

PROGRAM

Wednesday 26th, October

(First day)

8:30 REGISTRATION

9:00 OPENING ADDRESS

SESSION I TRIBOCHEMISTRY OF NANO-PARTICLES AND NANO-INORGANIC FILMS

Chair: A. Rossi & F. Dassenoy

9:10-9:35

O1 Lubricating Properties of Carbon Onion in Oil, Air and Vacuum

N. Ohmae¹ (¹Kobe University, Japan)

9:35-9:55

O2 Understanding Tribochemistry of IF-MoS₂ Nanoparticles under Boundary Lubrication.

F. Dassenoy¹, I. Lahouij¹, J. Tannous¹, T. Le Mogne¹, B. Vacher¹, M. Belin¹,
J.-M. Martin¹ (¹ Ecole Centrale de Lyon, France)

< Tea Break (20 min) >

SESSION II TRIBOCHEMISTRY OF NANO-ORGANIC FILMS

Chair: H.A Spikes & M. Belin

10:15-10:40

O3 The Method for Nanorheological Studies of Ultrathin Films of Organic Materials

D. Jarzabek¹, Z. Rymuza¹ (¹Warsaw University of Technology, Poland)

10:40-11:05

O4 Stratified Polymer Brush-Gels as Lubricious Surfaces

N.D. Spencer¹, R. Bielecki¹, E. Benetti¹ and A. Li¹ (¹ETH Zurich, Switzerland)

SESSION III SURFACE ENERGY, ELECTROMAGNETISM AND TRIBOCHEMISTRY

Chair: J. M. Martin & R. Wäsche

11:05-11:30

O5 The Correlation between Surface Energy, Surface Tension and Contact Angles and Their Relevance in Wetting Behaviour of Various Engineering Surfaces and Oils

M. Kalin¹, M. Polajnar¹ (¹University of Ljubljana, Slovenia)

11:30-11:55

O6 Triboelectromagnetic Phenomena as Energy Source for Tribochemistry

K. Nakayama^{1,2} (¹Chiba Institute of Technology, Japan; ²AIST, Japan),

11:55-12:20

O7 Surface Reactivity and Tribochemistry

S. Hsu¹ (¹George Washington University, USA)

< **Lunch (80 min)** >

SESSION IV ADVANCED TRIBOMETRY

Chair: G. Stachowiak & A. Fischer

13:40-14:00

O8 A Novel Insight on Friction-induced Surface Effects, Thanks to an Original Relaxation Tribometer

M. Belin¹, C. Minfray¹, P. Nijwa¹ and J.M. Martin¹ (¹Ecole Centrale de Lyon, France)

14:00-14:20

O9 In-situ Observation of Dynamic Structural Changes of Biodiesel Fuel during Friction Motion

K. Sasaki¹, N. Inayoshi¹ (¹DENSO Corporation, Japan)

SESSION V TRIBOMATERIAL AND TRIBOCHEMISTRY

Chair: M. Kubo & T. Prevenslik

14:20-14:40

O10 Aging of Silica in Aqueous Environments

I. Szlufarska¹, Y. Liu¹ (¹University of Wisconsin, USA)

14:40-15:00

O11 Tribochemistry and Tribomaterial

D. A. Rigney¹ (¹Ohio State University, USA)

15:00-15:25

O12 Tribomaterial –Mechanically Induced Tribochemical Reactions

A. Fischer¹ (¹University of Duisburg Essen, Germany)

< **Tea Break (20 min)** >

SESSION VI ADVANCED ANTI-FRICTION AND ANTI-WEAR COATINGS AND MECHANOCHEMISTRY

Chair: N. Ohmae & S. V. Kailas

15:45-16:05

O13 Superhard Carbon Coatings for Environmentally Friendly Lubrication

M. I. De Barros Bouchet¹, M. Kano², C. Matta¹, T. Le-Mogne¹ and J. M. Martin¹
(¹ Ecole Centrale de Lyon, France; ² Kanagawa Industrial Technology Center, Japan)

16:05-16:30

O14 Nano-Structured NiP Alloys as a Possible Smart Anti-Wear Coating

A. Rossi^{1,2} (¹University of Cagliari, Italy; ² ETH, Switzerland)

16:30-16:50

O15 The Mechanochemistry of Wear in Diamond

M. Moseler^{1,2} (¹Fraunhofer Institute for Mechanics of Materials IWM, Germany;
²University of Freiburg, Germany)

18:30-20:30 <**WELCOMING RECEPTION (Tamokuteki Room)**>

Thursday 27th, October

(Second day)

