jinan, China

15:30-16:30
Coffee Break & Poster Time

Room 305A
Track3: Lubrication and Lubricants
Additives V
Chair: Fabrice DASSENOY, *Ecole Centrale de Lyon, France*

16:30-16:50
Friction characteristics of environmentally adapted lubricants in boundary lubricated contacts
Kim BERGLUND, Yijun SHI
Lulea University of Technology, Sweden

16:50-17:10
Tribological performance of environmentally acceptable lubricants composed of various fatty acids
Szymon BERNAT[1], Nuria ESPALLARGAS[1], Sergio ARMADA[2]
[1]Norwegian University of Science and Technology, Norway; [2]SINTEF, Norway

17:10-17:30
Tribological properties of nitrided steel lubricated with fully formulated oils in boundary lubrication conditions
Hiroto AOTA[1], Aya SHINGAI[2], Yukio TAMURA[1], Hiroshi YAMAMOTO[1], Shinji TANAKA[2], Masao KIKUCHI[1,2], Masabumi MASUKO[2]
[1]Komatsu.Ltd, Japan; [2]Tokyo Institute of Technology, Japan

17:30-17:50
The oil additives effects on the friction property of rubbers
Ryota ASHIZAWA[1], Tasuku ONODERA[1], Yoshie SAKAI[2], Hiroaki TACHIBANA[2]
[1]Hitachi, Ltd, Japan; [2]Hitachi Automotive Systems, Ltd., Japan

17:50-18:10
Tribological performance of MoS_2/CNTs composite as lubricant additive in ester based oil
Jincan YAN, Wei SONG, Jiahua MAI, Hongbing JI
Sun Yat-sen University, China

18:10-18:30
Improving the performance of water-based lubrication system by ultrathin MoS_2 exfoliated by biological proteins
Lei LIU, Zhengquan LEI, Wei ZOU
Southeast University, China

Room 305C
Track4: Biotribology & Biomimetics
Artificial Joints I
Chair: Teruo MURAKAMI, *Teikyo University, Japan*

10:10-10:35 Invited
Ceramic multilayer coating under high demanding activities knee wear simulation
Thomas M. GRUPP, Bernhard FRITZ, Jens SCHWIESAU, Ana Laura Puente REYNA
Aesculap AG Research and Development, Tuttlingen 78532, Germany

10:35-10:55
Coordinate based methodology for wear and creep assessment of polyethylene tibial knee inserts in total knee replacement
Wei JIANG[1], Zhongmin JIN[2,3], Cuicui JI[4]
[1]Changzhou Institute of Technology, China; [2]University of Leeds, Engalnd; [3]Southwest Jiaotong iversity, China; [4]Hohai University, China

10:55-11:15
Effect of loading conditions on wear of polyethylene total hip joint replacements: A putational formulation
Feng LIU, Lei DONG, Li FENG, Junyuan WANG
North University of China, China

11:15-11:35
Toward minimizing wear in prosthetic socket by optimizing reliefs areas
Gabi NEHME
University of Balamand, Lebanon

11:35-11:55
Influence of acetabular cup inclination on wear of UHMWPE liner
Matúš RANUUSA[1], Martin VRBKA[1], Jiří GALLO[2], Ivan KRUPKA[1], Martin HARTL[1]
[1]Brno University of Technology, Chech; [2]University Hospital Olomouc, Chech

11:55-12:15
Fiber reinforcement promotes biphasic lubrication of PVA hydrogel as an artificial cartilage material
Nobuo SAKAI[1], Chie HASHIMOTO[1], Seido YARIMITSU[2], Yoshinori SAWAE[3], Teruo MURAKAMI[4]
[1]Kyushu Institute of Technology, Japan; [2]Tokyo Metropolitan University, Japan; [3]Kyushu Universtiy, Japan; [4]Teikyo University, Japan

12:15-13:30
Lunch

Room 305C
Track4: Biotribology & Biomimetics
Artificial Joints II
Chair: Thomas M. GRUPP, *Aesculap AG Research and Development, Tuttlingen 78532, Germany*

13:30-14:00 Keynote
Biomimetic articular cartilage and biotribology properties
Shirong GE
China University of Mining & Technology, China

14:00-14:20
Evaluation of friction properties of polyvinyl alcohol/graphene oxide hydrogels as articular cartilage replacement
Yan Brandon SHI, Dangsheng XIONG, Jianliang LI
Nanjing University of Science and Technology, China

14:20-14:40
Chemical and physical surface modification on polycarbonate urethane to reduce its friction against cartilage to make a durable permanent meniscus
Prashant SHARMA, Irene SCHIAVON, Sara EHSANI MAJD, Hans KAPER
University of Groningen and University Medical Center Groningen, Holland

14:40-15:00
"Tribological behaviors of PEEK-coated titanium alloys in contact with ZrO_2 counterbodies
Jian SONG[1], Yuhong LIU[1], Zhenhuha LIAO[2], Yiqin DUAN[1], Weiqiang LIU[1], Xiaohong MU[3]
[1]Tsinghua University, China; [2]Research Institute of Tsinghua University in Shenzhen, China; [3]Dongzhimen Hospital Affiliated to Beijing University of Chinese Medicine, China

15:30-16:30
Coffee Break & Poster Time

Room 305C
Track4: Biotribology & Biomimetics
Artificial Joints III
Chair: Shirong GE, *China University of Mining & Technology,China*

16:30-16:55 **Invited**
Superior lubricity of poly(vinyl alcohol) hydrogels as artificial cartilage with adaptive multimode lubrication
Teruo MURAKAMI[1], Seido YARIMITSU[2], Nobuo SAKAI[3], Kazuhiro NAKASHIMA[4], Tetsuo YAMAGUCHI[4], Yoshinori SAWAE[4], Atsushi SUZUKI[5]
[1]Teikyo University, Japan; [2]Tokyo Metropolitan University, Japan; [3]Kyushu Institute of Technology, Japan; [4]Kyushu University, Japan; [5]Yokohama National University, Japan

16:55-17:15
The effect of synovial fluid composition on CoCrMo wear
Harriet STEVENSON[1], Matthew JAGGARD[2], Claire BOULANGE[3], Pouya AKHBARI[2], Uddhav VAGHELA, John LINDON[3], Horace WILLIAMS[2], Chinmay GUPTE[2], Philippa CANN[1]
[1]Imperial College London, Tribology Group, England; [2]Imperial College London, Musculoskeletal Laboratory, England; [3]Imperial College London, Phenome Center, England

17:15-17:35
Could Ti_6Al_4V be alternative as a bearing surface articulated with polymer in artificial cervical disc?
Song WANG[1], Weiqiang LIU[1]
[1]Research Institute of Tsinghua University in Shenzhen, China; [2]Tsinghua University State Key Laboratory of Tribology, China

17:35-17:55
Study on the tribological behaviors of CoCrMo alloy against different materials for use in artificial cervical disc
Dingding XIANG[1], Jian SONG[2], Song WANG[3], Zhenhua LIAO[4], Weiqiang LIU[2]
[1]Tsinghua University State Key Laboratory of Tribology, China; [2]Tsinghua University Department of Mechanical Engineering, China; [3]Tsinghua University Biomechanics and Biotechnology Lab, China; [4]Research Institute of Tsinghua University in Shenzhen, China

17:55-18:15
Effect of corrosion on tribology and protein adsorption properties of a CoCrMo alloy used in artificial joints
Yu YAN, Zhongwei WANG, Lijie QIAO
University of Science and Technology Beijing, China

Room 303
Track5: Tribology in Manufacturing
Metal Forming & Advanced Processing I
Chair: Kun LIU, *Hefei University of technology, China*

10:10-10:35 **Invited**
Tribology in rolling technology of steel
Kiet TIEU
University of Wollongong, Australia

10:35-11:00 **Invited**
Tribology in multiscale metal forming
Kuniaki DOHDA
Northwestern University, USA

11:00-11:20
Oxidation and wear mechanics of high speed steel measured by a novel high temperature roller-on-disc testing rig
Hongtao ZHU[1], Qiang ZHU[12], Guanyu DENG[1], Kiet TIEU[1], Qiong WU[3], Qun FAN[3]
[1]University of Wollongong, Australia; [2]University of New South Wales, Australia; [3]Baosteel, China

11:20-11:40
Analysis of hot rolled surface and metallographic structure of SS41 steel lubricated with water-based nano-TiO2 fluid
Yanan MENG, Jianlin SUN, Linghui KONG
University of Science & Technology Beijing, China

11:40-12:00
Lubricant film thickness measurements in cold rolling using ultrasound
Andrew HUNTER
University of Sheffield, United Kingdom

12:00-13:30
Lunch

Room 303
Track5: Tribology in Manufacturing
Metal Forming & Advanced Processing II
Chair: Kuniaki DOHDA, *Northwestern University, USA*

13:30-13:55 **Invited**
Direct force measurement in thread rolling operations – experimental and numerical tribological process investigation
Philipp KRAMER, Peter GROCHE
TU Darmstadt, Germany

13:55-14:20 **Invited**
Effect of granular matter property on powder compaction
Kun LIU
Hefei University of Technology, China

14:20-14:40
Wear behavior of friction stir processed NAB alloys in marine environment
Ajay Kumar P.[1], Vishnu NAMBOODIRI[2], Anirudhan P.[2], Satish V. KAILAS[1]
[1]Indian Institute of Science (IISc) Bangalore, India; [2]Department of Mechanical Engineering, Government Engineering College, India

14:40-15:00
Tribological behaviors of porous metal produced by additive manufacturing from boundary to full film lubrication
Yi ZHU, Guoliang LIN, Xubin CHEN, Jun ZOU, Huayong YANG
Zhejiang University, China

15:00-15:20
Optimal design of the ring with boss compression test for high sensitivity to friction
Chengliang HU, Xiping LIAO, Qiang YIN, Zhen ZHAO
Shanghai Jiaotong University, China

15:30-16:30
Coffee Break & Poster Time

Room 303
Track5: Tribology in Manufacturing
Micro and Nano Fabrication
Chair: Guoshun PAN, *Tsinghua University, China*

16:30-16:50
A rotational near-field photolithography system for nanopatterning
Jiaxin JI[1,2], Yonggang MENG[2], Shayu LI[3]
[1]China University of Petroleum, China; [2]Tsinghua University, China; [3]Chinese Academy of Sciences, China

16:50-17:10
Friction-induced nanofabrication on UV/Ozone treated Si(100) surface
Linmao QIAN, Hongbo WANG, Shulan JIANG, Bingjun YU
Southwest Jiaotong University, China

17:10-17:30
Effects of surface wettability on the defects controlling in soft lithography of ceramic microparts
Junhu MENG[1], Bo SU[1], Lanqing JIAO[1,2]
[1]Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China; [2]University of Chinese Academy of Sciences, China

Room 305E
Track6: Engine and Transmission Tribology
Rolling bearings III
Chair: Xiaolan AI, *Timken co., USA*

10:10-10:35 Invited
Lubrication problem of retainerless rolling element bearings
Pat Lam Patrick WONG
City University of Hong Kong, Hong Kong

10:35-10:55
Non-steady elastohydrodynamic lubrication for the finite line contact: Subsurface stress analysis
Tobias HULTQVIST, Mohammad SHIRZADEGAN, Aleks VRCEK, Pär MARKLUND, Roland LARSSON, Braham PRAKASH
Luleå University of Technology, Sweden

10:55-11:15
Effect of bearings preload of the tribological performance of elastohydrodynamic conjunctions in the automotive manual transmissions
Angeliki Christina LADEROU, Mahdi MOHAMMADPOUR, Stephanos THEODOSSIADES, Homer RAHNEJATL
Loughborough University, UK

11:15-11:35
Numerical simulation of the transonic airflow resistance between rings of the high-speed rolling bearing
Hongbin LIU, Gongping LIU, Yunbin LI, Haiyang WANG
Henan University of Science and Technology, China

11:35-11:55
A numerical approach for lubrication analysis in rolling bearing considering real surface morphology
Shi CHEN[1], Zhinan ZHANG[1], Xinsheng WEI[2]
[1]Shanghai Jiao Tong University, China; [2]Shanghai Aerospace Control Technology Institute, China

11:55-12:15
Advanced calculations of spherical roller bearings (SRB) accounting for roller skewing
Luc HOUPERT
The Timken Company, France

12:15-13:30
Lunch

Room 305E
Track6: Engine and Transmission Tribology
Rolling Bearings IV
Chair: Luc HOUPERT, *Timken co., Europe*

13:30-13:55 Invited
Recent achievements in mixed EHL research
Dong ZHU
Sichuan University, China

13:55-14:15
Contact characteristic analysis of thin wall angular contact ball
Ming QIU[1,2], Zhenhua NIU[1], Hui DU[1], Xiaoxu PANG[1]
[1]Henan University of Science and Technology, China; [2]Collaborative Innovation Center of Machinery Equipment Advanced Manufacturing of Henan Province, China

14:15-14:35
The theoretical analysis and experimental study for ultra-high speed angular contact ball bearing
Dongfeng WANG, Shengchao LIU,Yanjing YIN
Luoyang Bearing Science & Technology Co., Ltd., China

14:35-14:55
Influence of preload on the friction and wear properties of high-speed instrument rotor angular contact ball bearings
Tao ZHANG, Xiaoyang CHEN
Shanghai University, China

14:55-15:15
Frictional work in oscillating bearings – simulation of an angular contact ball bearing under dry conditions and small amplitudes
Fabian SCHWACK, Felix PRIGGE, Gerhard POLL
Institute of Machine Design and Tribology, Germany

15:15-15:35
Effects of rough surfaces in an angular contact ball bearing
Yunlong WANG, Wenzhong WANG, Zhiqiang ZHAO
Beijing Institute of Technology, China

15:35-16:30
Coffee Break & Poster Time

16:30-16:50
Roller end and flange contact modeling for cylindrical rolling element bearings
Xiaolan AI, Jerry RHODES
The Timken Company, USA

Room 305E
Track6: Engine and Transmission Tribology
Rolling Bearings V
Chair: Dong ZHU, *Sichuan University, USA*

16:50-17:10
Tribological aspects of rolling bearings lubricated with refrigerant
Rudolf HAULEITNER[1], Guillermo E MORALES-ESPEJEL[2,3], Magnus ARVIDSSON[4]
[1]SKF Oesterreich AG; [2]SKF Engineering & Research Centre; [3]Université de Lyon; [4]SKF Application Competence Centre

17:10-17:30
Effect of detergent additive and standstill corrosion on rolling contact fatigue
Wen WANG[1], Bo HAN[3], Xiaobo ZHOU[2]
[1]Shanghai University, China; [2]SKF Engineering and Research Centre, China; [3]SKF Global Technical Centre China, China

17:30-17:50
NiTi alloys for aerospace bearing applications
Christopher DELLACORTE
NASA, USA

Room 307
Track6: Engine and Transmission Tribology
Fluid-film BearingsIII
Chair: Federico COLOMBO, *Polytechnic University of Turin, Italy*

10:10-10:30
A thermal elastic-hydrodynamic lubricated analysis of highly loaded journal bearings, with varying bulk modulus, to allow high areas of cavitation to be solved
Benjamin ROTHWELL, Seamus GARVEY, John WEBSTER
University of Nottingham, UK

10:30-10:50
Running-in of journal bearings subjected to non-stationary conditions
Gero BURGHADT, Georg JACOBS, Florian KOENIG, Christopher SOUS
RWTH Aachen University, Germany

10:50-11:10
Static characteristics of a cryogenic hydrostatic journal bearing
Jialei DU, Panyun YAN, Guozhu LIANG
Beihang University, China

11:10-11:30
External magnetic field of journal bearing with twined solenoid
Yanjuan ZHANG[1], Jianmei WANG[2], Decai LI[1]
[1]Beijing Jiaotong University, China; [2]Taiyuan University of Science and Technology, China

11:30-11:50
Load carrying capacity and friction torque in a thrust heterogeneous surface bearing
Evan THOMAS, Romeo GLOVNEA
University of Sussex, United Kingdom

11:50-13:30
Lunch

Room 307
Track6: Engine and Transmission Tribology
Fluid-film Bearings IV
Chair: Masaaki MIYATAKE, *Tokyo University of Science, Japan*

13:30-14:00 **Keynote**
Modelling development & technological improvements of hydrodynamic bearings
Michel FILLON
University of Poitiers, France

14:00-14:20
A new method for calculating the static performance of hydrostatic journal bearing
Peng LIANG[1], Changhou LU[2]
[1]Qingdao University of Technology, China; [2]Shandong University, China

14:20-14:40
Behavior of a two lobe journal bearing with a scratched shaft: comparison between numerical results and experimental data
Jean BOUYER[1], Célia GIRAUDEAU[1,2], Michel FILLON[1], Mathieu HÉLÈNE[2], Jérôme BEAURAIN[2]
[1]University of Poitiers, France; [2]EDF Lab Paris-Saclay, France

14:40-15:00
Efficient numerical solver of the unsteady thermohydrodynamic Reynolds equation for journal bearings
Silun ZHANG, Mohamed-Amine HASSINI, Mihai ARGHIR
EDF R&D, France

15:00-15:20
Ferro-fluid lubrication of finite journal bearings using Jenkins model
Benyebka Bou-Said
INSA Lyon

15:20-15:40
Comparison between the load carrying capacity of a Rayleigh step and a heterogeneous slip/non-slip surface bearing
Evan THOMAS[1], Romeo GLOVNEA[1], Kazuyuki YAGI[2], Joichi SUGIMURA[2]
[1]University of Sussex, United Kingdom; [2]Kyushu University, Japan

15:40-16:30
Coffee Break & Poster Time

Room 307
Track6: Engine and Transmission Tribology
Fluid-film Bearings V
Chair: T. V. V. L. N. RAO, *The LNM Institute of Information Technology, India*

16:30-16:50
Research on friction vibration of marine water lubricated rubber bearing
Jun YANG, Zhenglin LIU
Wuhan University of Technology, China

16:50-17:10
Equivalent support position and stiffness of misaligned water-lubricated stern tube bearing
Fangrui LV, Chunxiao JIAO, Zhushi RAO, Na TA
Shanghai Jiao Tong University, China

17:10-17:30
Study on dynamic characteristics of water lubricated bearings fluid-solid coupling system considering local contact
Wu OUYANG[1,2], Lei WANG[3], Yong JIN[1,2], Zhenglin LIU[1], Xinping YAN[1,4]
[1]Wuhan University of Technology, China; [2]Key Laboratory of Marine Power Engineering Technology (Ministry of Communications), China; [3]China Ship Development and Design Center, China; [4]National Engineering Research Center for Water Transport Safety, China

17:30-17:50
Static and dynamic characteristics of a self-controlled water-lubricated hydrostatic thrust bearing using an elastic hinge
Koichi JOTAKI, Kazuki FUKUYAMA, Masaaki MIYATAKE, Shigeka YOSHIMOTO
Tokyo University of Science, Japan

17:50-18:10
Study on the influencing mechanism of water temperature on the lubrication performance of water lubricated rubber pad
Xingxin LIANG[1], Xinping YAN[1,2], Wu OUYANG[1], Zhenglin LIU[1], Jian WANG[1]
[1]Wuhan University of Technology, China; [2]National Engineering Research Center for Water Transportation Safety, China

Room 308
Track7: Industrial Tribo-systems
Automotive Tribology I
Chair: Patrick G SWAN , *Aswan Consulting Cc, South Africa*

10:10-10:35 Invited
Drastic reduction in drag force of car brake by Rayleigh-step
Takashi NAKAMURA
Nagoya Institute of Technology, Jpan

10:35-10:55
A bottom-up approach to study metal sulphides in brake friction materials at higher temperatures
Christian WOLTER, Thomas GRADT
Bundesanstalt für Materialforschung und -prüfung (BAM), Germany

10:55-11:15
Brake squeal: Investigating the links between friction mechanisms and dynamic behavior
Edouard DAVIN[1,2,3], Anne Lise CRISTOL[1,2,3], Yannick DESPLANQUES[1,2,3], Jean Francois BRUNEL[1,3], Martin DUBOC[4], Philippe DUFRENOY[1,3]
[1]Laboratoire de mecanique de Lille, France; [2]Centrale Lille, France; [3]CNRS, France; [4]Arts et Métiers ParisTech - Lille, France

11:15-11:35
Friction induced noise analysis by potential exciting power method for car components applications
Yan-Ming CHEN[1], David CAZE[1], Moussa DIABY[2], Catherine GAERTNER[2], Dominique PIERRAT[2]
[1]CETIM, France; [2]PSA, France

11:35-11:55
Characterisation of airborne particles emitted from car brake materials
Oleksii NOSKO[1], Mattia ALEMANI[2], Ulf OLOFSSON[3]
[1]Bialystok University of Technology, Poland; [2]Brembo S.p.A., Italy; [3]KTH Royal Institute of Technology, Sweden

11:55-12:15
Synergetic effects inside a simplified friction material: a PCA approach
Florence VIVIER, Diego PELLEREJ
ITT Italia Srl, China

12:15-12:35
The influence of lubricant composition on shift performance of manual transmissions
Christoph WINCIERZ, Dmitriy SHAKHVOROSTOV, Anatolij SMIRNOV
Evonik, Germany

12:35-13:30
Lunch

Room 308
Track7: Industrial Tribo-systems
Automotive Tribology II
Chair: Yoshitsugu KIMURA, *The University of Tokyo / Kagawa University, Japan*

13:30-13:55 Invited
Contribution of tribology to the progress in industry in Japan - A brief review of the first half century of tribology
Yoshitsugu KIMURA
The University of Tokyo / Kagawa University, Japan

13:55-14:15
A method of reducing windage power loss of a high-speed motor using a viscous vacuum pump
Junpei HORIIKE, Masaaki MIYATAKE, Shigeka YOSHIMOTO
Tokyo University of Science, Japan

14:15-14:35
Study of rubber/road dry friction in rolling sliding and linear sliding conditions
Jonas BOUSMAT[1,2], Julien SCHEIBERT[1], Alain LE BOT[1], Florian BREMOND[2]
[1]Laboratoire de tribologie et dynamique des systèmes, France; [2]Manufacture Michelin, France

14:35-14:55
Experimental investigation on mechanism of tire wear particle production
Haibo HUANG, Jinpeng LIU
Ningbo University, China

14:55-15:15
Application of DLC coatings for automotive and industrial components in China to minimize friction and wear
Bo WANG, Simon ZHANG
Ionbond China, China

15:15-15:35
Applications of rotary tribometer with European urban driving cycles
Deepak Halenahally VEEREGOWDA, Angela Maria TORTORA
Ducom Instruments Europe B.V, Netherlands

15:35-16:30
Coffee Break & Poster Time

Room 308
Track7: Industrial Tribo-systems
Space and Aerospace
Chair: Qian ZOU, *Oakland University, USA*

16:30-16:50
Research on the characteristics of rolling-tribology with current of space ultra high power transfer rotary joint of unlike structures
Zili LIU[1], Yongzhen ZHANG[2], Chenfei SONG[2], Li WANG[1], Xinbin HOU[1]
[1]Qian Xuesen Laboratory of Space Technology, China; [2]Henan University of Science and Technology, China

16:50-17:10
Long life technologies of oil-lubricated ball bearing for space applications
Kazuhisa KITAMURA[1], Kazuyoshi YAMAKAWA[1], Akira KOYAMA[1], Kazuaki MANIWA[2], Takashi NOGI[2], Shingo OBARA[2]
[1]JTEKT Corporation, Japan; [2]Japan Aerospace Exploration Agency, Japan

17:10-17:30
Investigations of spatial grease tribological behavior for reformulation
Magali BUSQUET[1,2], David LEVEQUE[1], Yves BERTHIER[1,4], Mathieu RENOUF[3,4], Nathalie BOUSCHARAIN[1], Jacques SICRE[5]
[1]Université de Lyon, France; [2]INS, France; [3]Université de Montpellier, France; [4]International Tribology Group, France; [5]CNES, France

