# PROGRAM

# September 2, 2009 (Wed)

8:30 **REGISTRATION**

9:00 **OPENING ADRESS**

SESSION I DANGLING BOND AND SCALING OF TRIBOCHEMISTRY

*Chair: W. Tysoe, Cochair: T. Hirayama*

9:10-9:35

O1 **Role of Dangling Bonds on Friction of Graphitic Materials**

N. Ohmae, S. Miyatake and N. Matsumoto (Kobe University, Japan)

9:35-10:00

O2 **Scaling Issues in Tribochemistry**

S. M. Hsu (George Washington University, USA)

< **BREAK** (15 min) >

SESSION II TRIBOELECTROMAGNETISM AND QUANTUM TRIBOCHEMISTRY

*Chair: M. Belin, Cochair: K.T. Miklozic*

10:15–10:40

O3 **Triboplasma as a Cause for Tribochemical Reactions**

K. Nakayama[1,2] ([1]Chiba Institute of Technology, Japan; [2]National Institute of Advanced Industrial Science and Technology (AIST), Japan)

10:40-11:05

O4 **Tribochemistry by Quantum Mechanics**

T. Prevenslik (Consultant, Hong Kong, China)

SESSION III NEW ADVANCED ANALYTICAL TOOLS

*Chair:A. Eldemir, Cochair: M. Kalin*

11:05-11:30

O5 **Structural Analysis of Solid-Liquid Interface Using Neutron Reflectometry**

T. Hirayama[1], T. Torii[1], T. Matsuoka[1], K. Inoue[2], M. Hino[3], N. Torikai[4], D. Yamazaki[5] ([1]Doshisha University, Japan; [2]Waseda University, Japan; [3]Kyoto University, Japan; [4]KEK, Japan; [5] Atomic Energy Agency, Japan)

11:30-11:55

O6 **Compositional Nanoanalysis of Thin Films**

A. Rossi[1,2] ([1]Università degli Studi di Cagliari, Italy; [2]ETH Zurich, Switzerland)

< **LUNCH** (65 min) >

SESSION IV TRIBOCHEMISTRY OF DOPED-DLC -EXPERIMENT AND THEORY

*Chair: P. Kasai, Cochair: K. Hiratsuka*

13:00-13:25

O7 **Tribochemical Behaviour of 1-Adamantanethiol in a-C:H:W/Steel Contact under Scuffing Conditions**

M. Vlad[1], C. Kajdas[2], A. Tomala[3], E. Osuch-Slomka[1], R. Michalczewski[1] ([1]Institute for Sustainable Technologies National Research Institute, Poland; [2]Institute for Fuels & Renewable Energy and Warsaw University of Technology, Poland; [3]Vienna University of Technology, Austria)

13:25-13:50

O8 **Effects of Structure, Doping, & Environment on the Tribochemistry of DLC**

J. A. Harrison (United States Naval Academy, USA)

13:50-14:15

O9 **Can Molecular Waters on Hydrophilic Surfaces Act as a Boundary Film?**

H. Washizu[1], S. Kajita[1], S. Hyodo[1], T. Ohmori[1], H. Teranishi[2] and A. Suzuki[2] ([1]Toyota Central R&D Labs. Inc., Japan; [2]Toyota Motor Corp., Japan)

SESSION V SUPERLUBRICITY MECHANISM OF DLC FILM AND $C_{60}$
–EXPERIMENT AND THEORY-
*Chair: N. Ohmae, Cochair: M.I. De Barros*

14:15-14:40

O10 **On the Origins of Superlubricity and Tribochemistry in DLC Films: An Imaging TOF-SIMS Study**

A. Erdemir and O. Eryilmaz (Argonne National Laboratory, USA)

14:40-15:05

O11 **Mechanism of Superlubricity of Fullerene Molecular Bearings**

N. Sasaki (Seikei University, Japan)

< **TEA BREAK** (30 min) >

SESSION VI TRIBOCHEMISTRY IN MAGNETIC RECORDING SYSTEM
*Chair: A. Rossi, Cochair: K. Nakayama*

15:35-16:00

O12 **TOF-SIMS: Analysis of UV-Curing Process of Disk Lubricant**

P. H. Kasai and A. Wakabayashi (MORESCO, Japan)

16:00-16:25

O13 **Lubricant Transfer in Magnetic Recording Head-Disk Interfaces**

V. Raman, X. Guo and T. Nguyen (Hitachi Global Storage Technologies, USA)

SESSION VII MECHANISM OF TRIBO-OXIDATION
*Chair: V. Roman, Cochair:T.G. Mathia*

16:25-16:50

O14 **Surface Chemistry at the Tribological Interface**

W. T. Tysoe, O. Furlong and Z. Li (University of Wisconsin-Milwaukee, USA)

16:50-17:15

O15 **Analysis of Oxidative Processes in SiC-TiC-$TiB_2$ Ceramic Composites during Tribological Loading**

R. Waesche and M. Woydt (Federal Institute for Materials Research and Testing (BAM), Germany)

17:30-19:30 **WELCOMING RECEPTION** (Restaurant Hamac de Paradis in Kanbaikan 1F)

# September 3, 2009 (Thu)

SESSION VIII *In-situ* OBSERVATION OF DYNAMIC STRUCTURE CHANGE

*Chair:H.A. Spikes, Cochair: N. Suzuki*

8:30-8:55

O16 ***In situ* Attenuated Total Reflection (ATR) Tribometry of Environmentally Friendly Antiwear Additives**

F. Mangolini[1], A. Rossi[1,2] and N. D. Spencer[1] ([1]ETH Zurich, Switzerland; [2]Università degli Studi di Cagliari, Italy)

8:55-9:20

O17 ***In-situ* Observation of Dynamic Structural Changes of Lubricant Molecules on the Metal Friction Surface**