SESSION VII TRIBOCHEMISTRY OF BOUNDARY FILM

Chair: S. Hsu. & Y. Momose

8:30-8:55

O16 Multianalysis of Additive Adsorbed Layer on Metal Surface

T. Hirayama¹, N. D. Spencer² and A. Rossi^{2,3} (¹ Doshisha University, Japan;
²ETH Zürich, Switzerland, ³University of Cagliari, Italy)

8:55-9:20

O17 Mechanism of Action of Organic Friction Modifiers

S. Campen¹, J. H Green², G.D. Lamb² and H.A Spikes¹ (¹Imperial College, UK;
²Castrol Limited, UK)

SESSION VIII TRIBOCHEMISTRY OF GREASES AND LUBRICANTS

Chair: N.D. Spencer & M. I. De Barros Bouchet

9:20-9:40

O18 Mechanism of Lubricating Performance of Diurea Grease under EHL Contact

Toshiaki Endo (Kyodo Yushi.Co.,Ltd)

9:40-10:05

O19 Tribochemistry with Boron-based Lubricants and Lubrication Additives

A. Erdemir¹ (¹Argonne National Laboratory, USA)

< **Tea Break (20 min)** >

SESSION IX TRIBOLUMINESCENCE AND TRIBOELECTRICITY

Chair: M. Kaneta & V. Raman

10:25-10:50

**O20 Effect of Humidity on Triboluminescence and
Triboelectrification of Some Polymers**

K. Hiratsuka¹ and K. Hosotani¹ (¹Chiba Institute of Technology, Japan)

10:50-11:10

O21 Towards the Simulation of Triboelectricity

M.H. Müser¹ (¹Saarland University, Germany)

< **Lunch** (100 min) >

SESSION X MOLECULAR DYNAMICS APPROACH FOR TRIBOCHEMISTRY

Chair: W. T. Tysoe & P. H. Kasai

12:50-13:10

O22 Validity of Heat Transfer by Molecular Dynamics

T. Prevenslik¹ (¹QED radiations, Hong Kong, China)

13:10-13:35

O23 Anti-wear Chemistry of ZDDP by Computer Simulation

J. M. Martin¹, T. Onodera², C. Minfray¹, F. Dassenoy¹, H. Takaba², M. Kubo², A. Miyamoto² (¹Ecole Centrale de Lyon, France; ²Tohoku University, Japan)

13:35-14:00

**O24 Quantum Chemical Molecular Dynamics Approach for
Tribocchemistry**

A. Miyamoto¹, T. Onodera¹, S. Loehle^{1,2}, R. Nagumo¹, R. Miura¹, A. Suzuki¹, H. Tsuboi¹, N. Hatakeyama¹, A. Endou¹, H. Takaba¹ (¹Tohoku University, Japan; ²Ecole Centrale de Lyon, France)

14:00 - 16:00

POSTER SESSION
(120 min)

Poster size on board: 130 cm wide ×170 cm high

SESSION XI TRIBOCHEMISTRY IN EHL CONTACTS AND BALL BEARINGS

Chair : A. Miyamoto & K. Sasaki

16:00-16:25

O25 Direct Observations of Electrical Pitting

K. Sunahara¹ and M. Kaneta² (¹Yaskawa Electric Co., Japan; ² Kyusyu Kyoritsu University, Japan.)

16:25-16:50

O26 Tribochemical Behavior in Cryogenic High-Speed Ball Bearings of Rocket Turbopumps

M. Nosaka¹ (¹University of Tokyo, Japan)

17:00-17:45

<**SOCIAL TOUR FOR A VOLCANO** (Mt. KASA)>

Hotel (17:00) → Volcano (17:15) → Sunset (17:26) → Hotel (17:45)

19:00-21:00

<**BANQUET** (Room: Kaiyu-no-Ma)>

Friday 28th, October

(Third day)