17:30-17:50
Ball screw performance and film formation behavior of four multiply alkylated cyclopentane (MAC) base greases for space applications
Toshifumi MAWATARI[1], Nobuyoshi OHNO[1], Bo ZHANG[1], Akira NAKAJIMA[1], Hiroshi SHIOMI[2], Shingo OBARA[2]
[1]Saga University, Japan; [2]Japan Aerospace Exploration Agency, Japan

17:50-18:10
Tribology investigation in open space
Marat BRONOVETS
Institute for Problems in Mechanics of the Russian Academy of Scienses, Russia

Room 311A
Track 8: Tribotest and Monitoring
Condition Monitoring & Data Analysis I
Chair: Xinping YAN, *Wuhan University of Technology, China*

10:10-10:40 Keynote
How tribology has been helping us to advance and to survive
Gwidon STACHOWIAK
Curtin University, Australia

10:40-11:00
Wear monitoring based on reflected image of a novel on-line visual ferrograph
Bo LI
Xi'an Jiaotong University, China

11:00-11:20
Parameter estimation and residual life prediction for deteriorating lubricating oil based on hidden semi-Markov modeling
Ying DU[1], Tonghai WU[1], Viliam MAKIS[2]
[1]Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Canada; [2]Department of Mechanical and Industrial Engineering, University of Toronto, Canada

11:20-11:40
Three-dimensional feature extraction of wear particle based on multi-objects tracking and recognition
Shuo WANG, Tonghai WU, Lingfeng YANG, Longxin WANG
Xi'an Jiaotong University, China

11:40-12:00
Directional and multi-scale characterization of curvature of DLC-coated and uncoated surfaces
Marcin WOLSKI[1], Pawel PODSIADLO[1], Gwidon W. STACHOWIAK[1], Kenneth HOLMBERG[2], Anssi LAUKKANEN[2], Helena RONKAINEN[2], Mark GEE[3], Nunn John NUNN[3], Carsten GACHOT[4], Lawrence LI[5]
[1]Curtin University, Australia; [2]VTT Technical Research Centre, Finland; [3]National Physical Laboratory, UK; [4]Saarland University, Germany; [5]City University of Hong Kong, Hong Kong

12:00-12:20
Bearing faults in the wind turbine drivetrain: Comparative study of monitoring with FFT and the Discrete Wavelet Transform
Daniel STRöMBERGSSON, Pär MARKLUND, Kim BERGLUND
Division of Machine Elements, Luleå University of Technology, Luleå, Sweden

12:30-13:30
Lunch

Room 311A
Track 8: Tribotest and Monitoring
Condition Monitoring & Data Analysis II
Chair: Rob DWYER-JOYCE, *University of Sheffield United Kingdom*

13:30-14:00 Keynote
Remote fault diagnosis system for marine power machinery system based on tribology
Xinping YAN
Wuhan University of Technology, China

14:00-14:20
Vehicular engine oil drain interval evaluation based on on-board diagnostic data
Lei WEI[1], Haitao DUAN[1], Song CHEN[1], Yongliang JIN[1], Bingxue CHENG[1], Dan JIA[1], Jianfang LIU[1,2], Jian LI[1]
[1]Wuhan Research Institute of Materials Protection, China; [2]Wuhan Polytechnic University, China

14:20-14:40
Online characterization of rolling element bearing wear status using oil debris features
Yeping PENG[1], Tonghai WU[1],Lingfeng YANG[1], Ngaiming KWOK[2]
[1]Xi'an Jiaotong University, China; [2]The University of New South Wales, Australia

14:40-15:00
A fuzzy clustering-based BP neural network for intelligent wear debris recognition
Tao SHAO, Tonghai WU, Yeping PENG, Shuaiwei GUO
Xi'an Jiaotong University, China

15:00-15:20
The Research of engine oil performance evaluation method based on data mining
Minjie CHEN[1,2], Xincong ZHOU[1], Fuming KUANG[1], Kai CHEN[1]
[1]Wuhan University of Technology, China; [2]Guangzhou Mechanical Engineering Research Institute Co., ltd, China

15:20-16:30
Coffee Break & Poster Time

Room 311A
Track 8: Tribotest and Monitoring
Measurement and Instruments I
Chair: Dan GUO, *Tsinghua University, China*

16:30-16:55 **Invited**
Curvature analysis of surface topography at different scales and directions
Pawel PODSIADLO, Marcin WOLSKI, Gwidon STACHOWIAK
Curtin University, Australia

16:55-17:15
Acoustic emission modelling of three body abrasion in machinery elements
Surojit PODDAR, Naresh TANDON
ITMMEC, Indian Institute of Technology Delhi, India

17:15-17:35
Effects of surface tilt on measurement of friction coefficient by scratch testing
Ming LIU, Chenghui GAO
Fuzhou University, China

17:35-17:55
A novel ultrasonic viscometer to measure PAO viscosity in-situ at high shear rates and pressures suitable for use in EHD problems
Michele SCHIRRU, Rob DWYER-JOYCE
The University of Sheffield, United Kingdom

17:55-18:15
The dynamic measurement of contact pressure distribution in a wheel-rail interface
Henry BRUNSKILL, Roger LEWIS, Rob DWYER-JOYCE
University of Sheffield, United Kingdom

18:15-18:35
Observation of grease behavior in ball bearing using X-ray CT and multi-phase grease simulation
Takashi NODA, Kenichi SHIBASAKI, Shinji MIYATA, Masato TANIGUCHI
NSK Ltd, Japan

Room 201A
Track1: Science of Tribology
Tribochemistry I
Chair: Linmao QIAN, *Southwest Jiaotong University, China*

10:10-10:35 Invited
Tribochemistry at sliding interfaces – shear-induced polymerization of adsorbed molecules upon mechanical shear
Seong H. KIM
Pennsylvania State University, USA

10:35-10:55
Tribo-mechano-chemistry: lessons learnt from atomic scale modelling of diamond sliding against silica and silicon
Michael MOSELER, Andreas KLEMENZ, Lars PASTEWKA, Gianpietro MORAS
Fraunhofer IWM, MicroTribology Centr, Germany

10:55-11:15
Mechanochemical behaviour of ZDDP
Jie ZHANG, Hugh SPIKES
Imperial College London, UK

11:15-11:35
Water-induced mechanochemical reactions and wear of multicomponent silicate glass in humid ambient
Seong H. KIM
Pennsylvania State University, USA

11:35-11:55
Effect of interfacial chemical reaction and intermolecular interaction on friction and wear mechanism
Yuliang LI, Wen YUE
University of Geosciences(Beijing), China

12:00-13:30
Lunch

Room 201A
Track1: Science of Tribology
Tribochemistry II
Chair: Junhong JIA, *Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China*

13:30-13:55 Invited
Quantum chemical molecular dynamics simulations on tribochemical reaction dynamics of diamond-like carbon and molybdenum dithiocarbamate
Momoji KUBO, Hiroki MURABAYASHI, Keiko WATASE, Yoshie OHGOSHI, Miho NAKAMURA, Yusuke OOTANI, Yuji HIGUCHI, Nobuki OZAWA, Koshi ADACHI
Tohoku University, Japan

13:55-14:15
Influences of surface temperature and applied pressure on cracking of hydrocarbon chains at boundary lubrication: a molecular dynamics approach
Thi Dinh TA, Anh Kiet TIEU, Hongtao ZHU, Ha Manh LE, Huong Thi Thuy TA
University of Wollongong, Australia

14:15-14:35
Effect of tribochemical reaction on friction interface structure of amorphous silica under humidity: a molecular dynamics simulation study
Jingxiang XU, Naoki TAKAHASHI, Yusuke OOTANI, Yuji HIGUCHI, Nobuki OZAWA, Momoji KUBO
Tohoku University, Japan

14:35-14:55
Tight-binding quantum chemical molecular dynamics simulation study on tribological behaviors of diamond-like carbon against aluminum
Yang WANG, Jingxiang XU, Yusuke OOTANI, Yuji HIGUCHI, Nobuki OZAWA, Koshi ADACHI, Momoji KUBO
Tohoku University, Japan

14:55-15:15
First-principles molecular dynamics simulations for tribochemical reactions in silicon based ceramics sliding interface
Yusuke OOTAIN, Naoki TAKAHASHI, Momoji KUBO
Tohoku University, Japan

15:15-16:30
Coffee Break & Poster Time

Room 201A
Track1: Science of Tribology
Tribochemistry III
Chair: Momoji KUBO, *Tohoku University, Japan*

16:30-16:50
Frictional properties of model boundary films
Wilfred TYSOE[1], Dustin OLSON[1], Hongyu GAO[2], Chun TANG[2], Ashlie MARTINI[2]
[1]University of Wisconsin-Milwaukee, USA; [2]University of California-Merced, USA

16:50-17:10
The influence of Al-Si alloy on ZDDP tribofilm formation on the counter-surface
Yasunori SHIMIZU[1,2], Hugh SPIKES[1]
[1]Imperial College London, UK; [2]Idemitsu Kosan Co., Ltd., Japan

17:10-17:30
Influence of refrigerant-surface chemistry on lubrication conditions
Stephane TROMP[1], Laurent JOLY[2], Manuel COBIAN[3], Nicolas FILLOT[1]
[1]LaMCoS - INSA Lyon, France; [2]ILM, France; [3]LTDS, France

17:30-17:50
Electrochemical effect on tribofilm formation during running-in process of ZrO_2 ball/52100 steel plate in ZDDP/propylene carbonate solutions
Hui CAO, Yonggang MENG
Tsinghua University, China

17:50-18:10
Molecular dynamics analyses for boundary lubrications of carbon-based materials
Hitoshi WASHIZU[1,2], Tatsuya MAEDA[1], Hirotoshi AKIYAMA[1], Masakazu KONISHI[1]
[1]University of Hyogo, Japan; [2]Kyoto University, Japan

Room 201B
Track1: Science of Tribology
Hydrodynamic and Mixed Lubrication
Chair: Gwidon STACHOWIAK, *Curtin University, Australian*

10:10-10:30
Multi-scale modelling of the mixed lubrication
Noel BRUNETIERE
University of Poitiers, Ensma

10:30-10:50
Scaling of the dimple influence for parallel surfaces
Marie-Pierre NOUTARY, Nans BIBOULET, Ton LUBRECHT
INSA-Lyon, France

10:50-11:10
Squeeze flow of Bingham fluids through reticulated, compressed foams
Petrica TURTOI[1], Mircea PASCOVICI[2], Traian CIONE[2]
[1]Military Equipments and Technologies Research Agency, Romania; [2]University POLITEHNICA of Bucharest, Romania

11:10-11:30
Transition between mixed lubrication and elastohydrodynamic lubrication with randomly rough surfaces
Julien BONAVENTURE, Juliette CAYER-BARRIOZ, Denis MAZUYER
Ecole Centrale de Lyon, France

11:30-11:50
Investigating lubrication by mapping the evolution of surface topography
Deepak HALENAHALLY VEEREGOWDA, Martijn MIDDELKAMP, Fabio ALEMANNO
Ducom Instruments Europe B.V, Netherlands

12:00-13:30
Lunch

Room 201B
Track1: Science of Tribology
Elastohydrodynamic Lubrication IV
Chair: Antonius LUBRECHT, *INSA-Lyon, France*

13:30-13:50
Friction and lubricant flow inside concentrated EHL contact
Petr SPERKA, Ivan KRUPKA, Martin HARTL
Brno University of Technology, Czech Republic

13:50-14:10
Numerical analysis of thermohydrodynamic lubrication of the textured rough surfaces with micro-grooves
Jinghu JI, Moyang WANG, Hao FU, Tianyang CHEN, Yonghong FU
Jiangsu University, China

14:10-14:30
Exploring elasto-hydrodynamic lubrication using a finite volume CFD based method
Damon LEE, Daniele DINI, Amir KADIRIC
Imperial College London, UK

14:30-14:50
Towards a new in situ technique for a local measurement of temperature and pressure in elastohydrodynamic contacts using quantum dots
Tarek SEOUDI[1], Sayed ALBAHRANI[1], David PHILIPPON[1], Peter REISS[2], Jean-Marie BLUET[3], Philippe VERGNE[1]
[1]LaMCos-INSA LYON, France; [2]INAC, SPrAM, CEA Grenoble, France; [3]INL-INSA Lyon, France

14:50-15:10
Novel approach and new algorithm for the elastic deformation and cavitation in elastohydrodynamic line contacts
Tomasz WOLOSZYNSKI, Pawel PODSIADLO, Gwidon STACHOWIAK
Curtin University, Australia

15:10-15:30
Exact and general reduced order finite element modeling of elastohydrodynamic lubrication problems
Wassim HABCHI, Jimmy S ISSA
Lebanese American University, Lebanon

15:30-16:30
Coffee Break & Poster Time

Room 201B
Track1: Science of Tribology
Elastohydrodynamic Lubrication V
Chair:Pingyu ZHANG, *Henan Univeristy, CHINA*

16:30-16:50
TEHL simulation and measurements under high sliding conditions
Alexander LIEBEL[1], Milan OMASTA[2], Petr ŠPERKA[2], Willy BOIVIN[3], Vasilios BAKOLAS[1]
[1]Schaeffler Technologies AG & Co. KG, Germany; [2]Brno University of Technology, Czech Republic; [3]SIGMA-Clermont, France

16:50-17:10
Tribo-dynamics of concentrated point contact lubricated with nano-composite grease
Jayant SINGH, Deepak KUMAR, N TANDON
Indian Institute of Technology Delhi, India

17:10-17:30
Investigation of wall slippage by numerical analysis in combination with the test results at high speed
Yaoguang ZHANG, Wenzhong WANG, Ziqiang ZHAO
Beijing Institute of Technology, China

17:30-17:50
Investigation of velocity slip and influences in ball-disc system
Xin ZHAO, Chao WEI, Shihua YUAN
Beijing Institute of Technology, China

Room 201D
Track 2: Wear & Surface Engineering
Wear VI
Chair: Friedrich FRANEK, *AC2T Research GmbH, Austria*

10:10-10:40 Keynote
On strategies to reduce wear by using functional coatings and surface micro-structures
Dae-Eun KIM
Yonsei University, Korea

10:40-11:00
Characterization of the Low Wear on the Top of Asperities
Alexander KOVALEV[1], Dirk SPALTMAN[2], Mathias WOYDT[2], Yonggang MENG[1]
[1]Tsinghua University, China; [2]BAM - Federal Institute for Materials Research and Testing, Germany

11:00-11:20
Evolution of surface topography under mixed lubrication condition in running-in process
Yazhao ZHANG, Yonggang MENG, Nishiura KENSUKE, Hayashi NORIYUKI
Tsinghua University, China; Mitsubishi Heavy Industries, China

11:20-11:40
From use wear traces to prehistoric activities: a multiscale analysis of archaeological surfaces
Haris PROCOPIOU[1], Roberto VARGIOLU[2], Hassan ZAHOUANI[2]
[1]University of Paris, France; [2]LTDS- CNRS, France

11:40-12:00
Numerical study on the influence of scratch parameters in single asperity scratch abrasion of steels
Kannaki PONDICHERRY, Timothy GALLE, Xiaojun XU, Jacob SUKUMARAN, Dieter FAUCONNIER, Stijn HERTELÉ, Patrick DE BAETS
Ghent University, Belgium

12:00-13:30
Lunch

Room 201D
Track 2: Wear & Surface Engineering
Wear VII
Chair: Yongzhen ZHANG, *Henan University of Science and Technology, China*

13:30-13:55 Invited
The effect of the interlayer and the composition on the cavitation erosion behavior of DLC films
Jianhua ZHANG
School of Mechatronic Engineering and Automation, Shanghai University, Shanghai, China

13:55-14:15
Alternative approach to simulate an entire particle erosion experiment
Dirk SPALTMANN, Mathias WOYDT
Bundesanstalt fuer Materialforschung und -pruefung, Germany

14:15-14:35
Application of hard surface coatings for prevention of micro-pitting failure in transmission components Nicola
DE LAURENTIS, Amir KADIRIC
Imperial College London, United Kingdom

14:35-14:55
Simulation models for predicting the wear process of coated sphere/flat electrical contacts
Haomiao YUAN, Vitali SCHINOW, Jian SONG
Ostwestfalen-Lippe University of Applied Sciences, Germany

14:55-15:15
Slurry erosion behavior of microwave derived bi-modular composite coatings
Harpreet Singh GREWAL, Abhishek BABU, Harpreet Singh ARORA
Shiv Nadar University, India

15:15-16:30
Coffee Break & Poster Time

Room 201D
Track 2: Wear & Surface Engineering
Wear VIII
Chair: Xinchun CHEN, *Tsinghua Univesity, China*

16:30-16:50
Wear analysis of cobalt based alloys in nuclear reactor conditions: a combined experimental and numerical investigation
Ruby MCCARRON[1], David STEWART[2], Philip SHIPWAY[3], Daniele DINI[1]
[1]Imperial College London, United Kingdom; [2]Rolls Royce plc, England; [3]University of Nottingham, England

16:50-17:10
Investigation of micro-wear characteristics of layered coatings
Kyeong-Hee KANG, Dae-Eun KIM
Yonsei University, Korea

17:10-17:30
Investigation of the temporal development of roughness parameters of real rough surfaces due to wear under mixed-lubricated conditions with the finite-element-method
Stefan REICHERT, Albert ALBERS, Arn JOERGER
Karlsruher Institute of Technology (KIT), Germany

17:30-17:50
Chemical, morphological and interface stability of Cu-Nb layered nanocomposites subjected to sliding wear
Fuzeng REN[1,2], Ekiz ELVAN[2], Aaron DAHLKE[2], Pascal BELLON[2], Robert S. AVERBACK[2], Nathan MARA[3], Irene BEYERLEIN[3], M. POURYAZDAN[4], H. HAHN[4]
[1]Southern University of Science and Technology, China; [2]University of Illinois at Urbana-Champaign, America; [3]Los Alamos National Laboratory, America; [4]Karlsruhe Institute of Technology, Germany

17:50-18:10
Study on anti-loosening performance of nylon inserted nuts
Jianhua LIU[1], Huajiang OUYANG[2], Zhiqiang FENG[3], Zhenbing CAI[1], Minhao ZHU[1]
[1]Southwest Jiaotong University, China; [2]University of Liverpool, England; [3]Université d'Évry-Val d'Essonne, France

Room 203A
Track 2: Wear & Surface Engineering
Coatings VI
Chair: Maria Isabel DE BARROS BOUCHET, *Laboratoire de Tribologie et Dynamique des Systèmes, Université de Lyon, France*

10:10-10:35 Invited
New evaluation method for elastic and viscoelastic materials and coatings
Ralph STENGLER
President of Hochschule Darmstadt, Germany

10:35-11:00 Invited
Wear resistance and self-healing superhydrophobic coatings
Huaiyuan WANG, Zhanjian LIU, Yanji ZHU, Chijia WANG
Northeast Petroleum University, China

11:00-11:20
Investigation of fracture toughness and sliding properties of CrBC and CrBCN coatings for tribological application
Qianzhi WANG[1], Fei ZHOU[1], Qiang MA[1], Tomas POLCAR[2], Jiwang YAN[3]
[1]Nanjing University of Aeronautics and Astronautics, China; [2]University of Southampton, England; [3]Keio University, Japan

11:20-11:40
Comparison of tribological properties of lead and lead-free coatings using ring-on-disk test method
Mayank ANAND, Rizwan BAJWA, Ignacio TUDELA, Rolandas VERBICKAS, Yi ZHANG
Daido Metal Co. Ltd - European Technical Centre, United Kingdom

11:40-12:00
Comparison of tribological properties of CrN, CrTiN and CrTiBN coatings sliding against SiC and SUS440C balls in water
Fei ZHOU[1], Qiang MA[1], Qianzhi WANG[1], Kangmin CHEN[1,2], Zhifeng ZHOU[1,3], L.K.Y LI[1,3]
[1]Nanjing University of Aeronautics and Astronautics, China; [2]Jiangsu University, China; [3]City University of HongKong, China

12:00-12:20
Advanced Diamond Surface Technology – Latest Friction Joints Designed for Forthcoming Generations of Light-Weight-Designs
Willibald SPETH[1], Erhard LEIDICH[2], Yufeng ZHANG[3]
[1]Frictins GmbH, Germany; [2]IKAT Technische Universität Chemnitz, Germany; [3]Frictins Shanghai, China

12:30-13:30
Lunch

Room 203A
Track 2: Wear & Surface Engineering
Coatings VII
Chair: Stephen HSU, *George Washington University, United States*

13:30-14:00 Keynote
Contact mechanics of coated surfaces
Izhak ETSION
Technion-Israel Institute of Technology, Israel

14:00-14:20
Tribological characterization and wear mechanisms of novel nitride and oxynitride PVD coatings designed for applications at high temperatures
Bin ZHANG[1], Jiri NOHAVA[1], Pascal DESSARZIN[2], Pavla KARVANKOVA[2], Marcus MORSTEIN[2]
[1]Anton Paar TriTec SA, Switzerland; [2]PLATIT AG, Switzerland

14:20-14:40
Elevated temperature repetitive micro-scratch testing of hard PVD coatings
Ben BEAKE[1], German FOX-RABINOVICH[1,2], Jose ENDRINO[1,3]
[1]Micro Materials Ltd, United Kingdom; [2]McMaster, Canada; [3]Cranfield University, England

14:40-15:00
300 mm class of filtered cathode vacuum arc (FCVA) system for tribological applications
Jongkuk KIM, Yong-Jin KANG, Young-Jun JANG
Korea Institute of Materials Science (KIMS), Korea

15:00-15:20
Interaction of EP additives with W- or Mo- based carbide and nitride coatings and their in-situ related formation of a low friction tribofilm
Bernhard KOHLHAUSER[1], Manel RODRÍGUEZ RIPOLL[2], Helmut RIEDL[1], Carsten GACHOT[1], Paul Heinz MAYRHOFER[1]
[1]TU Wien, Austria; [2]AC[2]T Research GmbH, Austria

15:20-15:40
Influence of chemical bonding of PTFE lubricant to a polyamideimide matrix in antifriction coatings
Michaela GEDAN-SMOLKA[1], Anne MARSCHNER[1], Klaus KUNZE[2], Rainer FRANKE[3], Dieter LEHMANN[1]
[1]Leibniz-Institut fuer Polymerforschung Dresden, Germany; [2]Institut fuer Leichtbau und Kunststofftechnik at TU Dresden, Germany; [3]Struktur und Werkstoffmechnikforschung at TU Dresden, Germany

15:40-16:30
Coffee Break & Poster Time

Room 203A
Track 2: Wear & Surface Engineering
Coatings VIII
Chair: Ralph STENGLER, *Hochschule Darmstadt, Germany*

16:30-16:55 Invited
The friction and wear characteristics of graphene coating by the CVD process on piston rings under tribo and engine testing conditions
Hakan KALELI[1], Levent YÜKSEK[1], Emre ÇıTAK[2]
[1]YILDIZ Technical University, Turkey; [2]GrafenBioTech Nano Teknoloji Mühendislik San. ve Tic. Ltd. Şti, Selçuklu/Konya, Turkey

16:55-17:15
Low friction high electrical conductivity of nitrogen-graphene nanocrystalline embedded carbon films
Pengfei WANG[1], Weiqiang ZHANG[2], Dongfeng DIAO[1]
[1]Shenzhen University, China; [2]Xi'an Jiaotong University, China

17:15-17:35
Size dependence of frictional behavior of graphene nanocrystal carbon films by ion irradiation
Saizhou QIU, Xue FAN, Cheng CHEN, Dongfeng DIAO
Shenzhen University, China

17:35-17:55
Graphene-based film on steel surfaces in dry sliding and high load conditions for friction and wear reduction
Abdullah ALAZEMI[1], Arthur DYSART[1], Steve SHAFFER[2], Vilas POL[1], Farshid SADEGHI[1]
[1]Purdue University, United States; [2]Bruker Corporation, United States

17:55-18:15
Tribological behavior of Ni/GO nanocomposite coatings
Hanshan DONG, Shaojun QI, Xiaoying LI
University of Birmingham, United Kingdom

18:15-18:35
Tribological behavior of a self-lubricated GO/WC-12Co composite coating fabricated by detonation gun spraying
Haoliang TIAN
Beijing Institute of Aeronautical Materials, China

Room 203C
Track3: Lubrication and Lubricants
Liquid Lubricants I
Chair: Masjuki Bin Hassan HAJI HASSAN, *University of Malaya, Malaysia*

10:10-10:35 Invited
Bubble flow adjacent to surfaces: Shape of a thin lubricating film between a sliding bubble and an inclined plane
Roger HORN, Ninghui HAN, Wren GREENE
Deakin University

10:35-10:55
Development and stability of surfactantless soybean oil in water emulsion with nanoparticles for lubricating purposes
Buyung KOSASIH, Reza TAHERI, Hongtao ZHU, Kiet TIEU
University of Wollongong, Austrilia

10:55-11:15
In-situ observation of lubricant films in a model rolling element bearing
He LIANG, Amir KADIRIC
Imperial College London, UK

11:15-11:35
Effect of perfluoropolyether (PFPE) concentration on the tribological and mechanical properties of filled SU-8/Talc composite
Jitendra Kumar KATIYAR[1], Sujeet Kumar SINHA[2], Arvind KUMAR[1]
[1]Indian Institute of Technology Kanpur, India; [2]Indian Institute of Technology Delhi, India

11:35-11:55
Preparing for ILSAC GF-6: advantages of full-synthetic motor oils for boosting fuel economy
Boris ZHMUD, Boris TATIEVSKI
[1]BIZOL Lubricants, Germany; [2]Applied Nano Surfaces, UK

11:55-12:15
Investigation of inorganic alkali polymer glass as a high temperature lubricant in hot rolling process
Shaogang CUI, Anh Kiet TIEU, Hongtao ZHU, Shanhong WAN
University of Wollongong, Austrilia

12:30-13:30
Lunch

Room 203C
Track3: Lubrication and Lubricants
Rheology of Lubricants II
Chair: Wilfred TYSOE, *University of Wisconsin-Milwaukee, USA*

13:30-13:55 Invited
A new method to solve hydrodynamic lubrication problem of non-newtonian fluid
Ping HUANG[1], Qianqian YANG[2]
[1]South China University of Technology, China; [2]Sun Yat-sen University, China

13:55-14:15
Shear thinning and hydrodynamic friction of VM-containing engine oils
Hugh SPIKES[1], Nigel MARX[1], Luis FERNÁNDEZ[2], Francisco BARCELÓ[2]
[1]Imperial College London, UK; [2]Lubricants Group, Repsol Technology Centre, Spain

14:15-14:35
Stretching and shear behaviors of several base lubricants
Jie CHENG[1], Yuzhen ZHAO[2], Ka MA[2], Zhanjiang WANG [1], Qian WANG[1,3]
[1]Chongqing University, China; [2]Chongqing Branch, Lubricant Co. ltd. SINOPEC, China; [3]Northwestern University, China

14:35-14:55
Origin of shear banding of elastohydrodynamic lubricants
Luca DI MARE, Benedicte GALMICHE, Janet WONG
Imperial College London, UK

14:55-15:15
Fluorescence anisotropy as a tool to probe lubricant rheology
Jonathan DENCH[1], Neal MORGAN[2], Janet WONG[1]
[1]Imperial College London, UK; [2]Shell Global Solutions, UK

15:15-15:35
Interdependency between rheology and tribology of lubricants
Joerg LAEUGER[1], Florian RUMMEL[1], Kartik PONDICHERRY[2]
[1]Anton Paar Germany, Germany; [2]Anton Paar GmbH, Austria

15:35-16:30
Coffee Break & Poster Time

Room 203C
Track3: Lubrication and Lubricants
Liquid lubricants II
Chair: Roger HORN, *Deakin University*

16:30-16:55 Invited
Characterization of lubricants by resonance shear measurement
Kazue KURIHARA
Tohoku University, Japan

16:55-17:15
Low friction, lubricity and durability of polymer brushes coatings, characterized thanks to the relaxation tribometer technique
Michel BELIN[1], Hiroyuki ARAFUNE[2], Toshio KAMIJO[2], Takaya SATO , Joel PERRET-LIAUDET[3]
[1]CNRS, France; [2]Tsuruoka College, Japan; [3]Ecole Centrale de Lyon - LTDS, France

17:15-17:35
Tribological behaviors of ceramics in aqueous glycerol solutions
Shuai YAN, Bin LIN, Wenbin HU, Anying WANG, Xiaoxue ZHOU, Xiaofeng ZHANG
Tianjin University, China

17:35-17:55
The tribological behavior of nano carbon materials in aqueous systems
Xiangqiong (Lydia) ZENG, Hongmei, YANG, Jiusheng LI
Shanghai Advanced Research Institute, Chinese Academy of Sciences, China.

17:55-18:15
Water-based lubrication behavior of polyvinyl alcohol on styrene-ethylene-butylene-styrene block copolymers
Qinghua FANG, Feng YE, Xiaoniu YANG
Changchun Institute of Applied Chemistry, Chinese Academy of Science, State Key Laboratory of Polymer Physcis and Chemistry, China

18:15-18:35
Fuel economy 0W-20 engine oil for natural aspirated small gasoline engine
Daozheng WAN
Castrol (Shenzhen) Co., Limited Shanghai Pudong Branch, China

Room 305A
Track3: Lubrication and Lubricants
Additives VI
Chair: Feng GUO, *Qingdao University of Technology, China*

10:10-10:30
Supercritical fluid synthesis of gold nanoparticle-decorated graphene and its tribological properties as oil additive
Yuan MENG, Fenghua SU
South China University of Technology, China

10:30-10:50
Influence of lubricant additives on rolling-contact-fatigue of gears: role of sulphur on hydrogen embrittlement
Clotilde MINFRAY[1], Benoit L'HOSTIS[1], Marion FREGONESE[2], Catherine VERDU[2], Béatrice VACHER[1], Thierry LE MOGNE[1], Benoit TER OVANESSIAN[2], Frédéric JARNIAS[3], Alder DA-COSTA D'AMBROS[3]
[1]LTDS, France; [2]MATEIS, France; [3]TOTAL Marketing Services, France

10:50-11:10
Preparation of PEGylated black phosphorus nanoparticles and subsequent application as water-based lubricant additive
Wei WANG, Jianbin LUO, Guoxin XIE
Tsinghua University, China

11:10-11:30
The importance of additive chemistry in generating tribofilms efficient at preventing hydrogen permeation in rolling contacts
Vlad Bogdan NISTE, Hiroyoshi TANAKA, Joichi SUGIMURA
Kyushu University, Japan

11:30-11:50
Novel carbon nanotori additives for lubricants with superior extreme pressure properties
Laura PEñA-PARáS[1], Demófilo MALDONADO-CORTÉS[1], Oxana KHARISSOVA[2], José Santiago CRUZ-BAUELOSL[1], Karla Itzel SALDíVAR[1], Luisana LUISANA[1], Patsy ARQUIETA[2]
[1]Universidad de Monterrey, Mexico; [2]Facultad de Ciencias Físico-Matemáticas, Mexico

11:50-12:10
Nanotribology of functionalized silica nanoparticles as water-based lubricant additives
Tianyi SUI, Bin LIN, Shuai YAN
Tianjin University, China

12:10-12:30
Improving drilling efficiency by utilizing sepiolite nanoparticles in drilling fluids
Jamil ABDO, Jan KWAK
Qatar University, Oman

12:30-13:30
Lunch

Room 305A
Track3: Lubrication and Lubricants
Additives VII
Chair: Mark RUTLAND, *KTH, Sweden*

13:30-13:50
Mechanism of interactions between MoS_2 nanotubes and conventional oil additives under various contact conditions
Agnieszka TOMALA[1], Manel RODRíGUEZ RIPOLL[1], Maja REMšKAR[2], Mitjan KALIN[3]
[1]AC2T research GmbH, Austria; [2]Jožef Stefan Institute, Slovenia; [3]University of Ljubljana, Slovenia

13:50-14:10
The tribological properties of synthetic magnesium silicate hydroxide as additives in lubricating oil
Bin WANG, Qiuying CHANG, Kai GAO
Beijing Jiaotong University, China

14:10-14:30
Friction-reduction and life-extension effects of two types of new additives on multialkylated cyclopentanes under vacuum condition
Songwei ZHANG, Yi LI, Qi DING, Litian HU
Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China

14:30-14:50
Investigation of tribological properties of lubricity additives for chlorinated paraffin replacement
Yixing ZHAO(Philip), Alexandra GOODE
Houghton International Inc., USA

14:50-15:10
An investigation on the lubrication mechanism of MoS_2 nanoparticles in unidirectional and reciprocating point contact: the flow pattern effect around the contact area
Hongxing WU, Guangneng DONG
Xi'an Jiaotong University, China

15:10-15:30
The influence of adsorption and tribo-chemistry study of Cu nano-additives in DLC based solid-liquid synergetic system on friction behavior
Yaohui LIU, Yujuan ZHANG, Shengmao ZHANG, Pingyu ZHANG
National & Local Joint Engineering Research Center for Applied Technology of Hybrid Nanomaterials, China

15:30-16:30
Coffee Break & Poster Time

Room 305A
Track3: Lubrication and Lubricants
Additives VIII
Chair: Enrico CIULLI, *University of Pisa, Italy*

16:30-16:50
Impacts of polypropylene glycol (PPG) and pH on tribological properties of water based drilling mud
Huaping XIAO, Shuhai LIU, Yu CHEN
China University of Petroleum-Beijing, China

16:50-17:10
Tribological evaluation of Calcium-copper-titanate and Cerium oxide nano-additives in paraffin oil
Harsha ARAKERE PUTTASWAMY, Gupta RAJEEV NAYAN
Indian Institue of Technology, Banaras Hindu University, India

17:10-17:30
Towards industry application prospect to develop modified graphene oxide with good oil solubility
Zhilin CHENG[1,2], Wei LI[1], Peirong WU[1], Zan LIU[1]
[1]Yangzhou University, China; [2]China Aviation Union Graphene Technology Co., Ltd., China

17:30-17:50
Multiple ways to synthesis of thermally reduced graphene additives and reaching high-efficiency lubrication
Jun ZHAO[1], Junyuan MAO[1], Yingru LI[2], Wei WANG[1], Yongfu WANG[3], Yongyong HE[1], Jianbin LUO[1]
[1]Tsinghua University,China; [2]China Academy of Engineering Physics, China; [3]Chinese Academy of Sciences, China

17:50-18:10
Preparation and tribological properties study of CuS nanoparticles as water-based lubricating additives
Junhua ZHAO, Guangbin YANG, Shengmao ZHANG, Pingyu ZHANG
National & Local Jolnt Engineering Research Center for Applled Technology of Hybrid Nanomaterials, China

18:10-18:30
The effect of adding additives in biolubricant on physical and tribological properties
Dedison GASNI, Ismet Hari MULYADI, Jon AFFI
Andalas University, Indonesia

Room 305C
Track4: Biotribology & Biomimetics
Artificial Joints IV
Chair: Zhongrong ZHOU, *Tribology Research Institute, Southwest Jiaotong University, Chengdu 610031, China*

10:10-10:35 Invited
Contact mechanics and lubrication regime analysis of cervical total disc replacement in conjunction with a multi-body dynamics model of the Human
Hua XIN[1],Hao DIAO[1],Peng LIU[2],Zhongmin JIN[1]
[1]Xi'an JiaotongUniversity, China; [2]Xi'an Honghui Hospital, China

10:35-10:55
Tribology of surfaces: a study in cartilaginous tissue from synovial joints
Fausto MOREIRA, Ahmad JABBARZADEH
The University of Sydney, Australia

10:55-11:15
Observation of lubrication mechanisms within artificial hip joints
David NECAS[1],Martin VRBKA[1], Jiří GALLO[2], Ivan KRUPKA[1] , Martin HART[1]
[1]Brno University of Technology, Chech; [2]University Hospital Olomouc, Chech

11:15-11:35
Influence of dehydration by pre-loading on tribological property of hydrogel artificial cartilage and articular cartilage
Seido YARIMITSU[1], Naoya HASHIMOTO[1], Teruo MURAKAMI[2], Atsushi SUZUKI[3], Hiromichi FUJIE[1]
[1]Tokyo Metropolitan University, Japan; [2]Teikyo University, Japan; [3]Yokohama National University, Japan

11:35-11:55
Tribological properties of graphene oxide sheets as water-based lubricant additives in artificial knee joint
Gangqiang ZHANG[1], Xiangqiong ZENG[2], Tianhui REN[1], Emile Van der HEIDE[3]
[1]Shanghai Jiao Tong University, China; [2]Chinese Academy of Sciences, China; [3]University of Twente, Holand; [4]TU Delft, Holand

11:55-12:15
Regulation mechanism of biomacromolecules in synovial fluid for superlubricity of Poly (vinylphosphonic acid) (PVPA) coatings on Ti6Al4V
Caixia ZHANG[1], Zhifeng LIU[1], Yuhong LIU[2], Ligang CAI[1], Shizhu WEN[2]
[1]Beijing Key Laboratory of Advanced Manufacturing Technology, China; [2]State Key Laboratory of Tribology, Tsinghua University, China

12:30-13:30
Lunch

Room 305C
Track4: Biotribology & Biomimetics
Artificial Joints V
Chair: Zhongmin JIN, *Xi'an JiaotongUniversity, China; Xi'an Honghui Hospital, China*

13:30-13:50
The effect of insert conformity on wear in total knee replacement
Qida ZHANG[1], Jing ZHANG[1], Zhenxian CHEN[1], Zhongmin JIN[1]
[1]Xi'an Jiaotong University, China; [2]University of Leeds, England; [3]Southwest Jiaotong University, China

13:50-14:10
A simulator for friction and wear testing of artificial hip joints
Zikai HUA[1], Fei TANG[1], Pingchuan DOU[1], Zhongmin JIN[2], Xiaojing WANG[1]
[1]Shanghai University, China; [2]University of Leeds, England

14:10-14:30
Modelling of the elasto-hydrodynamic lubrication of knee joint replacements with surface topography
Leiming GAO[1], Zikai HUA[2], Robert HEWSON[1], Michael Skipper Andersen[3], Zhongmin JIN[4,5]
[1]Imperial College London, England; [2]Shanghai University, China; [3]Aalborg University, Denmar; [4]South West Jiaotong University, China; [5]University of Leeds, England

14:30-14:50
Analyzing the lubrication properties of hydrogel capsule over ceramic-on-ceramic artificial hip joint
Mahshid HAFEZI, Liguo QIN, Guangneng DONG
Key Laboratory of Education Ministry for Modern Design and Rotor-Bearing System, Theory of Lubrication and Bearing Institute, China

14:50-15:10
Implementing patient-derived multi-activity inputs in a knee joint simulator
Spencer FULLAM[1], Gauthier LOUBRIEU[2], Diego OROZCO[3], Markus WIMMER[1]
[1]Rush University Medical Center, America; [2]École centrale de Lyon, Frence; [3]ITESM Campus Guadalajara, Mexico

15:30-16:30
Coffee Break & Poster Time

Room 305C
Track4: Biotribology & Biomimetics
Organs&Tissues-I: Tooth
Chair: Jing ZHENG, *Tribology Research Institute, Southwest Jiaotong University, China*

16:30-17:00 Keynote
Bionic design perspectives based on the formation mechanism of dental anti-wear function
Zhongrong ZHOU, Jing ZHENG
Tribology Research Institute, Southwest Jiaotong University, China

17:00-17:20
Effect of hydroxyapatite fibres arrangement on mechanical and microtribological behavior of human tooth enamel
Jing XIA, Lei CHEN, Zhongrong ZHOU, Linmao QIAN
Southwest Jiaotong University, China

17:20-17:40
Effect of acid-attack on the lubrication performance of salivary pellicle on human tooth enamel
Dongwen LIU, Liang ZHENG, Jing ZhENG, Zhongrong ZHOU
Tribology Research Institute, Southwest Jiaotong University, China

17:40-18:00
Tribological effects of different toothpaste additive during tooth brushing on the permanent teeth
Mohamad Ali AHMAD[1], Salmiah KASOLANG[1], Azlina Mimi ABU BAKAR[1], Zakiah MAT RIPEN[2]
[1]UNIVERSITI TEKNOLOGI MARA, Malaysia; [2]University of Malaya, Malaysia

18:00-18:20
Effects of amelogenin-related amino acids on the remineralization behavior of bovine enamel in CPP-ACP
Liang ZHENG, Wei HAN, Jing ZHENG, Zhongrong ZHOU
Tribology Research Institute, Southwest Jiaotong University, China

Room 303
Track5: Tribology in Manufacturing
CMP and Surface Processing I
Chair: Xinchun LU, *Tsinghua University, China*

10:10-10:40 Keynote
Tribology in chemical-mechanical polishing
Hong LIANG
Texas A&M University, USA

10:40-11:00
Load dependence of frictional forces between single nanoparticles and copper substrate
Yating HUANG[1], Weiqi WANG[2], Dan GUO[2], Xinchun LU[2]
[1]Beijing Technology and Business University, China; [2]Tsinghua University, China

11:00-11:20
Flatness control in the grinding and polishing process of thick silicon reflection mirror
Bocheng JIANG, Dewen ZHAO, Xinchun LU
Tsinghua University, China

11:20-11:40
Defect-free nanofabrication on GaAs surface by tribochemistry material removal
Bingjun YU, Chenning JIN, Xiaoxiao LIU, Linmao QIAN
Southwest Jiaotong University, China

11:40-12:00
A novel catalyst (FeIII-based) and its catalytic performance towards the removal rate of sapphire substrate during CMP process
Li XU, Guoshun PAN, Chunli ZHOU, Yan ZHOU, Guihai LUO
Reseach Institute of Tsinghua University in Shenzhen, China

12:30-13:30
Lunch

Room 303
Track5: Tribology in Manufacturing
CMP and Surface Processing II
Chair: Hong LIANG, *Texas A&M University, USA*

13:30-13:55 Invited
Research and development of a new CMP tool and its applications
Xinchun LU
Tsinghua University, China

13:55-14:15
CMP behavior of Al_2O_3/SiO_2 core-shell abrasives on sapphire substrate
Xin WANG, Hong LEI, Yue DONG
Shanghai University, China

14:15-14:35
ReaxFF reactive molecular dynamics simulations of Cu chemical mechanical polishing process
Jialin WEN, Tianbao MA, Xinchun LU
Tsinghua University, China

14:35-14:55
The numerical analysis of marangoni drying mechanism in post-CMP cleaning
Changkun LI, Dewen ZHAO, Xinchun LU
Tsinghua University, China

14:55-15:15
Investigation of minimum depth of material removal in nanoscale machining process using molecular dynamics simulations
Pengzhe ZHU, Tianbao MA, Yuanzhong HU, Hui WANG, Jianbin LUO
Tsinghua University, China

15:15-15:35
Mechanochemical surface finishing: process runnability and surface condition monitoring by using angle-resolved light scattering, photothermal analysis and vibration analysis
Boris ZHMUD[1], Jonas LUNDMARK[1], Dietmar SCHORR[2], Boris BRODMANN[3]
[1]Applied Nano Surfaces AB, Sweden; [2]Steinbeis Transfer Center Tribology, Karlsruhe, Germany; [3]OptoSurf GmbH, Ettlingen, Germany

15:35-16:30
Coffee Break & Poster Time

Room 303
Track5: Tribology in Manufacturing
CMP and Surface Processing III
Chair: Linmao QIAN, *Southwest Jiaotong University, China*

16:30-16:50
Nanoparticle impacts on a solid surface in a liquid jet and its effects on the material removal
Xuechu ZHAO, Xuefeng XU
Beijing Forestry University, China

16:50-17:10
Multi-zone pressure control for chemical mechanical planarization system
Hongkai LI, Xinchun LU, Jianbin LUO
Tsinghua University, China

17:10-17:30
Improved fused silica optics surface quality using CMP with colloidal silica
Chunli ZHOU[1,2,3], Guoshun PAN[1,2,3], Li XU[1,2,3], Hua GONG[1,2,3], Yan ZHOU[1,2,3]
[1]Research Institute of Tsinghua University in Shenzhen, China; [2]Tsinghua University, China; [3]Guangdong Provincial Key Laboratory of Optomechatronics, China

17:30-17:50
Chemical mechanical polishing (CMP) of SiC wafer utilizing catalyst incorporated pad
Yan ZHOU[1,2,3], Guoshun PAN[1,2,3], Chunli ZHOU[1,2,3], Li XU[1,2,3]
[1]Tsinghua University, China; [2]Research Institute of Tsinghua University in Shenzhen, China; [3]Guangdong Provincial Key Laboratory of Optomechatronics, China

17:50-18:10
Synthesis of sm-doped colloidal SiO_2 composite abrasives and their chemical mechanical polishing performances on sapphire substrates
Tingting LIU, Hong LEI, Tianxian WANG
Shanghai University, China

18:10-18:30
Multiscale friction in bio-composite cutting
Mohamed EL MANSORI, Faissal CHEGDANI, Sabeur MEZGHANI
Arts et Métiers ParisTech, France

Room 305E
Track6: Engine and Transmission Tribology
Engine I
Chair: Victor WONG, *Massachusetts Institute of Technology, USA*

10:10-10:35 Invited
Tribology in hot steam
Mathias WOYDT[1], Wäsche R[1], Brandt G[1],Yano S[2], Sasaki S[2], Ehrke R[1]
[1]Federal Institute for Materials Research and Testing BAM, Germany; [2]Tokyo University of Science (TUS), Tokyo, Japan

10:35-10:55
Advanced piston assembly – liner friction evaluation: simulation and measurement
Ming-Tang MA[1,2], Christoph PRIESTNER[1,2]
[1]AVL List Technical Center (Shanghai) Co. Ltd, China; [2]AVL List GmbH, Austria

10:55-11:15
A newly developed piston tribo-dynamics model considering deterministic skirt surface grooves
Congcong FANG, Xianghui MENG, Youbai XIE
Shanghai Jiaotong University, China

11:15-11:35
Vibration localization in mechanical models experiencing self-excited vibrations
Antonio PAPANGELO[1], Aurelien GROLET[3], Loic SALLES[3], Norbert HOFFMANN[1,3], Michele CIAVARELLA[2]
[1]Hamburg University of Technology, Germany; [2]Polythecnic of Bari, Italy; [3]Imperial College London, UK

11:35-11:55
Tribology study on turbocharger kinematic parts
Shouxing ZHU[1], Moses ZHAO[1], Marc WILSON[2], Marek SLOUKA[3], Mrazek RADIM[3], Lionel TOUSSAINT[2]
[1]Honeywell integrated technology company, China; [2]Honeywell Transportation Systems, TLV, France; [3]Honeywell Technology Solution, Czech Republic

11:55-12:15
Study on the friction reduction between piston and cylinder using floating liner engine
Natsuki KANEKO[1], Hideyuki TABATA[1], Hideyuki IWASAKI[1], Yuji MIHARA[1], Hatsuhiko USAMI[3], Tomomi HONDA[2]
[1]Tokyo City University, Japan; [2]Fukui University, Japan; [3]Meijo University, Japan

12:15-13:30
Lunch

Room 305E
Track6: Engine and Transmission Tribology
Engine II
Chair: Jiujun XU, *Dalian Maritime University, China*

13:30-13:50
A numerical model for mechanical interaction of rough surfaces of hydrodynamic tribosystems of piston engines taking into account rheological characteristics of lubricants
Alexei DOIKIN[1], Konstantin GAVRILOV[1], Yurii GORITSKIY[2], Yuliya ISMAILOVA[2]
[1]Federal State Autonomous Educational Institution of Higher Education "South Ural State University (national research university)", Russia; [2]National Research University "Moscow Power Engineering Institute", Russia

13:50-14:10
Development of tribology simulator using FEM and CFD analyses to predict oil behavior around piston ring
Masayuki OCHIAI, Akihiko AZETSU, Kenji YAMAMOTO, Yuki KAWAMOTO, Ryuichi SASAKI, Shun TAKAHASHI
Tokai University, Japan