SESSION XII TRIBOCHEMISTRY OF HEAD DISK INTERFACE

Chair: A. Erdemir & K. Hiratsuka

8:30-8:50

O27 Counteracting Tribochemistry at the Head and Disk Interface

V. Raman¹ (¹Hitachi Global Storage Technologies, USA)

8:50-9:15

O28 Disk Lubricant and Carbon Overcoat

P. H. Kasai¹ and T. Shimizu¹ (¹MORESCO Corp., Japan)

SESSION XIII TRIBO-CORROSION AND TRIBO-OXIDATION

Chair: M. Kalin & Z. Rymuza

9:15-9:35

O29 Controlled Study of the Role on Tribo-Oxidation in Wear of Titanium using a High-Temperature Vacuum-based Pin-on-Disc Machine

N. Chelliah¹ and S. V. Kailas¹ (¹Indian Institute of Science, Bangalore, India)

9:35-9:55

O30 Oxidative Wear in Gross Slip Fretting of Thin Steel Wires

A.Cruzado¹, M.Hartelt², R.Wäsche², M.A.Urchequi³ and X.Gómez¹

(¹Mondragon Goi Eskola Politeknikoa, Spain; ²BAM (Federal institute for Materials Research and Testing), Germany; ³ORONA eic, Spain)

9:55-10:20

O31 Tribocorrosion Characteristics of Solid WC-Ni Matrix Claddings

G.B. Stachowiak¹, M. Salasi¹ and G.W. Stachowiak¹ (¹University of Western Australia, Australia)

< **Tea Break** (20min) >

SESSION XIV TRIBOCHEMISTRY IN VACUUM

Chair: R. Crockett & M. Nosaka

10:40-11:05

O32 Tribological Surface Chemistry of Model Lubricant Additive Measured in Ultrahigh Vacuum

W. T. Tysoe¹, O. Furlong¹ and B. Miller¹ (¹ University of Wisconsin-Milwaukee, USA)

11:05-11:30

O33 Effect of Temperature on Tribochemical Adsorption of Benzene on Nascent Steel Surface

N. Shimotomai¹, H. Nanao² and S. Mori² (¹Kyodoyushi Co. Ltd., Japan; ²Iwate University, Japan)

11:30 **CLOSING REMARKS**

< **Lunch** (95 min) >

13:15-16:15 <**SOCIAL TOUR** (Hagi Castle Town)>

Hotel Hagikomachi (13:15) → Castle Town → Hotel Hagikomachi (16:15)

16:30 **Microbuses leave for Shin-Yamaguchi Station**

POSTER SESSION

<14:00-16:00, Thursday 27th, October>

P1 TSEE Phenomena from Defects in Insulators Formed by Scratching and Electron Bombardment

A.Gatsenko¹ and K. Nakayama^{2,3} (¹ Kagoshima University, Japan; ²Chiba Institute of Technology, Japan; ³AIST, Japan)

P2 Tight-binding Quantum Chemical Molecular Dynamics Study for Tribo-chemical Reaction Dynamics of DLC

K. Hayashi¹, K. Kato¹, N. Ozawa¹, T. Shimazaki¹, M.I.de B. Bouchet², K. Adachi³, J.-M. Martin² and M. Kubo¹ (^{1,3}Tohoku University, Japan; ²Ecole Centrale de Lyon, France)

P3 Microplasma Generation and Effect of Plasma Action on Chemical Change and Lubricating Characteristics of Oils.

R. Ichimura¹, T. Moriuchi¹ and K. Nakayama^{2,3} (¹Kyodoyushi Co. Ltd, Japan; ²Chiba Institute of Technology, Japan; AIST, Japan)

P4 A Study of Chemical Mechanical Polishing Process of Glass Surface using CeO₂ Particle via Computational Simulations

M. Ishikawa¹, N. Ozawa¹, T. Shimazaki¹ and M. Kubo¹ (¹Tohoku University, Japan)

P5 Theoretical Study on Super-low Friction Mechanism of Carbon Nitride Coatings by Tight-binding Quantum Chemical Molecular Dynamics Method

K. Kato¹, K. Hayashi¹, N. Ozawa¹, T. Shimazaki¹, K. Adachi² and M. Kubo¹ (^{1,2}Tohoku University, Japan)

P6 Analyses of the Adsorption Structures of Friction Modifiers by means of Quantitative Structure-Property Relationship Method and Sum Frequency Generation Spectroscopy

H. Koshima¹ and S. Ye² (¹ Idemitsu Kosan Co. Ltd., Japan; ²Hokkaido University, Japan)

P7 Tribochemistry of C18 Fatty Acids on Fe-based surfaces. Coupling Experimental work and Computational Chemistry.