14:10-14:30
Thin film sensors for measuring oil film condition in engine sliding surfaces
Kouta MIURA, Yuji MIHARA
Tokyo City University, Japan

14:30-14:50
Influence of boundary conditions on starvation of piston ring conjunction
Stephen BEWSHER[1], Mahdi MOHAMMADPOUR[1], Ramin RAHMANI[1], Homer RAHNEJAT[1], Guenter OFFINER[2]
[1]Loughborough University, UK; [2]AVL List GmbH, Austria

14:50-15:10
Mixed lubrication modelling of internal combustion engine connecting-rod bearings
Aurelian FATU
University of Poitiers, France

15:10-16:30
Coffee Break & Poster Time

Room 305E
Track6: Engine and Transmission Tribology
Engine III
Chair: Mathias WOYDT, *Tokyo University of Science (TUS), Tokyo, Japan*

16:30-16:50
Improving vehicle fuel efficiency through viscosity index improver in engine oils
Frank LAUTERWASSER, Boris EISENBERG, Christoph WINCIERZ
Evonik, Germany

16:50-17:10
Influence of antiwear and dispersant lubricant additives on soot wear
Hugh SPIKES[1], Artemis KONTOU[1], Mark SOUTHBY[2], Neal MORGAN[2]
[1]Imperial College London, UK; [2]Lubricants Discovery Hub, Shell Global Solutions UK, UK

17:10-17:30
Tribological and tribochemical characteristics of a lubricated DLC/Cast iron system under sliding and rolling contacts
Yasir ALJEBOORI, Shahriar KOSARIEK, Ardian MORINA, Anee NEVILLE
Leeds University, UK

17:30-17:50
In-Manufacture running-in of engine components by using the triboconditioning process: synergy with PC-11 and ILSAC GF-6 motor oils
Boris ZHMUD
Applied Nano Surfaces AB, Sweden

Room 307
Track6: Engine and Transmission Tribology
Fluid-film bearings VI
Chair: Wojciech LITWIN, *Gdansk University of Technology, Poland*

10:10-10:30
Study on characteristics of high speed water-lubricated bearings for micro fabrication
Ryosuke MAKINO, Hiroki HOHUKU, Masaaki MIYATAKE, Shigeka YOSHIMOTO
Tokyo University of Science, Japan

10:30-10:50
Study on a reduction method of power consumption of water lubricated hydrostatic thrust bearings
Yusuke ASAKAWA, Masaaki MIYATAKE, Shigeka YOSHIMOTO
Tokyo University of Science, Japan

10:50-11:10
Hydrodynamic pressure distribution in water-lubricated hydrodynamic bearings - fluid structure interaction simulations and experimental tests
Artur OLSZEWSKI, Michal WODTKE
Gdansk University of Technology, Poland

11:10-11:30
The performance analysis of infinite length journal bearing under aqueous solution
Kuankuan LI, Chaohui ZHANG, Jun GU, Zhide LU
Beijing Jiaotong University, China

11:30-11:50
Surface profile design and its influence on the start-up and shut-down process for tilting-pad thrust bearing under water lubrication
Zhanchao WANG, Ying LIU
Tsinghua University, China

11:50-12:10
An experimental investigation on a water cooled tilting pad thrust bearing
Farooq NAJAR, G A HARMAIN
National Institute of Technology Srinagar, India

12:10-12:30
Research on water lubricated main shaft bearings in conditions of improper lubrication and cooling conducted on high torque real-life scale bush test rig
Wojciech LITWIN
Gdansk University of Technology, Poland

12:30-13:30
Lunch

Room 307
Track6: Engine and Transmission Tribology
Sealing I
Chair: Qingbing DONG, *Harbin Engineering University, China*

13:30-13:55 Invited
Towards the development of tribotronic sealing technology
Ian SHERRINGTON, Wilbert SINZARA, Hadley BROOKS, Ahmed ONSY, Edward SMITH
Jost Institute for Tribotechnology, United Kingdom

13:55-14:15
Fretting wear behavior of thermoplastic polyurethane (TPU) for mechanical seal application
Chao WANG[1], Andreas HAUSBERGER[1], Gerald PINTER[2], Thomas SCHWARZ[3]
[1]Polymer Competence Center Leoben, Austra; [2]University of Leoben, Austria; [3]SKF Sealing Solutions Austria GmbH, Austria

14:15-14:35
Cavitation in reverse spiral grooves and leak control in mechanical face seals
Xuezhong MA, Xiangkai MENG, Yuming WANG, Yangyang LIANG, Mingxue SHEN, Xudong PENG
Zhejiang University of Technology, China

14:35-14:55
Study of mixed lubrication in radial shaft seals with model surface topography
Hiromichi YOSHIMIZU[1], Shigenobu HONDA[2], Hirotaka MIZUTA[2], Joichi SUGIMURA[1]
[1]Kyushu University, Japan; [2]NOK Corporation

14:55-15:15
Tribological behavior of HNBR in oil and gas field applications
Winoj BALASOORIYA[1], Bernd SCHRITTESSER[1], Chao WANG[1], Andreas HAUSBERGER[1], Gerald PINTER[2], Thomas SCHWARZ[3]
[1]Polymer competence center Leoben GmbH, Austria; [2]Montanuniversitaet Leoben, Austria; [3]SKF Sealing Solutions Austria GmbH, Austria

15:15-15:35
A coupling hydrodynamic mechanical seal model with considering the gas-liquid phase flow conditions
Guozhong CHEN, Guoyuan ZHANG, Yi ZHANG
Xidian University, China

15:35-16:30
Coffee Break & Poster Time

Room 307
Track6: Engine and Transmission Tribology
Sealing II
Chair: Ian SHERRINGTON, *Jost Institute for Tribotechnology, United Kingdom*

16:30-16:50
Clearance regulation and transient sealing performance analysis of dry gas seal for extreme operating conditions
Yuan CHEN, Xudong PENG, Jinbo JIANG, Jiyun LI
Zhejiang University of Technology, China

16:50-17:10
An analysis on the stiffness characteristics of spiral groove dry gas seal influenced by the real gas effect at high pressure
Hengjie XU, Pengyun SONG, Wenyuan MAO, Qiangguo DENG
Kunming University of Science and Technology, China

17:10-17:30
Numerical simulation of the dynamic behavior of a contacting mechanical face seal
Jeremy COCHAIN, Noël BRUNETIÈRE
Pprime Institute, France

17:30-17:50
Numerical investigation on static and rotordynamic characteristics of convergent-tapered and divergent-tapered hole-pattern damper seals
Dan SUN
Shenyang Aerospace University, China

17:50-18:10
EHL simulation of the radial shaft sealing system
Stefan THIELEN, Balázs MAGYAR, Bernd SAUER, Flavien FOKO FOKO
University of Kaiserslautern, Germany

Room 308
Track7: Industrial Tribo-systems
Green Tribology
Chair: Jenfin LIN, *National Cheng Kung University, Taiwan, China*

10:10-10:40 Keynote
Financial Tribology
Patrick G SWAN
Aswan Consulting Cc, South Africa

10:40-11:10 Keynote
The challenge in creating sustainable tribological products – 'closing the loop' approach
Satish V. KAILAS
Indian Institute of Science, India

11:10-11:35 Invited
50 years of tribology: Malaysian perspective
Haji HASSAN, Masjuki Bin HASSAN
University of Malaya, Malaysia

11:35-12:00 Invited
Oil-water separation based on adjusted surface wettability of filters
Jiadao WANG, Chuan DU, Shuai CHEN, Bao WANG, Hao ZHAO
State Key Laboratory of Tribology, China

12:00-13:30
Lunch

Room 308
Track7: Industrial Tribo-systems
Railway I
Chair: Georg JACOBS, *RWTH Aachen University, Germany*

13:30-14:00 Keynote
Dynamic behavior of arc during electrical sliding and its directional erosion
Yongzhen ZHANG
Henan University of Science and Technology, China

14:00-14:20
A systematic study on the mechanism of friction-induced high-frequency noise
Shuwen WANG, Jie MEI, Linlei ZHOU
University of Shanghai for Science and Technology, China

14:20-14:40
Hi-tech: cast rails
Leonid SOSNOVSKIY[1], Sergei SHERBAKOV[2], Guozheng KANG[3], Zefeng WEN[3], Victor KOMISSAROV[4]
[1]S&P Group Tribo-Fatigue Ltd, Belarus; [2]Belarusian State University, Belarus; [3]Southwest Jiaotong University, China; [4]Belarusian State University of Transport, Belarus

14:40-15:00
Wheel/rail pair as a tribo-fatigue system and its laboratory models for the tests in the conditions close to operational
Leonid SOSNOVSKIY[1], Sergei SHERBAKOV[2], Zili LI[3], Meysam NAEIMI[3]
[1]S&P Group Tribo-Fatigue Ltd, Belarus; [2]Belarusian State University, Belarus; [3]Delft University of Technology, Netherlands

15:00-15:20
Damage evolution of AlSi7Mg0.6-T6 for catenary under impact-sliding wear
Deqiang TAN[1], Jiliang MO[1], Jinfang PENG[1], Minhao ZHU[1], Jian LUO[2]
[1]Tribology Research Institute, China; [2]The Third Railway Survey and Design Institute Group Corporation, China

15:30-16:30
Coffee Break & Poster Time

Room 308
Track7: Industrial Tribo-systems
Railway II
Chair: Satish V. KAILAS, *Indian Institute of Science, India*

16:30-16:50
On wear and damage transitions of two kinds of railway wheel materials in the rolling-sliding contact
Lubing SHI, Wentao ZHU, Lichang GUO, Qiyue LIU, Wenjian WANG
Tribology Research Institute, Southwest Jiaotong University, China

16:50-17:10
Grease selection for railway axlebox bearings
Muhammad Naqeeb BIN YUSOF[1], Marcel VAN EIJK[1], Marco VAN ZOELEN[2], Pieter BAART[2], Lieuwe DE VRIES[2]
[1]SKF Engineering & Research Centre, Netherlands; [2]SKF Global Testing NL, Netherlands

17:10-17:30
Identification of dynamic friction models in a customised sliders-disc system
Xiaocui WANG[1], Jiliang MO[1], Huajiang OUYANG[2], Yuhang JIANG[1], Minhao ZHU[1], Zhongrong ZHOU[1]
[1]Southwest Jiaotong University, China; [2]University of Liverpool, UK

Room 311A
Track 8: Tribotest and Monitoring
Measurement and Instruments II
Chair: Pawel PODSIADLO, *Curtin University, Australia*

10:10-10:35 Invited
Research progress on full-mode fretting wear test system
Min-Hao ZHU
Southwest Jiaotong University, China

10:35-10:55
Characterization and model of ionic polymer-graphene composite sensor
Qingsong HE[12], David VOKOUN[3], Min YU[1], Kwang Jin KIM[2], Dan LI[4], Zhendong DAI[1]
[1]Nanjing University of Aeronautics and Astronautics, China; [2]University of Nevada Las Vegas, United States; [3]Institute of Physics of the Academy of Sciences of the Czech Republic, The Czech Republic; [4]Monash University, Australia

10:55-11:15
Non-intrusive measurement of lubricant film thickness distribution of thrust bearings
Pan DOU, Tonghai WU, Kai ZHANG
Xi'an Jiaotong University, China

11:15-11:35
Using ultrasound for measuring friction in-situ in contacts
Xiangwei LI, Rob DWYER-JOYCE
The University of Sheffield, United Kingdom

11:35-11:55
A new simple method to investigate variations in electric conductivity of thin-layer coatings
Knut WANTZEN, Constantino PAVLIDES, Albert ALBERS
Karlsruhe Institute of Technology (KIT), Germany

11:55-12:15
Development of a lubricating film thickness and friction force measuring instrument
Dewen ZHAO[1], Xinchun LU[1], Chenhui ZHANG[1], Jianbin LUO[1], Juzhen FENG[2]
[1]Tsinghua University, China; [2]Tianjin Hwatsing Technology Company Limited, China

12:30-13:30
Lunch

Room 311A
Track 8: Tribotest and Monitoring
Measurement and Instruments III
Chair: Minhao ZHU, *Southwest Jiaotong University, China*

13:30-13:55 Invited
Measuring interfaces and lubricants with small shear ultrasonic frequency shear vibrations
Rob DWYER-JOYCE
University of Sheffield, United Kingdom

13:55-14:15
Assessment method for tribological property of ceramic/stainless steel rubbing pairs in hydrogen peroxide solutions
Fuming KUANG, XinCong ZHOU, Jun WANG, Junqiang FANG
Wuhan University of Technology, China

14:15-14:35
Effect of operating conditions and lubricating oils on fuel consumption and CO_2 emissions by real Taxi experiments
Jianfang LIU[1], Lei WEI[2], Xuzheng QIAN[2], Jian LI[2]
[1]Wuhan Polytechnic University, China; [2]Wuhan Research Institute of Materials Protection, China

14:35-14:55
Research on the relationship between rheological properties and molecular structure
Yong LIANG, Liran MA, Jianbin LUO
Tsinghua University, China

14:55-15:15
New perspectives on micro-abrasion corrosion tests
Jose Daniel BIASOLI DE MELLO, Wilian DA SILVA LABIAPARI, Marcelo BRAGA DOS SANTOS, Henara LILLIAN COSTA
Universidade Federal de Uberlandia, Brazil

15:15-15:35
Bearing fatigue tester with optical module for in situ observation
Martin REPKA[1], Milan OMASTA[3], Petr SPERKA[3], Colin MCALEESE[1], Motohiko KOSHIMA[2], Osamu ISHIGO[1]
[1]Daido Metal Co. Ltd. – organizacni slozka, The European Technical Center, Czech Republic; [2]Daido Metal Co. Ltd, Japan; [3]Brno University of Technology, Czech Republic

15:35-16:30
Coffee Break & Poster Time

Room 311A
Track 8: Tribotest and Monitoring
Measurement and Instruments IV
Chair: Steve SHAFFER, *Bruker-TSOM,United States*

16:30-16:50
Test method for evaluating tribologically stressed layers on a translatory oscillation tribometer (SRV)
Gregor PATZER
Optimol Instruments Prüftechnik GmbH, Germany

16:50-17:10
Full scale test setup for torque and friction measurements of large axial sliding bearings
Jan DE PAUW, Timothy GALLE, Jonathan VANCOILLIE, Wouter OST, Patrick DE BAETS
Ghent University, Belgium

17:10-17:30
Development of a specific tribometer for implementation in an environmental-SEM
Sylvie DESCARTES, Philippe STEYER, David PHILLIPPON, José FERREIRA
INSA Lyon, France

17:30-17:50
Design of high temperature high pressure water/helium tribometer
Manish KUMAR, Narendra Mohan DUBE, Anshuman DUBE, Kushal GAUR
DUCOM Instruments Pvt. Ltd., India

17:50-18:10
Tribology, the materials characterization tool for energy efficient and durable products & process design
A.Lgartua*, B. Fernández, E. Fuentes, X. Almandoz, R. Bayón, G. Mendoza, X. Fernández, V. Saenz de Viteri, B. Pinedo, B. Zabala, F. Pagano, J. C. Rodríguez, O. Areitioaurtena, I. Martínez de Alcocer, C. Cerrillo, A. López, A. Alberdi, N. Pacios, R. Gómez, P. Cobo, I. Saenz, C. Sanz, A. Arnaiz, J. Laucirica, J. Barriga, F. Egaña, I. Ruiz de Argandoña, A. Gutierrez, E. Aranzabe, J. Terradillos, R. Emparantza, I. Maurtúa, J. Mabe and A. Aranzabe
Fundación TEKNIKER (IK4-TEKNIKER), Spain

18:10-18:30
A comparative study on the micro-abrasive wear behavior of tribological systems submitted to conditions of "constant normal force" and "constant pressure"
Ronaldo COZZA
University Center of FEI – Educational Foundation of Ignatius "Padre Saboia de Medeiros", Brazil

Room 203B
Track9: Tribology in Future
Nanotribology
Chair: Carmine PUTIGNANO, *Politecnico di Bari, Italy*

10:10-10:35 Invited
In-situ analysis for adsorbed additive layer on metal substrate and its nanotribological properties
Tomoko HIRAYAMA
Doshisha University, Japan; JST Presto, Japan

10:35-11:00 Invited
Investigation of wear reduction effect by applying compliant nano-structure through molecular dynamics simulation
Hyun-Joon KIM[1], Dae-Eun KIM[2]
[1]Kyunpook National University, Korea; [2]Yonsei University, Korea

11:00-11:25 Invited
GaN: beyond ultralow wear
Guosong Zeng[1], Xiaofang Yang[2], Bruce. E. Koel[2], Nelson Tansu[3], Brandon A. Krick[1]
[1]Mechanical Engineering and Mechanics, Lehigh University, USA; [2]Princeton University, USA; [3]Center for Photonics and Nanoelectronics, Electrical and Computer Engineering, Lehigh University, USA

11:25-11:50 Invited
Investigation of the mechanism of water-based superlubricity
Chenhui ZHANG, Mingming DENG, Jianbin LUO
Tsinghua University, China

11:50-12:10
Science education for the future of tribology: new educational material to introduce tribology to young generation
Alan HASE
Saitama Institute of Technology, Japan

12:10-13:30
Lunch

Room 203B
Track9: Tribology in Future
Lubrication
Chair: Hyun-Joon KIM, *Kyunpook National University, Korea*

13:30-13:55 Invited
Lubricant flow in an elastohydrodynamic (EHD) contact
Janet WONG, Stephen JEFFREYS, Benedicte GALMICHE, Hugh SPIKES
Imperial College London, UK

13:55-14:20 Invited
Lubrication between viscoelastic solids: theory & experiments
Carmine PUTIGNANO[1], Nigel MARX[2], Giuseppe CARBONE[1], Daniele DINI[2], Hugh PIKES[2]
[1]Politecnico di Bari, Italy; [2]Imperial College, UK

14:20-14:45 Invited
Effects of cylinder liner surface grooves with different angle on tribological properties for cylinder liner-piston
Chengqing YUAN
Wuhan University of Technology, China

14:45-15:10 Invited
Tribo-condition monitoring for optimized performance and longer service life
Pär MARKLUND
Luleå University of Technology, Sweden

15:10-15:30
The optimization of dimple-arrangement for sealing and lubrication characteristics on mechanical seal surface
Tadatsugu IMURA, Ayano TANISHIMA, Yuta NEGISHI, Yuichiro TOKUNAGA, Hideyuki INOUE
EAGLE INDUSTRY CO., LTD., Japan

15:30-16:30
Coffee Break & Poster Time

Room 203B
Track9: Tribology in Future
Biotribology
Chair: Chengqing YUAN, *Wuhan University of Technology, China*

16:30-16:55 Invited
Tribological rehydration of cartilage: new insight into how movement helps keep joints moving
David BURRIS, Axel MOORE, Brian GRAHAM, Chris PRICE
University of Delaware, USA

16:55-17:20 Invited
Mucin growth dynamics on living corneal epithelial cell monolayers
Thomas ANGELINI, Tristan HORMEL, Angela PITENIS, Juan URUEÑA, Tapomoy BHATTACHARJEE, W. Gregory SAWYER
University of Florida, USA

17:20-17:40
Creation of protein film for low friction by surface texture under sliding contact in blood
Koki KANDA[1], Kenta SUZUKI[1], Shinji KOBAYASHI[2], Hideki KANEBAKO[2], Koshi ADACHI[1]
[1]Tohoku University, Japan;[2]Sun Medical Technology Research Corporation, Japan

17:40-18:00
Wormlike sliding motion of water droplets on the superhydrophobic surfaces with nanowire bundles
Yupeng LI, Xiaoyu LI, M. IQBAL, Mingkai LEI
Dalian University of Technology, China

Room 201A
Track1: Science of Tribology
Wear Fundmental I
Chair: Nicholas D SPENCER, *ETH Zurich, Switzerland*

10:10-10:40 Keynote
Relationship between stick-slip sliding and surface damage
Jacob ISRAELACHVILI
UC Santa Barbar, USA

10:40-11:05 Invited
Atomic removal mechanism on monocrystalline silicon surface
Linmao QIAN,Chen XIAO, Peng ZHANG, Cheng CHEN, Lei CHEN
Southwest Jiaotong University, China

11:05-11:25
Study of anti-wear tribofim evolution using in-situ synchrotron X-ray me asurements
Ardian MORINA, Abdel DORGHAM, Anne NEVILLE
University of Leeds, UK

11:25-11:45
Friction between fractal rough surfaces along lubricated point contact
William Woei Fong CHONG[1], Siti Hartini HAMDAN[2]
[1]Universiti Teknologi Malaysia, Malaysia; [2]University of Southampton Malaysia Campus, Malaysia

11:45-12:05
Nano-quantum standard of wear
Sergey FEDOROV
Kaliningrad State Technical University, Russia

12:05-13:30
Lunch

Room 201A
Track1: Science of Tribology
Wear Fundmental II
Chair: Zhanjiang WANG, *Southwest Jiaotong University, China*

13:30-14:00 Keynote
Science of degradation with application to wear and fatigue
Michael M KHONSARI
Louisiana State University, USA

14:00-14:20
Length-scale-dependent fracture behavior of polymeric materials in sliding wear
Li CHANG, Hongjian WANG
The University of Sydney, Australia

14:20-14:40
Improved predictive wear models: integration of mechanical properties evolution induced by friction
Tomasz LISKIEWICZ[1], Ben BEAKE[2], Norbert SCHWARZER[3], Nick BIERWISCH[3]
[1]University of Leeds, UK; [2]Micro Materials Ltd., UK; [3]Saxonian Institute of Surface Mechanics, Germany

14:40-15:00
Numerical and experimental investigations of the tungsten carbide wear through impact-sliding conditions
Fridrici VINCENT, Gaetan BOUVARD, Gaylord GUILLONNEAU, Philippe KAPSA, Marieme FALL
LTDS, France

15:00-15:50
Coffee Break

Room 201A
Track1: Science of Tribology
Wear Fundmental III
Chair: Li CHANG, *The University of Sydney, Australia*

15:50-16:10
Mechanical properties and erosion-corrosion behavior of polyetheretherketone (PEEK) /nickel foam co-continuous composites
Xiaoguang YANG[1,2], Deli DUAN[1], Shengli JIANG[1], Shu LI[1], Huichen ZHANG[2]
[1]Institute of Matal Research, Chinese Academy of Sciences, China; [2]Transportation Equipment and Ocean Engineering College, China

16:10-16:30
Fretting wear behavior of the depleted uranium under different atmosphere environment
Zhengyang LI[1], Zhenbing CAI[1], Yanping WU[2], Wenjin YANG[1], Minhao ZHU[1]
[1]Southwest Jiaotong University, China; [2]China Academy of Engineering and Physics, China

16:30-16:50
Solution of temperature distribution under frictional heating with consideration of inhomogeneous inclusions
Yuanqing LIU, Wenzhong WANG, Shengguang ZHANG
Beijing Institute of Technology, China

16:50-17:10
Analysis of two fractal surfaces state in micro sliding process with thermo-mechanical coupling
Lianfeng LAI[1,2], Chenghui GAO[2], Jianmeng HUANG[2]
[1]Ningde Normal University, China; [2]Fuzhou university, China

17:10-17:30
Heat conduction with an inhomogeneity due to distributed frictional heating in a half space
Xiujiang SHI[1,2], Liqin WANG[1], Qian WANG[2]
[1]Harbin institute of technology, China; [2]Northwestern University, China

Room 201B
Track1: Science of Tribology
Nanotribology I
Chair: Irina G. GORYACHEVA, *Institute for Problems in Mechanics, Russian Academy of Science, Russia*

10:10-10:35 Invited
Studies of the dynamic tribological properties of 2D nanomaterials
James BATTEAS, Meagan ELINSKI, Zhuotong LIU, Mealani NEGRITO
Texas A&M University, USA

10:35-10:55
Ultra-low friction interface detection of twisted multilayer MoS2 based on phonon vibration
Ke JIN, Dameng LIU, Junyi LI
Tsinghua University, China

10:55-11:15
Thickness dependent friction on few-layer TMDCs
Liang FANG[1], Dameng LIU[1], Yuzheng GUO[2]
[1]Tsinghua University, China; [2]University of Cambridge, UK

11:15-11:35
A combined experimental and DFT study of superlubricity of graphene/MoS_2 heterostructure
Linfeng WANG[1], Xiang ZHOU[1], Tianbao MA[1], Dameng LIU[1], Lei GAO[1], Xin LI[2], Yuanzhong HU[1], Hui WANG[1], Yadong DAI[3], Jianbin LUO[1]
[1]Tsinghua University, China; [2]Beijing Institute of Technology, China; [3]Neotrident Co., Ltd, China

11:35-11:55
Controllable nanotribological properties of graphene nanosheets
Yitian PENG, Xingzhong ZENG, Haojie LANG
Donghua University, China

11:55-12:15
Some physical phenomena in nanoscale dissipation and friction from theory and simulation
Erio TOSATTI
SISSA, Italy; ICTP, Italy; CNR-IOM Democritos, Italy

12:15-13:30
Lunch

Room 201B
Track1: Science of Tribology
Nanotribology II
Chair: Xianqiang PEI, *INM-Leibniz Institute for New Materials,Germany*

13:30-13:50
How does the molecular organization govern the interfacial friction at nanoscale?
Alexia CRESPO, Juliette CAYER-BARRIOZ, Denis MAZUYER, Nazario MORGADO
Ecole Centrale de Lyon, France

13:50-14:10
Confinement-induced nano-sandwich of liquid crystal in thin film lubrication
Liran MA, Ming GAO, Jianbin LUO
Tsinghua University, China

14:10-14:30
Simultaneous in situ measurements of contact state and friction to understand the mechanism of lubrication with nanometer-thick liquid lubricant films
Hedong ZHANG[1], Yasunaga MITSUYA[2], Yusuke TAKEUCHI[1], Kenji FUKUZAWA[1], Shintaro ITOH[1]
[1]Nagoya University, Japan; [2]Nagoya Industrial Science Research Institute, Japan

14:30-14:50
Investigation by in situ raman and in situ fluorescence spectroscopies of the friction reduction mechanisms in sphere plane contacts lubricated by dispersion of nanoparticles in low viscosity bases
Jean-Louis MANSOT, Audrey MOLZA, Yves BERCION
Université des Antilles, France

14:50-15:10
Interfacial structures and nanotribological behaviors of host-guest assemblies induced by hydrogen bond and van der Waals force
Hongyu SHI[1], Yuhong LIU[1], Qingdao ZENG[2], Chen WANG[2], Xinchun LU[1]
[1]Tsinghua University, China; [2]National Center for Nanoscience and Technology, China

15:30-15:50
Coffee Break

Room 201B
Track1: Science of Tribology
Nanotribology III
Chair: Hedong ZHANG, *Nagoya Univesity, Japan*

15:50-16:10
Single asperity experiments in understanding macroscopic polymer tribology
Xian-Qiang PEI, Roland BENNEWITZ
INM-Leibniz Institute for New Materials, Germany

16:10-16:30
Molecular origin of frictional behavior of pressure-driven water flow through graphene nanochannel
Lei YANG[1], Dongfeng DIAO[2]
[1]Xi'an Jiaotong University, China; [2]Shenzhen University, China

16:30-16:50
Nano-scale Investigation of frictional characteristics of tribo-films in sliding contacts of representative in-cylinder conditions
Jamal UMER[1], Nick MORRIS[1], Michael LEIGHTON[1], Ramin RAHMANI[1], Homer RAHNEJAT[1], Sebastian HOWELL-SMITH[2], Sashi BALAKRISHNAN[3]
[1]Loughborough University, UK; [2]Capricorn Automotive, UK; [3]Castrol Technology Centre, UK

16:50-17:10
Frictional properties of nanojunctions including atomically thin sheets
Wengen QUYANG[1], Ming MA[2], Quanshui ZHENG[2], Michael URBAKH[1]
[1]Tel Aviv University, Israel; [2]Tsinghua University, China

17:10-17:30
Effect of groove topography on the contact behavior in EHL and mixed lubrication.
Denis MAZUYER[1],Thomas TOUCHE[1],Tomasz WOLOSZYNSKI[2],Pawel PODSIADLO[2], Gwidon STACHOWIAK[2], Juliette CAYER-BARRIOZ[2]
[1]Ecole Centrale de Lyon, France; [2]Curtin University, Australia

17:30-17:50
Temperature dependency of shear properties of nanometer-thick liquid lubricant films: a molecular dynamics study
Takayuki KOBAYASHI, Hedong ZHANG, Kenji FUKUZAWA, Shintaro ITOH
Nagoya University, Japan

17:50-18:10
Finite element analysis of AFM-cantilever dynamic interactions with sample
G BIJU, U B JAYADEEP, M S BOBJI
Indian Institute of Science, India

Room 303
Track1: Science of Tribology
Tribophysics I
Chair: Liran MA, *Tsinghua University, China*

10:10-10:35 Invited
Material complexity and atomic scale models in tribology
Michael MOSELER
Fraunhofer IWM, Germany

10:35-10:55
Tribo-phase transformation of graphene nanocrystal carbon films studied by in-situ electrical property test
Xue FAN, Saizhou QIU, Dongfeng DIAO
Shenzhen University, China

10:55-11:15
Magnetic field induced ferromagnetic domain evolution and the influence on dry friction behavior: A first principles study
Chao SUN, Yongzhen ZHANG, Sanming DU, Hongbiao HAN
Henan University of Science & Technology, China

11:15-11:35
The relationship between friction coefficient and charge density of PDMS sliding against graphene sheets embedded carbon films
Weiqiang ZHANG[1], Pengfei WANG[2], Dongfeng DIAO[2]
[1]Xi'an Jiaotong University, China; [2]Shenzhen University, China

11:35-11:55
The study of magnetorheological elastomer's friction performance and mechanism with magnetic field
Rui LI, Dejun REN[1], Jiushan LIU[1], Shiwei CHEN[2], Xiaojie WANG[1]
[1]Chongqing University of Posts and Telecommunications, China; [2]Chongqing Univ. Science & Technology, China

12:00-13:30
Lunch

Room 303
Track1: Science of Tribology
Tribophysics II
Chair: Yuanzhong HU, *Tsinghua University, China*

13:30-13:55 Invited
From tribology to tribo-fatigue and mechanothermodynamics
LEONID SOSNOVSKIY[1], SERGEI SHERBAKOV[2]
[1]S&P Group Tribo-Fatigue Ltd, Belarus; [2]Belarusian State University, Belarus

13:55-14:15
Thermodynamic, tribo-fatigue and mechanothermodynamic entropies
Leonid SOSNOVSKIY[1], Sergei SHERBAKOV[2], Michael KHONSARI[3]
[1]S&P Group Tribo-Fatigue Ltd, Belarus; [2]Belarusian State University, Belarus; [3]Louisiana State University, USA

14:15-14:35
Thermodynamic analysis of tribo-fatigue
Michael KHONSARI[1], Mohammad MEHDIZADEH[1], Steven SHAFFER[1,2]
[1]Louisiana State University, USA; [2]Bruker Nano Surfaces Division, USA

14:35-14:55
Entropy generation related to heat conduct and plastic deformation in tribology
Zhendong DAI, Yi SONG
Nanjing University of Aeronautics and Astronautics, China

14:55-15:15
Non-equilibrium thermodynamics model and experiments on thin-film lubrication: the role of interfacial interaction
Xiangjun ZHANG, Haoda JING, Yu TIAN, Yonggang MENG
Tsinghua University, China

15:30-15:50
Coffee Break

Room 303
Track1: Science of Tribology
Tribophysics III
Chair: Dongfeng DIAO, *Shenzhen University, China*

15:50-16:10
Triboemission mechanism and its correlation with tribocharging
Alessandra CINIERO, Tom REDDYHOFF
Imperial College London, UK

16:10-16:30
Collection and Utilization of Triboelectrification Charge
Daoai, WANG, Feng ZHOU, Weimin LIU
Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China

16:30-16:50
A simple way to modulate the discharging induced by triboelectrification
Na LI[1], Xuefeng XU[1], Liran MA[2], Jianbin LUO[2]
[1]Beijing Forestry University, China, [2]Tsinghua University, China

16:50-17:10
Friction contact affected by surface electron of multi-layer graphene: quantum friction
Xi ZHANG, Dongfeng DIAO
Shenzhen University, China

17:10-17:30
Mechanical states of multielement tribo-Fatigue system
Sergei SHERBAKOV[1], Leonid SOSNOVSKIY[2]
[1]Belarusian State University, Belarus; [2]S&P Group Tribo-Fatigue Ltd, Belarus

17:30-17:50
Study on interfacial mechanical properties of diffusion bonding of TiAl alloy and TC11 titanium alloy by nanoindentation test
Haosheng PANG[1], Chenghui GAO[1], Ming LIU[1], Xiaochen WANG[2], Xuesong FU[2]
[1]Fuzhou University, China; [2]Dalian University of Technology, China

17:50-18:10
Triboelectric behavior of Cu rolling electric contact pairs
Chenfei SONG, Yixiang SUN, Yang YUE, Yongzhen ZHANG
Henan University of Science and Technology, China

Room 311A
Track1: Science of Tribology
Contact Mechanics I
Chair: Valentin POPOV, *Berlin Univesity of Technology, Institute of Mechanics, Germany*

10:10-10:30
In situ measurements of the real area of contact: The contact mechanics challenge
W Gregory SAWYER[1], Alexander BENNETT[1], Kathryn HARRIS[1], Kyle SCHULZE[1], Juan URUENA[1], Angela PITENIS[1], Martin MUSER[2], Thomas ANGELINI[1]
[1]University of Florida, USA; [2]Saarland University, Germany

10:30-10:50
Measurement of the real area of contact using coating technique and SEM
Robert JACKSON, Yang XU, Yan CHEN, Bart PROROK
Auburn University, USA

10:50-11:10
The effect of velocity on the nominal contact area of elastomeric materials: comparison between theory and experiment
M. Khafidh[1,2], N.V. Rodriguez[1,2], M.A. Masen[3], D.J. Schipper[1]
[1]University of Twente, The Netherlands; [2]Dutch Polymer Institute, The Netherlands; [3]Imperial College, United Kingdom

11:10-11:30
In-situ measurement of dewetting behavior on rubber-glass interface
Toshiaki NISHI, Kenta MORIYASU, Tsuyoshi NISHIWAKI
ASICS Corporation, Japan

11:30-11:50
An in-situ optical study of subsurface crack propagation under sliding herzian contact
Haiyang ZHANG, Bo TAO, Jia ZENG, Xiaojun LIU, Kun LIU, Jiaxin YE
HeFei University of Technology, China

11:50-12:10
An efficient model for the contact of multiferroic composite materials
Xin ZHANG[1,2], Zhanjiang WANG[1], Huoming SHEN[1], Qian WANG[2,1]
[1]Southwest Jiaotong University, China; [2]Northwestern University, China

12:00-13:30
Lunch

Room 311A
Track1: Science of Tribology
Contact Mechanics II
Chair: Thomas ANGELINI, *University of Florida*

13:30-14:00 Keynote
Strength of adhesive contacts:influence of contact geometry and material gradients
Valentin POPOV
Berlin Univesity of Technology Institute of Mechanics, Germany

14:00-14:20
Influence of vibration on friction: Critical velocity of controllability
Mikhail POPOV
National Research Tomsk Polytechnic University, Russia; Technische Universität Berlin, Germany; National Research Tomsk State University, Russia

14:20-14:40
Modeling elastic adhesive contact for different forms of molecular interaction potential
Yulia MAKHOVSKAYA
Ishlinsky Institute for Problems in Mechanics of the Russian Academy of Sciences, Russian

14:40-15:00
A FFT-enhanced boundary element methodology
Carmine PUTIGNANO, Giuseppe CARBONE
Politecnico di Bari, Italy

15:00-15:20
Modeling approach for contact simulation of real surfaces on the microscale with composite materials
Daniel NADERMANN[1], Avijit RASTOGI[2], Hubert SCHWARZE[3]
[1]Robert Bosch GmbH - Corporate Sector Research, Germany; [2]RWTH Aachen University, Germany; [3]Institute of Tribology and Energy Conversion Machinery at Clausthal University, Germany

15:30-15:50
Coffee Break

Room 311A
Track1: Science of Tribology
Contact Mechanics III
Chair: Tom REDDYHOFF, *Imperial College of London, UK*

15:50-16:15 Invited
Modeling of sliding contact for viscoelastic layer (3-D model of material)
Elena TORSKAYA, Feodor STEPANOV
Ishlinsky Instiute for Problems in Mechanics, Russia

16:15-16:35
Contact of curved surfaces in elastic and plastic deformation
Robert JACKSON
Auburn University, USA

16:35-16:55
A computational model for evaluating the stressed volume in contact fatigue
Xiaoqing JIN, Xiangning ZHANG, Pu LI
Chongqing University, China

16:55-17:15
Effects of truncated tails on pull-off of nominally gaussian self-affine rough surfaces
Antonio PAPANGELO[1,2], Michele CIAVARELLA[1], Luciano AFFERRANTE[1]
[1]Polythecnic of Bari, Italy; [2]Hamburg University of Technology, Germany

17:15-17:35
Contact pressure distribution during sliding interaction
Vera DEEVA[1], Stepan SLOBODYAN[2]
[1]National Research Tomsk Polytechnic University, Russia; [2]Omsk State Technical Universit, Russia

17:35-17:55
Molecular dynamics simulations for the bonding preference of hydrocarbon contaminants in hard disk drives
Jingan SONG, Changdong YEO
Texas Tech University, USA

Room 201D
Track 2: Wear & Surface Engineering
Tribo-Materials I
Chair: Junhong JIA, *Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China*

10:10-10:35 Invited
Tribological Performance of Cu-Sn Alloys Manufactured by Advanced Master Forming Technologies
Friedrich FRANEK[1], Ulrike CIHAK-BAYR[1], Robin JISA[2], Andreas PAUSCHITZ[1]
[1]AC2T Research GmbH, Austria; [2]Österreichische Tribologische Gesellschaft , Austria

10:35-10:55
Friction and wear properties of A356-TiB_2 cast composites fabricated by flux assisted synthesis
Rajnesh TYAGI, Rahul SARASWAT
Indian Institute of Technology (Banaras Hindu University), India

10:55-11:15
Friction and wear properties of CrSiCN/SiC tribopairs in water lubrication
Fei ZHOU, Zhiwei WU, Qianzhi WANG
Nanjing University of Aeronautics and Astronautics, China

11:15-11:35
Research on preparation and properties of copper-based powder metallurgy brake pads for high-speed train
Tiantian HE, Zhenjun YUAN, Sanming DU, Yongzhen, ZHANG
Henan University of Science and Technology, China

11:35-11:55
The mechanisms of strain inducing grain refinement and mixture in worn surface of binary brass
Lin LIU[1], Pujie ZHAN[1], Martin DIENWIEBEL[2,3]
[1]Changzhou University, China; [2]Karlsruhe Institute for Technology, Germany; [3]Fraunhofer Institute for Mechanics of Materials, Germany

11:55-12:15
Microstructure and tribological behavior of in situ Zr-based bulk metallic glass composites
Hong WU, Yanwen TIAN, Han ZENG, Yong LIU
Central South University, China

12:15-12:35
Fabrication and high-temperature tribological properties of self-lubricating NiCr-$SrCrO_4$ composites
Jiahu OUYANG, Fan LIU, Zhanguo LIU, Yaming WANG, Yujin WANG
Harbin Institute of Technology, China

12:35-13:30
Lunch

Room 201D
Track 2: Wear & Surface Engineering
Tribo-Materials II
Chair: Ming QIU, *Henan University of Science and Technology, China*

13:30-14:00 Keynote
Polymer tribology fundamentals and applications
Nikolai MYSHKIN
Metal-Polymer Research Institute of Belarus National Academy of Sciences, Belarus

14:00-14:20
High performance hybrid polymer composites for tribological applications
Nazanin EMAMI, A. JAIN
Luleå University of Technology, Sweden

14:20-14:40
Preparation of polyimide/UHMWPE blends and their tribological properties in high-speed dry sliding
Song CHEN, Haitao DUAN, Lei WEI, Bingxue CHENG, Jian LI, Kali GU
Wuhan Research Institute of Materials Protection, China

14:40-15:00
Clarification of reactive extruding mechanism and tribological behavior on carbodiimide added fiber reinforced PA resin material
Takeshi KUNISHIMA, Takanori KUROKAWA, Hirokazu ARAI
JTEKT CORPORATION, Japan

15:00-15:20
A comparative study of tribological performance of PEEK composites filled by α-Fe_2O_3 and α-FeOOH nanoparticles under water lubrication conditions
Chuanping GAO[1,2], Pingyu ZHANG[1], Qihua WANG[2], Shengmao ZHANG[1], Ga ZHANG[2]
[1]Henan University, China; [2]State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China

15:20-15:50
Coffee Break

Room 201D
Track 2: Wear & Surface Engineering
Tribo-materials III
Chair: Pingping YAO, *Central South University, China*

15:50-16:15 Invited
Multiscale design of wear resistant polymer composites
Sergey PANIN[1], B.A. LYUKSHIN[1,2], P.A. LYUKSHIN[1], L.A. KORNIENKO[1], S.A. BOCHKAREVAL[1], N.Yu. GRISHAEVA[1,2], V.O. ALEXENKO[1,2], Nguyen Duc ANH[3], Huan QITAO[3]
[1]ISPM SB RAS, Russia; [2]Tomsk State University of Control Systems and Radioelectronics, Russia; [3] National Research Tomsk Polytechnic University, Russia

16:15-16:35
Effect of hygrothermal aging on wear mechanism and friction behavior of PTFE composites
Nazanin EMAMI, M.R. HOMAYOUN
Luleå University of Technology, Sweden

16:35-16:55
Effects of graphene on tribological performance of resin matrix composites
Kaikui ZHENG, Chenghui GAO, Fushan HE, Lei WANG
Fuzhou University, China

16:55-17:15
Effect of cenospheres on mechanical properties of epoxy resin composites
Ping CHEN
University of Science and Technology Beijing, China

17:15-17:35
Tribological behavior of carbon filled hybrid UHMWPE composites in water
Hari Shankar VADIVEL, Arash GOLCHIN, Nazanin EMAMI
Lulea University of technology, Sweden

17:35-17:55
Impact of metallic counterpart materials on tribofilm formation and tribological mechanisms of polymer composites
Huimin QI, Gen LIU, Ga ZHANG, Tingmei WANG, Qihua WANG
Lanzhou Institute of Chemical Physics, China

17:55-18:15
Silver nanosheet coated copper nanowire/epoxy resin nanocomposites with enhanced electrical conductivity and wear resistance
Ningning ZENG
Henan University, China

Room 203A
Track 2: Wear & Surface Engineering
Coatings IX
Chair: Roman GOLTSBERG, *Technion, Israel*

10:10-10:30
Sliding wear behavior of thermal sprayed Al_2O_3-Y_2O_3 composite coatings under severe conditions
Jian RONG, Kai YANG
Chinese Academy of Sciences, China

10:30-10:50
Microstructure and properties of TiC/Fe non-skid coating by plasma transferred arc cladding
Deqiang CHEN, Yongzhen ZHANG, Yongping NIU, Bao SHANGGUAN
Henan University of Science and Technology, China

10:50-11:10
Thermal arc spray alumininium coating analysis as a sacrificial anode for cathodic protection
Nor Hayati SAAD, Muhamad Hafiz ABD MALEK, Abdul Rahim M SAHAB
Universiti Teknologi MARA, Malaysia

11:10-11:30
Tribological performances of Al_2O_3/YAG amorphous ceramic coating fabricated by atmospheric plasma spraying
Kai KANG, Jian RONG, Jinxing NI, Yin ZHUANG, Shunyan TAO, Chuanxian DING
Chinese Academy of Sciences, China

11:30-11:50
Effect of Fe content on the microstructure and properties of plasma spraying and remelting NiCrBSi coatings
Jingbai CHEN[1], Lining WAN[1], Yanchun DONG[1,2]
[1]Hebei University of Technology, China; [2]University of Alberta, Canada

11:50-12:10
Plasma Sprayed Fe-based Amorphous Alloy Superhydrophobic Coating
Xin JIN
China University of Mining and Technology, China

12:20-13:30
Lunch

Room 203A
Track 2: Wear & Surface Engineering
Coatings X
Chair: Ahmet ALPAS, *University of Windsor, Canada*

13:30-13:50
Structure and tribological properties of multicomponent CrTiAlCN coatings in ambient environment
Fei ZHOU[1], Haotian FANG[1], Qianzhi WANG[1], Kangmin CHEN[1,2], Zhifeng ZHOU[1,3], L.K.Y LI[1,3]
[1]Nanjing University of Aeronautics and Astronautics, China; [2]Jiangsu University, China; [3]City University of HongKong, China

13:50-14:10
Effects of blade material characteristic on high-speed rubbing behaviour between Al-hBN abradable seal coatings and blades
Weihai XUE, Siyang GAO, Deli DUAN, Peng WANG, Shu LI
Chinese academy of sciences, China

14:10-14:30
Tribological behaviors between aluminum-based seal coatings and titanium boride-coated blades under high-speed rubbing condition
Siyang GAO, Weihai XUE, Deli DUAN, Sihan HOU, Shu LI
Chinese Academy of Sciences, China

14:30-14:50
Effect of Ta addition on the properties of TiAlTaN coating
Hongfei SHANG, Tianmin SHAO
Tsinghua University, China

14:50-15:10
Nano-impact testing to compare the fatigue performance of multilayered coatings
Mayank ANAND[1], Richard COOK[2], Ignacio TUDELA[1], Rolandas VERBICKAS[1], Yi ZHANG[1]
[1]Daido Metal Co. Ltd - European Technical Centre, United Kingdom; [2]National Centre for Advanced Tribology at Southampton (nCATS), England

15:10-15:30
Analysis of three-dimensional thermo-mechanical contact of multilayered materials
Haibo ZHANG, Wenzhong WANG, Ziqiang ZHAO
Beijing Institute of Technology, China

15:30-15:50
Coffee Break

Room 203A
Track 2: Wear & Surface Engineering
Coatings XI
Chair: Wen YUE, *China University of Geosciences (Beijing), China*

15:50-16:10
Tribocorrosion behavior of Al2O3 and Al2O3-TiO2 multilayer thin films produced by atomic layer deposition
Polyana ALVES RADI[1,2], Giorgio ERNESTO TESTONI[1,2], Rodrigo SÁVIO PESSOA[1,2], Homero SANTIAGO MACIEL[1,2], Luis AUGUSTO SOUSA MARQUES DA ROCHA[3,4], Lucia VIEIRA[1,2]
[1]Instituto Tecnológico de Aeronáutica , Brasil; [2]Universidade do vale do Paraíba Brazil; [3]UNESP Univ. Estadual Paulista, Brazil; [4]Centre for Mechanical and Materials Technologies, Portugal

16:10-16:30
Tribocorrosion behavior of DLC film on metal alloys
Lucia VIEIRA, L.O PAULA, P. A RADI
Instituto Tecnológico de Aeronáutica, Brazil

16:30-16:50
Stress evolution in DLC and Cr monolayer and DLC /Cr multilayer films with variable layer thickness
Junjun WANG[1,2], Haoran HE[1], Weijiu HUANG[1,2], Linqing WANG[1]
[1]Chongqing University of Technology, China; [2]Chongqing Collaborative Innovation Center for Brake Tribological Materials, China

16:50-17:10
Numerical analysis of exponential type hard gradient coating in elastic line contact
Tingjian WANG[1,2], Guoen MA[2], Xinxin MA[2,3], Yanshuang WANG[1], Liqin WANG[2,3]
[1]Tianjin University of Technology and Education, China; [2]AECC Harbin Bearing, China; [3]Harbin Institute of Technology, China