S. Loehle^{1,2,3}, T. Onodera¹, K. Inaba¹, Y. Obara¹, Y. Sato¹, R. Nagumo¹, R. Miura¹, A. Suzuki¹, H. Tsuboi¹, N. Hatakeyama¹, A. Endou¹, H. Takaba¹, C. Matta^{2,3}, C. Minfray², J.-M. Martin², R. Iovine³, C. Pizard³ and A. Miyamoto¹ (¹Tohoku University, Japan; ²Ecole Centrale de Lyon, France; ³TOTAL, France)

P8 Observation of Thermally Assisted Photoemission from Carbon Nanotubes

Y. Momose¹, M. Kudou¹, T. Sakurai², M. Yanagisawa³ and K. Nakayama^{4,5} (¹Ibaraki University, Japan; ²Ashikaga Institute of Technology, Japan; ³Waseda University, Japan; ⁴ Chiba Institute of Technology, Japan; ⁵ AIST, Japan)

P9 Tribological Properties of PTFE Retainer in Ball Bearing for Liquid Rocket Engine

H. Morishita¹, K. Takahashi¹, T. Hirayama¹, T. Matsuoka¹, S. Takada², T. Takano², M. Yoshida² and H. Maeda³ (¹Doshisha University, Japan; ²JAXA, Japan; ³Ryukoku University, Japan)

P10 Tribochemistry of C₆₀ Fullerene and Its Derivatives: Computational Chemistry and Experimental Investigations

T. Onodera¹, R. Nagumo¹, R. Miura¹, A. Suzuki¹, H. Tsuboi¹, N. Hatakeyama¹, A. Endou¹, H. Takaba¹, M. Kubo¹, J.-M. Martin² and A. Miyamoto¹ (¹Tohoku University, Japan; ²Ecole Centrale de Lyon, France)

P11 Engine Lubrication by UV Radiation

T. Prevenslik¹ (¹QED radiations, Hong Kong, China)

P12 Surface Chemistry of Glassy Polyphosphates Investigated by ToF-SIMS

A. Rossi^{1, 2} M. Crobu² and N.D. Spencer² (University of Cagliari, Italy; ²ETH, Switzerland)

P13 Triboluminescence from the Rubbing between Metal and Polymer

S. Sato¹, T. Tsutsumi¹ and K. Hiratsuka¹ (¹Chiba Institute of Technology, Japan)

P14 Boundary Lubrication Properties of Nanoperiod Multilayer Films Composed of Carbon and Gold Layers

T. Shindo¹, S. Miyake¹, Y. Saito¹ and M. Komiya¹ (¹Nippon Institute of Technology, Japan)

P15 Effect of Acid Additive Adsorption under Mixed-Lubricated Condition

Y. Tanaka¹, T. Hirayama¹ and T. Matsuoka¹ (¹Doshisha University, Japan)

P16 Graphene Formation during Bending of Basal Planes of Graphite by Tribo-action of Atomic Force Microscopy

T. Tsubota¹, S. Miyake¹, S. Kawasaki¹ and Y. Ozawa¹ (¹Nippon Institute of Technology, Japan)

P17 Activation Energy in Tribocatalytic Oxidation of Ethylene

T. Tsutsumi¹, K. Hiratsuka¹, K. Ohta¹ and C. Kajdas² (¹Chiba Institute of Technology, Japan; ²Warsaw University of Technology, Poland)

P18 Tribological Properties of Si-Doped and Ti-doped DLC/DLC Slidings

Y. Yamaguchi¹, Y. Harada¹, T. Hirayama¹, T. Matsuoka¹ and M. Asano² (¹Doshisha University, Japan; ²Nara Prefectural Institute of Industrial Technology, Japan)

P19 Effects of Sliding Speed and Load on Friction and Antiwear Properties of BiDTC in Presence of ZnDTP under Sliding Condition

K. Akazawa¹, H. Iwamatsu¹, M. Mitsuoka¹ and H. Komiya¹ (¹Nippon Grease Co. Ltd., Japan)

P20 Effect of High Pressure on Molecular Interaction of Lubricant Oil at EHL Contact

K. Takiwatari¹, H. Nanao¹ and S. Mori¹ (¹Iwate University, Japan)