17:10-17:30
Molecular dynamics simulation of nanoscratching on different interface Cu/Ni multilayer films
Rui LI, Teng LIU, Xi LI, Xiang CHEN
Chongqing University of Posts and Telecommunications, China

17:30-17:50
Tribological properties of silver containing at elevated temperatures and wear resistance by laminar coating
Ameet KUMAR, Jianliang LI
Nanjing University of Science and Technology, China

Room 203C
Track3: Lubrication and Lubricants
Liquid Lubricants-III
Chair: Stephen HSU, *George Washington University, USA*

10:10-10:40 Keynote
Lubrication next 50 years
Roland LARSSON
Lulea University of Technology, Sweden

10:40-11:00
Advanced fuel efficient low viscosity lubricants
Stephen HSU[1], Xiangyu GE[1], Gefei WU[1,2]
[1]George Washington University, USA; [2]Valvoline LLC, USA

11:00-11:20
Measurement of shape of nm-sliding gaps by using ellipsometric micro scopy
Kenji FUKUZAWA, Yusuke SASAO, Shintaro ITOH, Hedong ZHANG
Nagoya University, Japan

11:20-11:40
In situ micro-FTIR spectroscopic observation on shear-induced molecular orientation of carboxylic acids
Renguo LU[1], Shigeyuki MORI[2], Hiroshi TANI[1], Norio TAGAWA[1], Shinji KOGANEZA WA[1]
[1]Kansai University, Japan; [2]Iwate University, Japan

11:40-12:00
Migration of liquid lubricants on a radial grooved surface
Qingwen DAI[1], M. KHONSARI[2], Wei HUANG[1], Xiaolei WANG[1]
[1]Nanjing University of Aeronautics and Astronautics, China; [2]Louisiana State University, USA

12:00-12:20
How to effectively improve the tribological performance of liquid lubricant under space environment: from onefold lubrication to synergistic lubrication
Xiaoqiang FAN
Southwest Jiaotong University, China

12:20-13:30
Lunch

Room 203C
Track3: Lubrication and Lubricants
Liquid Lubricants IV
Chair: Masabumi MASUKO, *Tokyo Institute of Technology, Japan*

13:30-14:00 Keynote
Friction Characteristic and Tribofilm Formation of Zinc dialkyldithiophosphate-formulated Lubricating Oils
Masabumi MASUKO
Tokyo Institute of Technology, Japan

14:00-14:25 Invited
Inkjet based droplet on demand lubrication system for EHL contacts
C.H. VENNER
University of Twente, Netherland

14:25-14:45
Novel injectable biolubricants mimicking surpamolecular complex effectivly restore the lubrication of cartilage by assembling behavior
Renjian XIE[1], Hang YAO[1,2], Sa LIU[1,2], Li REN[1,2], Yingjun WANG[1,2], Dongan WANG[3]
[1]South China University of Technology; [2]National Engineering Research Center for Tissue Restoration and Reconstruction; [3]Nanyang Technological University, Singapore

14:45-15:05
Anti-spreading behavior of 1,3-diketone oils for precision lubrication
Ke LI, Xinping YAN, Deshuang LIU
Wuhan University of Technology, China

15:05-15:25
Lubrication with aqueous solution of polyoxyethylene with castor oil
Chaohui ZHANG, Kuankuan LI, Jianguo HE, Zhide LU
Beijing Jiaotong University, China

15:30-15:50
Coffee Break

Room 203C
Track3: Lubrication and Lubricants
Grease
Chair: Chenhui ZHANG, *Tsinghua University, China*

15:50-16:10
The effect of lubricant composition upon film thickness in grease-lubricated EHD contacts subjected to vibrations
Xingnan ZHANG, Romeo GLOVNEA
University of Sussex, UK

16:10-16:30
The influence of mechanical degradation on grease life
Hong CHEN, Jianping LIU
Shandong University of Technology, China

16:30-16:50
Grease performance in blade bearings for wind turbine applications – experimental results of scaled tests
Fabian SCHWACK[1], Norbert BADER[1], Fabian HALMOS[2], Gerhard POLL[1]
[1]Institute of Machine Design and Tribology, Germany; [2]IMO GmbH & Co. KG, Germany

16:50-17:10
Behaviour of grease-lubricated EHD contacts under variable loading
Romeo GLOVNEA, Xingnan ZHANG
University of Sussex, UK

17:10-17:30
Experimental study on flow properties of greases with different thickeners
Wataru MORI[1], Joichi SUGIMURA[1], Hiroyoshi TANAKA[1], Kazumi SAKAI[2], Yuji SHITARA[2]
[1]Kyushu University, Japan; [2]JX Nippon Oil & Energy Corporation, Japan

17:30-17:50
Visualization of the grease flow velocity distribution in a rotating bearing using fluorescent particles
Tomohiko HARUYAMA, Naoki SAWADA, Kouta NANRI
Jtekt Corporation, Japan

17:50-18:10
Study into structural impact of novel calcium complex grease delivering high temperature performance
Kazuya WATANABE, Keji TANAKA, Eiji NAGATOMI
Showa Shell Sekiyu K.K., Japan

Room 305A
Track3: Lubrication and Lubricants
Ionic Liquids
Chair: Lei LIU, *Southeast University, China*

10:10-10:30
Nanotribology study of ionic liquids as lubricant additives for alumina surfaces
Hua LI, Stephen COWIE, Rob ATKIN
University of Newcastle, Australia

10:30-10:50
Study of the tribological properties of in situ synthesized ionic liquids as lubricants additives in mild wear
Shuyan YANG[1], Janet WONG[2], Feng ZHOU[3], Feng GUO[1]
[1]Qingdao University of Technology, China; [2]Imperial College London, UK; [3]Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China

10:50-11:10
Tribotronic control of friction in oil-based lubricants with ionic liquid additives
Peter COOPER[1], Hua LI[1], Mark W RUTLAND[2], Grant B WEBBER[1], Rob ATKIN[1]
[1]University of Newcastle, Australia; [2]KTH Royal Institute of Technology, Sweden

11:10-11:30
Tribological property of cyano-based ionic liquids under various environment
Shouhei KAWADA[1], Watanabe SEIYA[1], Shinya SASAKI[2]
[1]Graduate School of Tokyo University of Science, Japan; [2]Tokyo University of Science, Japan

11:30-11:50
Novel green lubricants: strengthened lignin-amino acid bio-ionic liquids interaction via reciprocal hydrogen bonding
Liwen MU[1,2], Jiahua ZHU[2], Yijun SHI[1]
[1]Lulea University of Technology, Sweden; [2]The university of Akron, USA

11:50-12:10
Ionic liquids from 2-mercaptobenzothiazole: noncorrosive lubricants for steel/bronze contact
Yi LI[1,2], Songwei ZHANG[1], Litian HU[2]
[1]Lanzhou Institute of Chemical physics, Chinese Academy of Sciences, China; [2]University of Chinese Academy of Sciences, China

12:10-12:30
Solvent-free ionic nanofluids with excellent lubricating performance
Yuexia GUO
Lanzhou Institute of Chemical physics, Chinese academy of sciences, China

12:30-13:30
Lunch

Room 305C
Track4: Biotribology & Biomimetics
Organs & Tissues-II: Skin
Chair: Hongyu ZHANG, *Tsinghua University, Chair*

10:10-10:40 Keynote
Perception and skin tribology: psychophysics and nanophysics
Mark RUTLAND
Department of Chemistry, Surface and Corrosion Science, Royal Institute of Technology, Sweden

10:40-11:05 Invited
Tribological interaction between the textile fabric and human skin
Hassan ZAHOUANI, Mehdi DJEGHLOUL, Roberto VARGIOLU, Cyril PAILLER-MATTEI
Laboratoire de Tribologie et Dynamique des SYstèmes - Université de Lyon - ENISE - ECL - ENTPE, France

11:05-11:25
Factors affecting friction behavior between laparoscopic grasper and large intestine
Qingyuan YU, Chengmo CAI, Wei LI, Zhongrong ZHOU
Tribology Research Institute, Southwest Jiaotong University, China

11:25-11:45
Skin tribology: the abrasion of calluses
Hassan ZAHOUANI[1], Roberto VARGIOLU[1], Cyril PAILLER-MATTEI[1], Sylvain DELIGNY[3]
[1]University of Lyon, France; [2]LTDS- UMR CNRS 5513, France; [3]BABYLISS France

11:45-13:30
Lunch

Room 305C
Track4: Biotribology & Biomimetics
Organs & Tissues III
Chair: Hassan ZAHOUANI, *Laboratoire de Tribologie et Dynamique des SYstèmes - Université de Lyon - ENISE - ECL - ENTPE, France*

13:30-13:50
The Tribology of Hair and its Control
Mark RUTLAND
Department of Chemistry, Surface and Corrosion Science, Royal Institute of Technology, Sweden

13:50-14:10
Study on the frictional performance of surgical needle/suture interacting with soft tissue by using a newly developed penetration friction apparatus (PFA)
Gangqiang ZHANG[1,2,3], Tianhui REN[3], Walter LELLE[2], Erik DE VRIES[2], Xiangqiong ZENG[1,2], Emile van der HEIDE[2,4]
[1]Chinese Academy of Sciences, China; [2]University of Twente, Holand; [3]Shanghai Jiao Tong University, China; [4]TU Delft, Holand

14:10-14:30
Investigation on the mouth-feel and frictional behavior of typical drinks under the oral environment
Shanhua QIAN, Di WANG
Jiangnan University,China

14:30-14:50
Development of an ex vivo tongue-enamel friction model to mimic dry mouth and to compare saliva substitutes
Jeroen VINKE[1], Hans J. KAPER[1], Arjan VISSINK[2], Prashant K. SHARMA[1]
[1]Department of Biomedical Engineering, University of Groningen and University Medical Center Groningen, Holand; [2]Department of Oral Maxillofacial Surgery, University of Groningen and University Medical Center Groningen, Holand

14:50-15:10
Applying Tribology to Understand Food Oral Processing
Kartik PONDICHERRY, Charlotte REPPICH, Florian RUMMEL
Anton Paar GmbH, Austria

15:10-15:30
Friction behavior of esophageal internal surface under different liquid mediums
Chengxiong LIN, Wei LI
Tribology Research Institute, Southwest Jiaotong University, China

15:30-15:50
Coffee Break

Room 305C
Track4: Biotribology & Biomimetics
Organs & Tissues IV
Chair: Mark RUTLAND, *Department of Chemistry, Surface and Corrosion Science, Royal Institute of Technology, Sweden*

15:50-16:10
Study on tactile perception evoked by skin friction
Si CHEN[1], Shirong GE[2]
[1]Jiangsu University, China; [2]China University of Mining and Technology, China

16:10-16:30
The friction effects in the stick slip phenomena of the human skin
Andrei TUDOR, Kussay SUBHI, Andrei CALIN, Haider WAHAD, Nicolae STOICA
The Polytechnic University of Bucharest, Romania

16:30-16:50
Development of low friction facial tissue paper
Kei SHIBATA[1], Shohei MATSUMURA[1], Naoki YAMAI[1], Takeshi YAMAGUCHI[1], Hidenori OROZU[2], Shuta ASUI[2], Kazuo HOKKIRIGAWA[1]
[1]Tohoku University, Japan; [2]Daio Paper Corportain, Japan

16:50-17:10
Friction behaviour and tactile stimulation: friction and touch and feel of writing
Marc MASEN, Aham ROCHAS
Imperial College London, England

17:10-17:30
Tactile friction of Fischer - Tropsch wax emulsion with liquid crystal structure
Ye WANG
Shanghai Advanced Research Institute, Chinese Academy of Sciences, China

17:30-17:50
Friction characteristics of a finger pad slid on the solid surfaces coated with organic molecular layer with different pattern intervals and width
Yimeng LIU, Rina YANAGISAWA, Saiko AOKI
Tokyo Institute of Technology, Japan

17:50 -18:10
Adhesion anisotropy and controllability of attachment between grooved adhesion surfaces
Zheyu LIU, Dashuai TAO, Hongyu LU, Yonggang MENG, Yu TIAN
The State Key Laboratory of Tribology, Tsinghua University, China

Room 305E
Track6: Engine and Transmission Tribology
Engine IV
Chair: Bin ZHAO, *Harbin Engineering University*

10:10-10:30
Enhanced piston-liner friction reduction through surface texturing
Tom REDDYHOFF, Sorin VLADESCU
Imperial College London, UK

10:30-10:50
Friction control by surface texture in tribosystem with Al-alloy and cast iron in MoDTC oil
Masahiro TAGO, Daiki SUZUKI, Koshi ADACHI
Tohoku University, Japan

10:50-11:10
Cooperative control of friction and oil consumption by combining surface roughness and micro-textures on cylinder bore
Bo XU, Bifeng YIN, Huiqin ZHOU
Jiangsu University, China

11:10-11:30
Impact of honing, engine oil and crankshaft offset on the friction of the piston assembly of a diesel engine
Dirk BARTEL, Matthias SCHORGEL
Otto von Guericke University Magdeburg, Germany

11:30-11:50
The effect tappet geometry on cam tappet durability
Quanbao ZHOU
Changan UK R&D Centre, UK

11:50-12:10
A combined experimental and modelling investigation of laser micro-textured surfaces with focus on piston ring - cylinder liner contacts
Francisco PROFITO[1,2], Sorin-Cristian VLĂDESCU[2], Thomas REDDYHOFF[2], Daniele DINI[2]
[1]Polytechnic School of the University of São Paulo, Brazil; [2]Imperial College London, UK

12:10-13:30
Lunch

Room 305E
Track6: Engine and Transmission Tribology
Engine V
Chair: Quanbao ZHOU, *Changan UK R&D Centre, UK*

13:30-13:50
EHL simulation of the timing chain drive
Stefan THIELEN, Balázs MAGYAR, Markus LÖWENSTEIN, Andre BECKER, Bernd SAUER
University of Kaiserslautern, Germany

13:50-14:10
Effect of film strength on roller slip in engine valve train
Riaz MUFTI, Muhammad KHURRAM, Usman BHUTTA, Naqash AFZAL, Usman ABDULLAH, Samiur RAHMAN, Fazal BADSHAH, Zafar RANA
National University of Sciences and Technology, Pakistan

14:10-14:30
Experimental and analytical wear investigations of chain joint wear
Andre BECKER, Bernd SAUER
University of Kaiserslautern, Germany

14:30-14:50
Research trend of engine tribology by Japanese university cooperation
Yuji MIHARA[1], Hatsuhiko USAMI[2], Masabumi MASUKO[3], Kazuyuki YAGI[4], Masayuki OCHIAI[5], Yasuhiro DAISHO[6]
[1]Tokyo City University, Japan; [2]Meijo University, Japan; [3]Tokyo Institute of Technology, Japan; [4]Kyushu University, Japan; [5]Tokai University, Japan; [6]Waseda University, Japan

14:50-15:10
Application of big data base and cloud computing in engine component tribology
Chao ZHANG
Shanghai University, China

15:10-15:30
Numerical analysis of the lubrication performance of piston ring-cylinder liner tribo-systems of low speed 2-stroke diesel engine
Tongyang LI, Xiqun LU, Fuzhan HUANG, Xiuyi LV, Shuaiyu ZHOU
Harbin Engineering University, China

15:30-15:50
Coffee Break

Room 305E
Track6: Engine and Transmission Tribology
Gas Bearings
Chair: Pyung HWANG, *Yeungnam University, Korea*

15:50-16:10
Balance mechanism and characteristic analysis of the gas thrust bearing for the micro-gravity platform
Yi ZHANG, Guoyuan ZHANG, Guozhong CHEN
Xidian University, China

16:10-16:30
Dynamic model of a gas thrust bearing: experimental tests and numerical model
Colombo FEDERICO
Politecnico di Torino, Italy

16:30-16:50
Modeling of a multi-layer foil gas thrust bearing and its load carrying mechanism study
Jianjun DU, Changlin LI
Harbin Institute of Technology, China

16:50-17:10
Analysis of tilt stiffness and damping coefficients of partial arc annular-thrust aerostatic porous journal bearings
Pyung HWANG[1], Polina V. KHAN[2]
[1]Yeungnam University, South Korea; [2]Melentiev Energy Systems Institute, South Korea

17:10-17:30
Static and dynamic characteristics of downsized aerostatic circular thrust bearing with multiple feed holes
Akihito KONDO[1], Masaaki MIYATAKE[1], Shigeka YOSHIMOTO[1], Tadeusz STOLARSKI[2]
[1]Tokyo University of Science, Japan; [2]Brunel University London, UK

17:30-17:50
A novel non-contact squeeze film air journal bearing based on near field acoustic levitation
Minghui SHI, Tao GONG, Kai FENG
State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, China

17:50-18:10
Performance measurement of gas foil bearing with high structural stiffness and damping under varying bearing loads on a rotordynamic test rig
Tao ZHANG, Xueyuan ZHAO, Kai FENG
State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, China

Room 307
Track6: Engine and Transmission Tribology
Sealing III
Chair: Jean BOUYER, *Institut Pprime, University of Poitiers, France*

10:10-10:30
Effect of the circumferential distance between seal fingers on the formation of hydrodynamic film in finger seal
Zengfeng GAO, Tong ZHAO, Yanchao ZHANG, Yahui CUI, Kai LIU
Xi'an University of Technology, China

10:30-10:50
Influence of wall slip effect on leakage rate of hydrodynamic pressure finger seal
Yanchao ZHANG, Pengfei DU, Tong ZHAO, Yahui CUI, Kai LIU
Xi'an University Of Technology, China

10:50-11:10
TEHD analysis of a mechanical seals with tilted surface
Xiao YANG, Xudong PENG, Xiangkai MENG, Yuming WANG
Zhejiang University of Technology, China

11:10-11:30
Theoretical and experimental research of steady performance of a through-slot combined groove dry gas seal
Jinbo JIANG, Cong ZONG, Xudong PENG, Yuan CHEN, Jiyun LI
Zhejiang University of Technology, China

11:30-11:50
Thermo-elastohydrodynamic lubrication simulation of X-ring hydraulic seals
Bingqing WANG, Xudong PENG, Xiangkai MENG, Jiyun LI
Zhejiang University of Technology, China

11:50-12:10
Experimental and theoretical analysis of small diameter brush seals
Mihai ARGHIR, Lilas DEVILLE
Université de Poitiers, France

12:10-13:30
Lunch

Room 307
Track6: Engine and Transmission Tribology
Sealing IV
Chair: Dr. Noel BRUNETIERE, *Institut Pprime, University of Poitiers, France*

13:30-13:50
Experimental study of friction in pneumatic seals
Abdelhak AZZI[1], Abdelghani MAOUI[2], Didier FRIBOURG[2], Aurelian FATU[1], Dominique SOUCHET[1]
[1]University of Poitiers, France; [2]CETIM Pôle Technologies de l'Etanchéité, France

13:50-14:10
Performance characteristics of viscoseals in laminar flow regime
Mohamed JARRAY, Dominique SOUCHET, Aurelian FATU
University of Poitiers, France

14:10-14:30
Effects of subsea operating conditions on mechanical face seal performance
Shifeng WU[1], Ray CLARK[1], Henri AZIBERT[2]
[1]A. W. Chesterton Co. USA; [2]Fluid Sealing Association, USA

Room 307
Track6: Engine and Transmission Tribology
Tribology Materials I
Chair: Simon TUNG, *TUNG Innovation Technology Consulting, Inc.*

15:50-16:10
Friction and wear behaviors of the modified nylon self-lubricating rod end spherical plain bearings
Ming QIU[1,2], Dawei ZHOU[1], Xia LIANG[1], Xiaoxu PANG[1]
[1]Henan University of Science and Technology China; [2]Collaborative Innovation Center of Machinery Equipment Advanced Manufacturing of Henan Province, China

16:10-16:30
Tribological compatibility of some selected Pb-free engine bearing materials with different engine oil formulations
Daniel Woldegebriel GEBRETSADIK, Jens HARDELL, Braham PRAKASH
Luleå University of Technology, Sweden

16:30-16:50
Study on tribological properties of novel biomimetic material for water-lubricated stern tube bearing under the simulated marine environment
Zhiwei GUO, Chengqing YUAN, Song JIANG, Zongrong YANG
Wuhan University of Technology, China

16:50-17:10
Development of fluid for chain type CVT
Toshiaki IWAI[1], Mitsugu KUDO[1], Keiichi NARITA[1], Masato OGAWA[2]
[1]Idemitsu Kosan, Japan; [2]Subaru, Japan

17:10-17:30
Tribological behaviors of porous polyimide containing lubrication oil
Gang ZHOU[1,2], Fengbin LIU[3], Shaohua ZHANG[1,2], Ani ZHANG[1,2], Tao ZHANG[1,2]
[1]Beijing Institue of Control Engineering, China; [2]Beijing Key Laboratory of Long-life Technology of Precise Rotation and Transmission Mechanisms, China; [3]North China University of Technology, China

17:30-17:50
Tribological performance of high performance polymers in dry conditions
Janet WONG[1], Annelise JEAN-FULCRAND[1], Marc MASEN[1], Tim BREMNER[1,2]
[1]Imperial College London, UK; [2]Hoerbiger Corporation of America, Inc., USA

17:50-18:10
Preparation and performances of oil solubility $BaSO_4$@SiO_2 nanoparticles as additive in oil-based drilling fluid
Lu CUI, Shengmao ZHANG, Pingyu ZHANG
Henan University, China

Room 308
Track7: Industrial Tribo-systems
Energy Equipment I
Chair: Yongzhen ZHANG, *Henan University Of Science And Technology, China*

14:00-14:20
Investigation of grease behavior on the metal seal surface under high pressure gas tight condition by in-situ observations
Keita INOSE, Masaaki SUGINO, Kunio GOTO
Nippon Steel & Sumitomo Metal Corporation, Japan

14:20-14:40
Sliding friction behaviors of shale rock-silica contacts under guar gum aqueous solution lubrication in hydraulic fracturing
Huijie ZHANG, Shuhai LIU, Huaping XIAO
China University of Petroleum-Beijing, China

14:40-15:00
Friction and wear during wellbore sands cleanout process
Yanbao GUO, Liu YANG, Deguo WANG, Shuhai LIU
China University of Petroluem, China

15:00-15:20
Evolution of contact between rubber and rigid pipe during experiment of pipe-laying operation
Yongjie ZHOU, Deguo WANG, Yanbao GUO, Shuhai LIU
China University of Petroleum, China

15:20-15:50
Coffee Break

Room 308
Track7: Industrial Tribo-systems
Energy Equipment II
Chair: Wei CHEN, *Xi'an Jiaotong University, China*

15:50-16:10
Measurement of roller load and lubricant film thickness in a wind turbine high-speed shaft bearing in the field
Gary NICHOLAS, Rob DWYER JOYCE
The University of Sheffield, United Kingdom

16:10-16:30
Cool Tribology: polymer and composites in low temperature sliding
Iestyn STEAD[1], David ECKOLD[1], Henry CLARKE[2], Daniel FENNELL[2], Athanasios TSOLAKIS[1], Karl DEARN[1]
[1]University of Birmingham, United Kingdom; [2]Dearman Engine Company, United Kingdom

16:30-16:50
Reproduction of white etching crack under rolling contact loading on thrust bearing and two-disc test rigs
Francisco GUTIERREZ GUZMAN, Georg JACOBS, Gero BURGHARDT
RWTH Aachen University, Germany

16:50-17:10
Flow-induced vibration simulation of steam generator U-tubes based on OpenFOAM
Xiao YE, Run DU, Xiaoyu ZHANG, Pingdi REN
Southwest Jiaotong University, China

Room 305A
Track7: Industrial Tribo-systems
Heavy Machinery I
Chair: Wei PU, *Sichuan University, China*

13:30-13:50
A combined numerical and experimental investigation of disengaged wet clutch system power loss
Michael LEIGHTON[1], James DAVIES[1], Nicholas MORRIS[1], Gareth TRIMMER[2], Paul KING[1], Homer RAHNEJAT[1]
[1]Loughborough University, United Kingdom; [2]J. C. Bamford Excavators, United Kingdom

13:50-14:10
Development of analysis method to estimate dynamic characteristics of tilting pad journal bearing
Tomoaki YAMASHITA, Makoto HEMMI
Hitachi, Ltd., Research & Development Group, Japan

14:10-14:30
Measurement of lubrication film thickness of titling-pad thrust bearing by ultrasonic methods
Kai ZHANG, Pan DOU, Tonghai WU
Xi'an Jiaotong University, China

14:30-14:50
Dynamic analysis of a multi-fulcrum slender shafting
Zhiqiang ZHANG, Liqin WANG, Chuanwei ZHANG
Harbin Institute of Technology, China

14:50-15:10
Research on dynamic frictional contact behavior of friction hoist's liner under different working conditions
Cunao Feng, Dekun ZHANG, Yongbo GUO, Yuan LIU
China University of Mining and Technology, China

15:10-15:30
Experimental study on tribological property of braking mechanism for anti-skid device of friction hoist
Qian WANG[1], Xiaofang XING[1], Xingming XIAO[1,2], Chuanhui HUANG[1]
[1]Xuzhou University of Technology, China; [2]China University of Mining and Technology, China

15:30-15:50
Coffee Break

Room 305A
Track7: Industrial Tribo-systems
Heavy Machinery II
Chair: Jiadao WANG, *State Key Laboratory of Tribology, China*

15:50-16:10
Friction-induced deformation of small caliber projectile during engraving process
Bin WU, Bangjun LIU, Jing ZHENG, Zhiqiang ZOU, Liming HU, Kun JIANG, Xiaolei CHEN, Kaishuan ZHANG, Ronggang CHEN
Army Academy Officier, China

16:10-16:30
Tribological behaviour of coated spur gear pairs with tooth surface roughness
Huaiju LIU[1], Heli LIU[1], Caichao ZHU[1], Ye ZHOU[1], Jinyuan TANG[2]
[1]Chongqing University, China; [2]Central South University, China

16:30-16:50
Dynamic internal contact and slip characteristics of bent hoisting rope during lifting
Jun ZHANG, Dagang WANG, Dekun ZHANG, Shirong GE
China University of Mining and Technology, China

16:50-17:10
Dynamic characteristics of mine hoist braking torque during emergency braking in km deep mine
Dagang WANG, Jun ZHANG, Dekun ZHANG, Shirong GE
China University of Mining and Technology, China

17:10-17:30
Viscoelastic behavior of conveyor belts and roller bearings seismic isolators
Nicola MENGA, Luciano AFFERRANTE, Giuseppe CARBONE, Giuseppe P. DEMELIO
Politecnico di Bari, Italy

17:30-17:50
Sliding friction and wear of liner and grinding ball in iron ore ball mill under different conditions
Yuxing PENG[1,2], Xu NI[1,2], Zhencai ZHU[1,2], Shengyong ZOU[4,3], Tongqing LI[1,2], Songyong LIU[1,2], Lala ZHAO[1,2], Jie XU[5]
[1]China University of Mining and Technology, China; [2]China University of Mining and Technology, China; [3]Luoyang Mining Machinery Engineering Design Institute Co. Ltd, China; [4]State Key Laboratory of Mining Heavy Equipment, China; [5]China University of Mining and Technology, China

Room 203B
Track9: Tribology in future
Wear and Friction Control
Chair: David BURRIS, *University of Delaware, USA*

10:10-10:35 Invited
Emergence of surface roughness in plastic deformation
Lars PASTEWKA, Adam HINKLE, Richard JANA
Karlsruhe Institute of Technology

10:35-11:00 Invited
Examples of third body formation in sliding metal surfaces
Martin DIENWIEBEL
Karlsruhe Institute of Technology, Germany; Fraunhofer Institute for Mechanics of Materials, Germany

11:00-11:20
Measurements of 3D friction forces and of surface potential-controlled friction
Kai KRISTIANSEN[1], Xavier BANQUY[2], Hongbo ZENG[3], Suzanne GIASSON[2], Markus VALTINER[4], Jacob ISRAELACHVILI[1]
[1]University of California Santa Barbara, USA; [2]Universite de Montreal, Canada; [3]University of Alberta, Canada; [4]Max-Planck-Institut fur Eisenforshung, Germany

11:20-11:40
Multi-objective design optimization for zero-leakage and low-friction mechanical seals with surface texturing
Yuichiro TOKUNAGA[1], Hideyuki INOUE[1], Joichi SUGIMURA[2]
[1]Kyushu University, Japan; [2]Kyushu University, Japan

11:40-12:00
A review on adhesion of wheel/rail interface
Wenjian WANG, Lubing SHI, Yi ZHU, Qiyue LIU
Zhejiang University, China

12:00-13:30
Lunch

Room 203B
Track9: Tribology in future
Carbon-based Materials
Chair: Lars PASTEWKA, *Karlsruhe Institute of Technology*

13:30-13:55 Invited
Hard yet tough carbon-based coatings towards high-tech applications
Liping WANG[1,2]
[1]Key Laboratory of Marine Materials and Related Technologies, China; [2]Key Laboratory of Marine Materials and Protective, China

13:55-14:20 Invited
Wear resistance of graphene: Interior vs. step edge
Qunyang LI[1], Yizhou QI[1], Jun LIU[2], Quanzhou YAO[1], Ji ZHANG[1], Yalin DONG[2]
[1]Tsinghua Unviersity, China; [2]University of Akron, USA

14:20-14:45 Invited
Enhancement of friction-reducing effects of functionalized polymethacrylate-series polymer additives by combination with DLC coatings under elevated oil temperature condition
Saiko AOKI, Daiki INOUE
Tokyo institute of technology, Japan

14:45-15:05
Effect of UV/ozone treatment on the tribological properties of carbon microelectromechanical systems structures
Shulan JIANG, Fangshang ZHONG, Linmao QIAN
Southwest Jiaotong University, China

15:30-15:50
Coffee Break

Room 203B
Track9: Tribology in Future
Tribo-materials
Chair: Yitian PENG, *Donghua University, China*

15:50-16:10
Effects of moisture, oxygen and temperature on friction mechanism of MoS_2: A molecular dynamics simulation
Nian YIN[1], Zhinan ZHANG[1], Shuaihang PAN[2], Sulin CHEN[1], Bin SHEN[1]
[1]Shanghai Jiao Tong University, China; [2]University of California-Los Angeles, USA

16:10-16:30
Microstructure and wear behavior of functionally graded Al-Si composite prepared by selective laser melting
Nan KANG[1], Zhongming REN[2], Pierre CODDET[1], Hanlin LIAO[1], Christian CODDET[1]
[1]Université de Bourgogne, France; [2]Shanghai University, China

16:30-16:50
Towards understanding of mechanical mixing using multilayer model alloys
Martin DIENWIEBEL, Ebru CIHAN
Karlsruhe Institute of Technology, Germany

16:50-17:10
Anisotropic flat nanoparticles with different sides sticky/slippery for self forming coatings
Pavlo RUDENKO
TriboTEX, USA

Room 201A
Track1: Science of Tribology
Superlubricity I
Chair: Jean Miche MARTIN, *Laboratory of Tribology and System Dynamics LTDS, France*

08:30-08:55 Invited
Direct measurement of graphite-water interfacial energy
Quanshui ZHENG
Tsinghua University, China

08:55-09:15
Effect of sliding velocity on superlubricity degradation of DLC film
Yunhai LIU[1], Lei CHEN[1], Zhongyue CAO[2], Bin ZHANG[2], Junyan ZHANG[1], Linmao QIAN[1]
[1]Southwest Jiaotong University, China; [2]Lanzhou Institute of Chemical Physics, China

09:15-09:35
Tribochemistry and superlubricity of tetrahedral amorphous carbon
Stefan MAKOWSKI[1], Schaller Frank SCHALLER[1], Volker WEIHNACHT[1], Michael BECKER[2], Andreas LESON[1]
[1]Fraunhofer Institute for Material and Beam Technology, Germany; [2]Fraunhofer USA, Center for Coatings and Diamond Technologies, United States

09:35-09:55
Anisotropy of peeling and superlubricity at graphene-formed interfaces – toward control of atomic-scale real contact area
Naruo SASAKI[1], Takeshi NARTIA[1], Shuya OHMUKI[1], Kouji MIURA[2]
[1]The University of Electro-Communications, Japan; [2]Aichi University of Education, Japan

09:55-10:15
Atomic-scale analysis of tribo-induced interfacial nanostructures in superlubric amorphous carbon films
Xinchun CHEN[1], Chenhui ZHANG[1], Takahisa KATO[2], Xin-an YANG[3], Sudong WU[4], Rong WANG[1], Masataka NOSAKA[2], Jianbin LUO[1]
[1]Tsinghua University, China; [2]The University of Tokyo, Japan; [3]Institute of Physics, Chinese Academy of Sciences, China; [4]Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China

10:15-10:35
Coffee Break

Room 201A
Track1: Science of Tribology
Superlubricity II
Chair: Quanshui ZHENG, *Tsinghua University, China*

10:35-10:55
New insight into origin of macro-superlubricity of polyethylenimine / molybdenum disulphide films in dry environments
Prabakaran SARAVANAN,Joichi SUGIMURA,Tanaka HOROYOSHI
International Institute for Carbon-Neutral Energy Research (I2CNER), Japan

10:55-11:15
Superlubricity of segregated polymer brushes in water
Troels RON, Seunghwan LEE, Irakli JAVAKHISHVILI
Technical University of Denmark, Denmark

11:15-11:35
The effect of contact area on the ultra-low friction between the carbon nanotube and substrate
Kai ZHANG, Ming MA, Yingying ZHANG, Wen WANG, Songlin SHI, Quanshui ZHENG
Tsinghua University, China

12:00-13:30
Lunch

Room 201A
Track1: Science of Tribology
Superlubricity III
Chair: Tianbao MA, *Tsinghua University, China*

13:30-13:55 Invited
Impact of superlubricity on the Stribeck curve
Jean Miche MARTIN[1], Qunfeng ZENG[2], Maria Isabel DE BARROS BOUCHET[1], Makoto KANO[3]
[1]Laboratory of Tribology and System Dynamics LTDS, France; [2]Xi'an Jiaotong University, China; [3]Kanagawa Industrial Technology center, Japan

13:55-14:15
Superlubricity achieved by aqueous hydroxyethyl cellulose in surface contact
Huichen ZHANG, Dezun SHENG, Xuelian QI
Dalian Maritime University, China

14:15-14:35
Ultralow friction of steel surfaces induced by a tribochemical running-in process using 1,3-Diketone lubricants
Shumin ZHANG[1], Ke LI[2,3], Deshuang LIU[2,3], Chenhui ZHANG[1], Xinping YAN[2,3], Jianbin LUO[1]
[1]State Key Laboratory of Tribology, China; [2]National Engineering Research Center for Water Transport Safety, China; [3]Intelligent Transport Systems Research Center, China

14:35-14:55
AFM studies on the liquid superlubricity between silica surfaces achieved with surfactant micelles
Jinjin LI
State Key Laboratory of Tribology, China

14:55-15:15
Graphene nanoribbons and polymeric chains sliding on Au(111)
Ernst MEYER[1], Remy PAWLAK[1], Sara FREUND[1],Urs GYSIN[1], Thilo GLATZEL[1], Alexis BARATOFF[1], Res JOEHR[1], Shigeki KAWAI[2]
[1]University of Basel, Switzerland; [2]National Institute for Material Science (NIMS), Japan

15:15-15:35
Critical length limiting superlow friction
Ming MA[1], Andrea BENASSI[2], Andrea VANOSSI[3,4], Michael URBAKH[5]
[1]Tsinghua University, China; [2]Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland; [3]CNR-IOM Democritos National Simulation Center, Italy; [4]International School for Advanced Studies (SISSA), Italy; [5]Tel Aviv University, Israel

Room 201B
Track1: Science of Tribology
Nanotribology IV
Chair: Ming MA, *Tsinghua University, China*

8:30-8:50
Single asperity sliding: a multi-scale coupling analysis between discrete dislocation plasticity and crystal plasticity finite element method
Yilun XU, Diniele DINI, Daniel BALINT
Imperial College London, UK

8:50-9:10
Numerical simulation of shearing liquid bridge
Kentaro TANAKA, Katsumi IWAMOTO
Tokyo University of Marine Science and Technology, Japan

9:10-9:30
Exploring nano-scale friction involving textured surfaces via molecular dynamics simulations
Hualong YU[1], Xia HU[2], Chengjiao YU[3], Qian WANG[4]
[1]China University of Petroleum-Beijing at Karamay, China; [2]Karamay Vocational and Technical College, China; [3]Baker Hughes Inc, US; [4]Northwestern University, China

Room 311A
Track1: Science of Tribology
Contact Mechanics IV
Chair: Patrick WONG, *City University of Hong Kong, China*

8:30-8:50
Coating-substrate system with imperfect bonding interface: coupled dislocation-like and force-like conditions
Zhanjiang WANG[1], Hao YU[2], Qian WANG[3,1]
[1]Southwest Jiaotong University, China; [2]Chongqing Universtiy, China; [3]Northwestern University, China

8:50-9:10
Elasto-plastic contact of materials containing double-layered inhomogeneities
Mengqi ZHANG[1,2], Ning ZHAO[1], Qinghua ZHOU[3], Zhanjiang WANG[4], Xiaoqing JIN[4], Leon KEER[2], Peter GLAWS[5], Phil HEGEDUS[5], Qian WANG[2]
[1]Northwestern Polytechnical University, China; [2]Northwestern University, China; [3]Sichuan University, China; [4]Chongqing University, China; [5]TimkenSteel, USA

9:10-9:30
An explicit matrix solution for a three-dimensional elastic wedge under surface loadings
Wen WANG[1], Zhiming ZHANG[1], Liang GUO[2], Patrick WONG[2]
[1]Shanghai University, China; [2]City University of Hong Kong, Hong Kong, China

9:30-9:50
A numerical contact solver for adhesive contact between viscoelastic materials
Hualong YU[1], Xia HU[2], Qian WANG[3]
[1]China University of Petroleum-Beijing at Karamay, China; [2]Karamay Vocational and Technical College, China; [3]Northwestern University, China

10:10-10:30
Coffee Break

Room 311A
Track1: Science of Tribology
Contact Mechanics V
Chair: Robert JACKSON, *Auburn University, USA*

10:30-10:50
Contact formation on soft patterned substrates: scale similarities in wetting and adhesion behaviours
Vincent LE HOUEROU[1], Valentin HISLER[1,2], Christian GAUTHIER[1], Michel NARDIN[2], Laurent VONNA[2]
[1]Institut Charles Sadron (I.C.S.), CNRS UPR 022 - Strasbourg, France; [2]Institut de Science des Matériaux de Mulhouse (IS2M) - CNRS UMR 7361, Mulhouse

10:50-11:10
Analysis of heat partition and bulk temperature jump in sliding contact problem
Yuwei LIU[1,3,2], Yong Hoon JIANG[1,3,2], Ames Richard BARBER[1,3,2]
[1]China University of Mining & Technology, China; [2]University of Michigan, USA; [3]Yonsei University, South Korea

11:10-11:30
Clumping criteria of vertical nanofibers on surfaces
Ming ZHOU
Guangxi University of Science and Technology, China

11:30-11:50
Peeling of elastic thin films from substrates of soft material
Nicola MENGA, Luciano AFFERRANTE, Giuseppe CARBONE, Giuseppe P. DEMELIO
Politecnico di Bari, Italy

11:50-12:10
Modeling and analysis of rough surface with arbitrary geometrical shape based on fractal theory
Yuchen DAI, Jianmeng HUANG
Fuzhou University, China

Room 201D
Track 2: Wear & Surface Engineering
Tribo-materials IV
Chair: Nikolai MYSHKIN, *Metal-Polymer Research Institute of Belarus National Academy of Sciences, Belarus*

8:30-8:50
Design and Performances of Adaptive Lubricating Composites in a Wide Temperature Ranges
Junhong JIA, Gewen YI, Xiaochun FENG, Eryong LIU
Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China

8:50-9:10
Effect of Preparation Technology on Arc Erosion Resistance of MgO/Cu Contact Materials
Xiuhua GUO
Henan University of Science and Technology, China

9:10-9:30
Spark Plasma Sintered WC-Ni-Cr Based Self-lubricating Composites with Addition of WS2 Solid Lubricant
Bin WU
Tsinghua University, China

9:30-9:50
Dry sliding wear behavior of tri-ceramic reinforced copper based hybrid composites
Rekesh Kumar GAUTAM, Manvandra Kumar SINGH
Indian Institute of Technology (Banaras Hindu University) Varanasi, India

9:50-10:10
Successes in Synthesis of New Green Tribology Materials
Vladimir LEVCHENKO[1], Vladimir MATVEENKO[1], Iliya BUYANOVSKII[2], Andrey BOLSHAKOV[2]
[1]Lomonosov Moscow State University, Russia; [2]Blagonravov Institute of Machine Science, Russia

10:10-10:30
Tribology of hard reinforced particles cold-sprayed coatings
Sylvie DESCARTES[1], Richard CHROMIK[2], Yinyin ZHANG[2], Michael SHOCKLEY[3]
[1]INSA Lyon - LaMCoS, France; [2]McGill University, Canada; [3]NRC, Canada

10:30-10:50
Coffee Break

Room 201D
Track 2: Wear & Surface Engineering
Tribo-materials V
Chair: Sergey PANIN, *ISPM SB RAS, Russia*

10:50-11:10
High temperature tribological behaviors of microarc oxidation coatings on Ti-35Nb-9Zr alloy
Lin CHEN, Yao QU, Kejian WEI, Xiaoyue JIN, Bin LIAO, Wenbin XUE
Beijing Normal University, China

11:10-11:30
Impact of Fe-intermetallic compounds on the hardness and wear resistance performance of laser alloyed AISI 1015 steel
Olawale FATOBA[1], Elizabeth MAKHATHA[1], Esther AKINLABI[1], Patricia POPOOLA[2]
[1]University of Johannesburg, South Africa; [2]Tshwane University of Technology, South Africa

11:30-11:50
Effect of in-situ modification on the tribological properties of synthetic magnesium silicate hydroxide as lubricant additives
Kai GAO,Qiuying CHANG,Bin WANG
Beijing Jiaotong University,China

11:50-12:10
Improved tribological behaviors of graphene/polytetrafluoroethylene composite
Xiao WANG, Junwei WU, Luhai ZHOU, Xicheng WEI
Shanghai University, China

12:10-12:30
Fabrication, Microstructure and High Temperature Tribological Properties of Hot-pressed hBN–SiC–ZrO2 Ceramics in Sliding against Different Metallic Counterfaces
Jiahu OUYANG, Heng WEN, Lei CHEN, Zhanguo LIU, Yujin WANG
Harbin Institute of Technology, China

12:10-13:30
Lunch

Room 201D
Track 2: Wear & Surface Engineering
Heat Treatment I
Chair: Xiqun LU, *Harbin Engineering University, China*

13:30-13:50
Sliding and impact wear resistance of tool steel after deep cryogenic treatment
Bojan PODGOMIK, Marko SEDLAČEK, Ana KRAČUN, Fevzi KAFEXHIU
Institute of Metals and Technology, Slovenia

13:50-14:10
Study on properties of Ti13Nb13Zr after carburizing
Junyang WANG, Xu RAO, Yong LUO
China University of Mining and Technology, China

14:10-14:30
Improving the wear resistance of CrWMn by deep cryogenic treatment
Kaixuan GU, Jianpeng ZHENG, Jia GUO, Yuan ZHOU, Junjie WANG
CAS, China

14:30-14:50
Two phase ratio recovery for deteriorated duplex stainless steel by laser surface treatment
Yang SONG[1,2], Peng WEN[1,2], Haiyan ZHAO[1,2]
[1]Tsinghua University, China; [2]Ministry of Education, China

14:50-15:10
Approach to controllable tribological properties of sintered polycrystalline diamond compact through annealing treatment
Wen YUE[1,2], Jiansheng LI[1], Wenbo QIN[1], Chengbiao WANG[1,2]
[1]School of Engineering and Technology, China; [2]Key Laboratory on Deep Geo-drilling Technology of the Ministry of Land and Resources, China

15:10-15:30
Tribological properties of TC4 titanium alloy treated by plasma nitriding at different temperatures
Yungang YUAN
China University of Geosciences, China

15:30-15:50
Coffee Break

Room 203A
Track 2: Wear & Surface Engineering
Surface Modification I
Chair: Ali ERDEMIR, *Agonne National Lab. USA*

8:30-9:00 Keynote
Surface and Interface design for friction control
Stephen HSU
George Washington University, USA

9:00-9:20
Friction properties of nanostripe inducing structures in vacuum environment
Yasuhisa ANDO, Shunsuke ABE, Masatoshi SAITO
Tokyo University of Agriculture and Technology, Japan

9:20-9:40
A key technology for reducing frictional run-in period of amorphous carbon film
Cheng CHEN[1], Peidong XUE[1,2], Dongfeng DIAO[1]
[1]Shenzhen University, China; [2]Xi'an Jiaotong University, China

9:40-10:00
Effect of irradiation on the frictional performance of sintering materials
Wenkai ZHENG[1], Ying LIU[1], Yuming WANG[1], Guoping WU[2], Mingjie QI[2]
[1]Tsinghua University, China; [2]Ningbo Vulcan Mechanical Seal Manufacturing Co. Ltd., China

10:00-10:20
Microstructure and tribological properties of Ti ion implantated cronidur 30 bearing steel
Jie JIN, Tianmin SHAO
State Key Laboratory of Tribology, Tsinghua University, China

10:20-10:40
Coffee Break

Room 203A
Track 2: Wear & Surface Engineering
Surface Modification II
Chair: Yasuhisa ANDO, *Tokyo University of Agriculture and Technology, Japan*

10:40-11:05 **Invited**
Effect of surface modification on surface properties and tribological behaviours of titanium alloys
Yong LUO
China University of Mining and Technology, China

11:05-11:25
Characteristic of modified spiral bearing and its seals effect through geometries and dimension modification
Norliza MARUSMAN[1], Mohd Danial IBRAHIM[1], Yuta SUNAMI[2], Aidil Azli ALIAS[1], Siti Nur Azizah AMRAN[1], Saad Salahuddin MUSA[1], Mohd Rahmat A RAHMAN[1], Yana Shaheera YUNOS[1], Muhammad Zaidi MOHTAR[1], Lee Kwang WONG[1]
[1]Universiti Malaysia Sarawak, Malaysia; [2]Tokai University, Japan

11:25-11:45
Enhanced wear resistance of mechanically modified tin plating
Jian SONG[1], Stephan HANSMANN[2], Christian KOCH[1], Haomiao YUAN[1], Vitali SCHINOW[1]
[1]Ostwestfalen-Lippe University of Applied Sciences, Germany; [2]Gebr. Kemper GmbH + Co. KG, Germany

11:45-12:05
Characterization of N+C, Ti+N and Ti+C ion implantation into Ti6Al4V alloy
Xingguo FENG
Lanzhou Institute of Physics, China

12:05-12:25
Tribological evaluation of new surface modifications for cold rolling mill rolls
Jose Lucio GONCALVES JUNIOR[1,2], Jose Daniel Biasoli DE MELLO[1,3], Henara Lillian COSTA[1,4]
[1]Federal University of Uberlandia, Brazil; [2]Federal University of Goias, Brazil; [3]Federal University of Santa Catarina, Brazil; [4]Federal University of Rio Grande, Brazil

12:30-13:30
Lunch

Room 203A
Track 2: Wear & Surface Engineering
Surface Modification III
Chair: Yong LUO, *China University of Mining and Technology, China*

13:30-13:50
Tribological investigations on tailored formed axial bearing washers
Gerhard POLL[1], Florian PAPE[1], Timm COORS[1], Alexander BARROI[2], Jörg HERMSDORF[2], Stefan KAIERLE[2], Tim MATTHIAS[1], Christian BONK[1], Anna CHUGREEVA[1], Anas BOUGUECHA[1], Bernd-Arno BEHRENS[1], Ludger OVERMEYER[2]
[1]Leibniz Universitaet Hannover, Germany; [2]Laser Zentrum Hannover e.V., Germany

13:50-14:10
Residual stresses induced by cavitation peening
Emmanuel SONDE[1,2], Thibaut CHAISE[1], Daniel NELIAS[1], Cyril MAUGER[1], Nicolas BOISSON[1]
[1]Univ Lyon, France; [2]AREVA NP Lyon, France

14:10-14:30
Effects of UV radiation on the friction behavior of thermoplastic polyurethanes
Géraldine THEILER, Volker WACHTENDORF, Anna ELERT, Steffen WEIDNER
Bundesanstalt für Materialforschung und -prüfung, Germany

14:30-14:50
Surface modification of hybrid-fabric composites with amino silane and polydopamine for enhanced mechanical and tribological behaviors
Junya YUAN, Zhaozhu ZHANG
University of Chinese Academy of Sciences, China

14:50-15:10
Tribological performance of surface engineered low-cost beta titanium alloy
Xiaoying LI, Eleanor REDMORE, Hanshan DONG
University of Birmingham, United Kingdom

15:10-15:30
The wear characteristic and deformation mechanism of QT500-7 nodular cast iron performed by atmospheric plasma beam shock peening
Wei DAI, Zhizhen ZHENG, Jianjun LI
Huazhong University of Science and Technology

15:30-15:50
Coffee Break

Room 203B
Track 2: Wear & Surface Engineering
Tribo-corrosion I
Chair: Minhao ZHU, *Southwest Jiaotong University, China*

8:30-8:50
Abrasion-corrosion of PTA inconel 625 deposits
Henara COSTA[1,2], Regina GARCIA[2]
[1]Universidade Federal do Rio Grande, Brazil; [2]Universidade Federal de Uberlandia, Brazil

8:50-9:10
Enhanced cavitation erosion-corrosion resistance of friction stir processed high entropy alloy
Harpreet Singh GREWAL[1], Rakesh NAIR[1], Sundeep MUKHERJEE[2], Harpreet Singh ARORA[1]
[1]Shiv Nadar University, India; [2]University of North Texas, USA

9:10-9:30
Tribocorrosion study of tin bronze in contact with bearing steel in synthetic sea water
Elina HUTTUNEN-SAARIVIRTA, L. KILPI, L. CARPEN, H. RONKAINEN
VTT Technical Research Centre of Finland Ltd, Finland

9:30-9:50
Effects of particle angularity on three-body abrasion-corrosion of high-Cr white cast irons
Mobin SALASI, Grazyna STACHOWIAK, Gwidon STACHOWIAK
Curtin University, Australia

9:50-10:10
Study on Impact-fretting Wear of 304 Austenitic Stainless Steel
Yoshiki SATO, Yuta NAKAGAWA, Bo ZHANG
Saga University, Japan

10:10-10:30
Coffee Break

Room 203B
Track 2: Wear & Surface Engineering
Tribo-corrosion II
Chair: Guoxin XIE, *Tsinghua University, China*

10:30-11:50
Comparison of Two- and Three-body Abrasion-corrosion of 316L Stainless Steel
Grazyna STACHOWIAK, Mobin SALASI, Gwidon STACHOWIAK
Curtin University, Australia

10:50-11:10
Study of the tribocorrosion behaviours of albumin on a cobalt-based alloy using SKPFM and AFM
Yu YAN, Zhongwei WANG, Lijie QIAO
University of Science and Technology Beijing, China

11:50-13:30
Lunch

Room 203B
Track 2: Wear & Surface Engineering
Tribo-corrosion III
Chair: Yu YAN, *Beijing University of Science and Technology, China*

13:30-13:50
Influence of corrosion inhibitor content in sliding CO_2 corrosion on wear and coefficient of friction for steel tubings
Andreas TRAUSMUTH[1], Manel RODRIGUEZ RIPOLL[1], Gerald ZEHETHOFER[2], Ronald SCHÖNGRUNDNER[3], Ewald BADISCH[1]
[1]AC2T research GmbH, Austria; [2]OMV Exploration & Production GmbH, Austria; [3]voestalpine Tubulars GmbH&Co KG, 8652 Kindberg-Aumiihl, Austria

13:50-14:10
Seawater induced tribo-corrosion of marine alloys
Robert WOOD
University of Southampton, United Kingdom

14:10-14:30
Study on erosion-corrosion behavior of metal foam/polyurethane co-continuous composite
Junxiang WANG, Deli DUAN, Shengli JIANG, Sihan HOU, Shu LI
Institute of Metal Research, Chinese Academy of Sciences, China

14:30-14:50
Tribocorrosion behavior of 410SS in artificial seawater: effect of applied potentia
Beibei ZHANG[1,2], Jianzhang WANG[1], Yue ZHANG[1,2], Gaofeng HAN[1,2], Fengyuan YAN[1]
[1]Lanzhou Institute of Chemical Physics, China; [2]University of Chinese Academy of Sciences, China

14:50-15:10
Tribocorrosion of zinc-doped TiO_2 nanotubular anodic films
Luís ROCHA[1,2,5], Sofia ALVES[2,3], André ROSSI[4], Paulo FILLO[1,5], Jean-Pierre CELIS[6], Tolou SHOKUHFAR[3,7]
[1]Universidade Estadual Paulista, Brazil; [2]Center of MicroElectroMechanical Systems, Portugal; [3]US Branch of the Institute of Biomaterials, USA; [4]Brazilian Center for Research in Physics, Brazil; [5]Brazilian Branch of the Institute of Biomaterials, Brazil; [6]KU Leuven, Belgium; [7]University of Illinois at Chicago, USA

15:10-15:50
Coffee Break

Room 203B
Track 2: Wear & Surface Engineering
Surface Exploration I
Chair: Nazanin EMANI, *Luleå University of Technology, Sweden*

15:30-15:55 **Invited**
Stress control based design of coating/substrate systems
Tianmin SHAO, Xiao HUANG, Hongfei SHANG, Zhe GENG
Tsinghua University, China

15:55-16:15
The preparation and elastic properties of core-shell structured polystyrene/SiO_2 composite nanoparticle
Xu CAO, Dan GUO, Guoshun PAN
Tsinghua University, China

16:15-16:35
Computation of rough engineering surfaces
Szerena Krisztina UJVARI[1], Ivana RISTIC[1], Andras VERNES[1,2], Carsten GACHOT[1,3]
[1]AC2T research GmbH, Austria; [2]Technische Universität Wien, Austria

16:35-16:55
A mixed lubrication analysis of a thrust washer bearing with fractal rough surfaces
Xiaohan ZHANG[1], Yang XU[1], Robert JACKSON[1], Timothy PARSONS[2], Jianpeng FENG[2]
[1]Auburn University, USA; [2]Oiles America Corporation, USA

16:55-17:15
Hot nano-indentation modeling of high temperature Ni alloys under Helium environment
Ali BEHESHTI, Sepehr SALARI
Lamar University, USA

17:15-17:35
Wetting behavior of an underwater oil droplet on structured surfaces: a comparison between theoretical, experimental and simulation study
Shuai CHEN[1], Jiadao WANG[2], Gang ZHANG[1], Yongwei ZHANG[1]
*[1]A*Star, Singapore; [2]Tsinghua University, China*

17:35-17:55
Capturing molecular interactions in lubricants and fluid/solid interfaces
James EWEN, David M. HEYES, Daniele DINI
Imperial College London, UK

Room 305C
Track4: Biotribology & Biomimetics
BioSurface & Contact I
Chair: Bharat BHUSHAN, *The Ohio State University,America*

08:30-09:00 Keynote
Understanding how medical implant materials interact with their environment in tribological contacts
Anne NEVILLE
University of Leeds, England

09:00-09:20
In vitro hydrogel friction on mucin-producing corneal cells
Angela A. PITENIS, Juan Manuel URUENA, Tristan T. HORMEL, Tapomoy BHATTACHARJEE, Kyle D. SCHULZE, Thomas E. ANGELINI, W. Gregory SAWYER
University of Florida, America

09:20-09:40
Catheter friction and testing rig in urethra model
Troels RON, Seunghwan LEE
Technical University of Denmark, Denmark

09:40-10:00
The potential role of tribocorrosion on in-Stent restenosis
Emily CLARK, Karen PORTER, Michael BRYANT
University of Leeds, England

10:00-10:20
Coffee Break

Room 305C
Track4: Biotribology & Biomimetics
BioSurface & Contact II
Chair: Anne NEVILLE, *University of Leeds, England*

10:20-10:50 Keynote
Bioinspired mechanically durable superliquiphilic/phobic surfaces
Bharat BHUSHAN
The Ohio State University, America

10:50-11:10
Friction measurements with chocolate in a simulated tongue-palate contact.
Philippa CANN, Marc MASEN
Imperial College London, England

11:10-11:30
Biolubrication and its modulation: Taking saliva as an example
Hongping WAN, Deepak H. VEEREGOWDA, H. C. VAN DER MEI, H.J. BUSSCHER, Herrmann ANDREAS, K. Sharma PRASHANT
University of Groningen and the University Medical Center Groningen; Zernike Institute for Advanced Materials; University of Groningen

11:30-11:50
Wedged anisotropic dry adhesive fabricated with ultra-precision diamond cutting
Dashuai TAO[1], Xing GAO[1], Hongyu LU[1], Zheyu LIU[1], Yong LI[1], Hao TONG[1], Yonggang MENG[1], Noshir PSEIKA[1,2], Yu TIAN[1]
[1]Tsinghua University, China; [2]Tulane University, America

11:50-12:10
Bionic frictional driving dominated by intermolecular adhesion
Keju JI, Feiqian GUO, Guiyun MENG, Zhendong DAI
Nanjing University of Aeronautics and Astronautics, China

12:20-13:30
Lunch

Room 305C
Track4: Biotribology & Biomimetics
Biomaterials I
Chair: Feng ZHOU, *Lanzhou Institute of Chemical Physics, China*

13:30-13:50
Composite hydrogel: A new tool for reproducing the mechanical behaviour of soft human tissues
Zhengchu TAN[1], Antonio FORTE[1], Cristian FERDINANDO PARISI[2], Rodriguez Y BAENA[3], Daniele DINI[1]
[1]Imperial College London, Enaland; [2]Tissue Engineering and Biophotonics Division, King's College London, Enaland; [3]Mechatronics in Medicine, Mechanical Engineering, Imperial College, England

13:50-14:10
Highly efficient moisture-enabled power-generation device from flexible carbon dot gel film
Ming ZHOU
State Key Laboratory of Tribology, China

14:10-14:30
Multistage composite structure hydrogel with high strength and low friction
Jin ZHAO, Yuhong LIU, Pengxiao LIU
Tsinghua University, China

14:30-14:50
Tribological properties of surface texturing padded with hydrogel
Junde GUO[1], Yu LI[2], Guangneng DONG[1]
[1]Xi'an Jiaotong University, China; [2]Department of Applied Chemistry, School of Science Xi'an Jiaotong University, China

14:50-15:10
Nanoporous substrate-infiltrated hydrogels: a bioinspired solution for high load bearing, tunable friction and under water adhesion
Michele SCARAGGI[1,4], Shuanhong MA[2,3], Feng ZHOU[2], Daniele DINI[4]
[1]Universitá del Salento, Italia; [2]Lanzhou Institute of Chemical Physics, China; [3]University of the Chinese Academy of Sciences, China; [4]Imperial College London, England

15:10-15:30
Growing polymer brushes from a hydrogel surface: a step towards imitating articular cartilage
Joydeb MANDAL
ETH Zurich, Switzerland

15:30-15:50
Coffee Break

Room 305C
Track4: Biotribology & Biomimetics
Biomaterials II
Chair: Ming ZHOU, *State Key Laboratory of Tribology, China*

15:50-16:15 **Invited**
Induction of long-lived room-temperature phosphorescence of N -doped grapheme quantum dots by water in hydrogen bonded matrices
Ming ZHOU, Qijun LI
State Key Laboratory of Tribology, Tsinghua University, China

16:15-16:35
Mathematical interpretation of ""cross-shear"" wear for UHMWPE
Aiguo WANG[1], Shirong GE[2]
[1]Trauson Medical Instrument (China) Company, China; [2]China University of Mining & Technology, China

16:35-16:55
AFM study of Nanomechanics of liposomes on titanium alloy
Yiqin DUAN, Yuhong LIU, Hongyu SHI, Jian SONG, Shizhu WEN
State Key Laboratory of Tribology, China

16:55-17:15
Lubrication by polymer brushes and friction control
Feng ZHOU
Lanzhou Institute of Chemical Physics, China

17:15-17:35
Cartilaginous tissue formation by cultured chondrocytes under traction loading
Yoshinori SAWAE, Keisuke FUKUDA, Yoshifumi SHIGYO, Hideaki ARIURA, Takehiro MORITA, Tetsuo YAMAGUCHI
Kyushu University, Japan

17:35-17:55
Temperature measurement during drilling of acrylic composite materials for development of bone biomodels
Yuta MURAMOTO[1], Vincent FRIDRICI[2], Philippe KAPSA[2], Gaëtan BOUVARD[2], Makoto OHTA[3]
[1]Graduate School of Biomedical Engineering, Tohoku University, Japan; [2]Laboratoire de Tribologie et Dynamique des Systèmes UMR CNRS 5513 ECL-ENISE, Ecole Centrale de Lyon – Université de Lyon, Frence; [3]Institute of Fluid Science, Tohoku University, Japan

17:55-18:15
Frictional behaviors of wound dressings
Xiangqiong ZENG[1], Lin LIN[2], Jiusheng LI[2]
[1]Advanced Lubricating Materials Laboratory, Shanghai Advanced Research Institute, Chinese Academy of Sciences, China; [2]Shanghai Advanced Research Institute, Chinese Academy of Sciences, China

Room 305E
Track6: Engine and Transmission Tribology
Gears I
Chair: Thomas LOHNER, *Technical University of Munich, Germany*

8:30-8:50
Effect of running-in-load and speed-on surface characteristics of honed gears
Dinesh MALLIPEDDI, Mats NORELL, Mario SOSA, Lars NYBORG
Chalmers University of Technology, Sweden

8:50-9:10
Micropitting damage in gear teeth contacts: influencing factors and mechanisms of their action
Amir KADIRIC[1], Pawel RYCERZ[1], Guillermo MORALES[2]
[1]Imperial College London, UK; [2]SKF Engineering and Research Centre, Netherlands

9:10-9:30
In-situ testing of wear and fatigue on gear segments
Florian GRÜN[1], Tobias KOBLMILLER[1], István GÓDOR[1], Werner SCHADLER[2]
[1]Montanuniversität Leoben, Austria; [2]MAHLE Filtersysteme Austria, Austria

9:30-9:50
The tribology of PEEK gear contact simulated using the TE 77 EP - gear dynamic contact
Zainab SHUKUR, K. D DEARN, S. N KUKUREKA
University of Birmingham, UK

9:50-10:10
At the 'PEEK' of gear performance: the evolution of the wear of PEEK and PMC gears at high temperatures
Karl DEARN, S KONO, A B CROPPER
University of Birmingham, UK

10:10-10:30
Coffee Break

Room 305E
Track6: Engine and Transmission Tribology
Gears II
Chair: Karsten Stahl, *Technical Univ. of Munich, Germany*

10:30-10:50
TEHL simulation on the influence of lubricants on the frictional losses of DLC coated gears
Andreas ZIEGLTRUM, Thomas LOHNER, Karsten STAHL
Technical University of Munich, Germany

10:50-11:10
Numerical modeling and validation of oil distribution and churning losses in gearboxes
Hua LIU, Thomas JURKSCHAT, Thomas LOHNER, Karsten STAHL
Technical University of Munich, Germany

11:10-11:30
A test procedure to investigate lubricant-surface combination for high performance racing transmissions
Edward HUMPHREY, Nick MORRIS, Ramin RAHMANI, Homer RAHNEJAT
Loughborough University, UK

11:30-11:50
Thermal modelling of mixed non-newtonian thermo-elastohydrodynamics contact in dry sump lubrication system
Ehsan FATOUREHCHI, Mahdi MOHAMMADPOUR, Ramin RAHMANI, Stephanos THEODOSSIADES, Homer RAHNEJAT
Loughborough University, UK

11:50-12:10
Non-newtonian thermal elastohydrodynamic lubrication in point contact for modified double helical gears
Lijun PAN[1], Changjiang ZHOU[1,2], Xu HAN[1]
[1]Hunan University, China; [2]Central South University, China

12:10-12:30
Tangential and normal oil film stiffness and damping for modified spur gears in non-newtonian transient thermal elastohydrodynamic lubrication
Zeliang XIAO[1], Changjiang ZHOU[1,2], Siyu CHEN[2]
[1]Hunan University, China; [2]Central South University, China

12:30-13:30
Lunch

Room 305E
Track6: Engine and Transmission Tribology
Gears III
Chair: Marian SZCZEREK, *National Research Institute, Poland*

13:30-13:50
Friction, wear and lubrication of coated spiral bevel gears
Remigiusz MICHALCZEWSKI, Marek KALBARCZYK, Waldemar TUSZYNSKI, Anita MANKOWSKA-SNOPCZNSKA, Edyta OSUCH-SLOMKA, Marian SZCZEREK, Elzbieta ROGOS
National Research Institute (ITeE-PIB), Poland

13:50-14:10
Friction reduction in gearboxes by plastic deformation (PD) additives
Thomas LOHNER, Karsten STAHL
Technical University of Munich, Germany

14:10-14:30
The dynamic performance analysis of gear train with one way meshing sliding
Heyun BAO, Rupeng ZHU, Fengxia LU, Guanghu JIN
Nanjing University of Aeronautics and Astronautics, China

14:30-14:50
Influence of textured teeth faces on the vibration behavior of meshed spur gears
N. GUPTA, N. TANDON, R. K. PANDEY
Indian Institute of Technology Delhi, India

14:50-15:10
Investigation of power loss and contact conditions of a DLC coated helical gear pair considering limiting shear stress behavior of the lubricant
Ronny BEILICKE, Lars BOBACH, Dirk BARTEL
Otto von Guericke University Magdeburg, Germany

15:10-15:30
Lubricated tooth contact analysis of hypoid gears
Gajarajan SIVAYOGAN[1], Mahdi MOHAMMADPOUR[1], Ramin RAHMANI[1], Homer RAHNEJAT[1], Guenter OFFNER[2], Martin SOPOUCH[2]
[1]University of Loughborough, UK; [2]AVL List GmbH, Austria

15:30-15:50
Coffee Break

Room 305E
Track6: Engine and Transmission Tribology
Gears IV
Chair: Zainab SHUKUR, *University of Birmingham, UK*

15:50-16:10
Influence of lubricant on shift performance of manual transmissions
Dmitriy SHAKHVOROSTOV, Anatolij SMIRNOV, Christoph WINCIERZ
Evonik Resource Efficiency GmbH, Germany

16:10-16:30
On friction-drive model of metal belt continuously variable transmission under slip control situation
Yuanqiang TAN, Shiping YANG, Jingang LIU, Xiaoru ZHANG
Huaqiao University, China

16:30-16:50
Efficiency optimization and investigation of the lubricant distribution in a high-speed gearbox as part of the speed2E project
Alexander FRIEDL
University of Hanover, Germany

16:50-17:10
Gear durability performance derived from anti-wear additives applied to continuously variable transmission fluids
Keiichi NARITA
Idemitsu Kosan Co., Ltd., Japan

17:10-17:30
The selection of thin coatings and gear oils to improve the durability of planetary gears in mining conveyors
Marian SZCZEREK[1], Remigiusz MICHALCZEWSKI[1], Witold PIEKOSZEWSKI[1], Andrzej WIECZOREK[1,2], Jan WULCZYNSKI[1]
[1]National Research Institute, Poland; [2]Silesian University of Technology, Poland"

17:30-17:50
Design optimization research on double helical gear of high efficiency
Fengxia LU, Weiping LIU, Rupeng ZHU, Heyun BAO, Guanghu JIN
Nanjing University of Aeronautics and Astronautics, China

17:50-18:10
Effective stiffness of an assembled shaft with a regularized coulomb law
Jean-louis LIGIER, Mathieu BENOIT
HEIG-VD, Switzerland

Room 307
Track6: Engine and Transmission Tribology
Tribology Materials II
Chair: Guoxin XIE, *Tsinghua University, China*

8:30-9:00 Keynote
Insights of engine friction reduction and wear control technology and future trends for improving energy sustainability and environmental opportunity
Simon TUNG
Tung Innovation Technology Consulting, Inc, USA

9:00-9:20
Synthesis and tribological properties of spark plasma sintering NiCr-Cr_2AlC composites at elevated temperature
Yufeng LI, Xinliang LI, Hong YIN
Harbin Institute of Technology Shenzhen Graduate School, China

9:20-9:40
Thermal response of M50 steel tribopairs in sliding-rolling contacts under mixture lubrication
Kun SHU, Le GU, Chuanwei ZHANG
Harbin Institute of Technology, China

9:40-10:00
Fetting fatigue crack formation in Ni-base single-crystal superalloys: in-situ SEM experiment and crystal plasticity analysis
Qinan HAN[1,2], Wenhui QIU[1], Yibo SHANG[1], Huiji SHI[1]
[1]Tsinghua University, China; [2]Aircraft Strength Research Institute of China, China

10:00-10:20
Coffee Break

Room 307
Track6: Engine and Transmission Tribology
Tribology Materials III
Chair: David ECKOLD, *University of Birmingham, United Kingdom*

10:20-10:40
Tribological behaviour of short carbon fibre reinforced PEEK under diesel lubrication
Daniel NADERMANN[1], Philipp DIETRICH[1,2], Gregor KORN[1], Huber SCHWARZE[3]
[1]Robert Bosch GmbH - Corporate Sector Research, Germany; [2]Aalen University of applied Sciences, Germany; [3]Clausthal University, Germany

10:40-11:00
Printing the spine: PEEK as a bearing material
David ECKOLD, Karl DEARN, Duncan SHEPHERD
University of Birmingham, United Kingdom

11:00-11:20
Friction of hybrid filled PEEK composites sliding against WC-Ni under water lubrication in start-up period
Gaolong ZHANG[1], Ying LIU[1], Yuechang WANG[1], Xiangfeng LIU[1], Ga ZHANG[2], Yuming WANG[1]
[1]Tsinghua University, China; [2]State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Science, China

11:20-11:40
The tribological performance of polytetrafluoroethylene and polyimide composites in adverse operating conditions
Fuzhi SONG, Zenghui YANG, Yong SUN, Qihua WANG, Tingmei WANG
Lanzhou Institute of Chemical Physics of the Chinese Academy of Sciences, China

11:40-12:00
Friction of short-cut aramid fiber reinforced elastomer: the effect of fiber orientation
M. Khafidh[1,2], D.J. Schipper[1], M.A. Masen[3], N. Vleugels[1,2], J.W.M. Noordermeer[1]
[1]University of Twente, The Netherlands; [2]Dutch Polymer Institute, The Netherlands; [3]Imperial College, United Kingdom

12:20-13:30
Lunch

Room 308
Track7: Industrial Tribo-systems
Tribology of Machine Elements
Chair: Jian LI, *Wuhan Research Institute of Materials Protection, China*

8:30-9:00 Keynote
Tribological Behavior and Thermoelastic Instability Arising in Ball-Screw -Like Specimens Operating in Dry Contacts and with Grease Lubrications
Jenfin LIN
Cheng Kung University, Taiwan, China

9:00-9:25 Invited
The research of contact force model in multibody systems with clearance joints
Wei CHEN, Fang YANG
Xi'an Jiaotong University, China

9:25-9:45
Geometrical analysis of the roller screw mechanism
Sebastian SANDU[1,2], Nans BIBOULET[1], Daniel NELIAS[1], Folly ABEVI[2]
[1]University of Lyon, France; [2]SKF Transrol, France

9:45-10:05
Research on tribological performance of surface-textured steel alloy for the retainer in EHAP
Yuan CHEN, Junhui ZHANG, Bing XU, Min HU
The State Key Laboratory of Fluid Power and Mechatronic Systems, China

10:05-10:30
Coffee Break