K. Sasaki[1], N. Inayoshi[1] and K. Tashiro[2] ([1]DENSO Corporation, Japan; [2]Toyota Technological Institute, Japan)

SESSION IX NASCENT SURFACE AND CATALYTIC ACTION

*Chair: C. Kajdas, Cochair: C. Minfray*

9:20-9:45

O18 **Nascent Surfaces as an Active Source for Tribochemical Reactions**

S. Mori, R. Lu, H. Nanao and T. Kubo (Iwate University, Japan)

9:45-10:10

O19 **Tribocatalytic Methane Oxidation on Palladium**

K. Hiratsuka[1], T. Abe[1] and C. Kajdas[2,3] ([1]Chiba Institute of Technology, Japan; [2]Warsaw University of Technology, Poland; [3]Institute for Fuels and Renewable Energy, Poland)

< **BREAK** (15 min) >

SESSION X MECHANISM OF TRIBOELECTROCHEMISTRY AND WATER LUBRICATION

*Chair: S.M. Hsu, Cochair: M. Yanagisawa*

10:25-10:50

O20 **Surface Charge Effects in Boundary Lubrication of Ceramics with Water**

M. Kalin[1], S. Novak[2] and J. Vižintin[1] ([1]University of Ljubljana, [2]Jožef Stefan Institute, Slovenia)

10:50-11:15

O21 **Brush-Forming Additives for Enhanced Boundary Lubrication**

N. D. Spencer, S. Lee, C. Perrino, P. Nalam, and J. Clasohm (ETH Zurich, Switzerland)

11:15-11:40

O22 **How do Cations in Solutions Affect the Friction and Wear of $SiO_2$ Surfaces?**

Vakarelski, N. Teramoto, C. McNamee and K. Higashitani (Kyoto University, Japan)

< **LUNCH** (70 min) >

SESSION XI TRIBOCHEMICAL REACTIONS -EXPERIMENT AND THEORY-

*Chair: A. Miyamoto, Cochair: F. Dassenoy*

12:50-13:15

O23 **On the Tribochemistry of Engine Soot**

S. Antusch[1], M. Dienwiebel[2], P. Albers[3], U. Spicher[1] and M. Scherge[2] ([1]University of Karlsruhe, Germany; [2]Fraunhofer Insitute for Mechanics of Materials, Germany; [3]AQura GmbH, Germany)

13:15-13:40

O24 **Evidence of Titanium Tribochemical Reaction with Nitrogen**

C. Mary[1,2], T. Le Mogne[1], J.-M. Martin[1], S. Fouvry[1] ([1]Ecole Centrale Lyon, France; [2]SNECMA, France)

13:40-14:05

O25 **Semi Empirical Prediction of the Lubricity of Fuels, Using COSMO-RS**

A. Fatemi[1], K. Masuch [2], A. Wohlers[1], H. Murrenhoff[1], K. Leonhard[2]

([1]RWTH-Aachen University, Germany; [2]RWTH-Aachen University, Germany)

14:05-16:05 **POSTER SESSION** (120 min)

SESSION XII NEW ADVANCED MEASUREMENT TOOLS

*Chair: J.M. Martin, Cochair: Y. Momose*

16:05-16:30

O26 **Resonance Shear Measurement Employing SFA for Nano-Tribology**

K. Kurihara (Tohoku University, Japan)

16:30-16:55

O27 **Comparison of a 2-Dimensional Wear Scar Measurement and a 3-Dimensional Profilometer Measurement of the Same Wear Scar in a Point Contact**

E. S. Yamaguchi, S. Li, and K. S. Ng (Chevron Oronite Company LLC, USA)

16:55-17:20

O28 **Study of Organic Friction Modifiers Using Fluid Cell, Tapping Mode Atomic Force Microscopy**

S. Campen[1], J. Green[2], G. Lamb[2] and H. Spikes[1] ([1]Imperial College, UK; [2]Castrol Ltd, UK)

18:20-20:30

**BANQUET** (L'hotel de Hiei in Mt. Hiei)

Buses will start at **17:30** from the Kanbaikan and will arrive at L'hotel de Hiei about 18:10. After the banquet the buses also take the participants from the banquet place to their hotels or stations.

# September 4, 2009 (Fri)

SESSION XIII ADDITIVE TRIBOCHEMISTRY (I) -EXPERIMENT AND THEORY-

*Chair: E.S. Yamaguchi, Cochair: M. Kubo*

8:55-9:20

O29 **Experimental Simulation of the Additives Tribochemical Reactions in Boundary Lubrication Regime by Gas Phase Lubrication**

M.I. De Barros Bouchet[1], D. Philippon[2], T. Le-Mogne[1], O. Lerasle[3] and J.M. Martin[1] ([1]Ecole Centrale de Lyon, France; [2]Instituto de Ciencia de Materiales de Sevilla, Spain; [3]TOTAL, Solaize Research Center, France)

9:20-9:45

O30 **Film Forming Properties of Combined Zinc-Dialkyl-Dithiophosphate and Overbased Calcium Sulphonate Lubricant Additive Systems**

K. T. Miklozic[1], H. A. Spikes[2] and T. R. Forbus[3] ([1] Powertrib Ltd, UK, [2]Imperial College London, UK, [3]The Valvoline Company, USA)

9:45-10:10

O31 **Pressure-Induced Amorphisation of Zinc Orthophosphate – Effect of the Zinc Coordination**

F. Dassenoy[1], M. Gauvin[1], M. Belin[1], C. Minfray[1], J.M. Martin[1], G. Montagnac[2], B. Reynard[2] and G. Aquilanti[3] ([1]LTDS/ECL, France; [2]LST/ENS, France; [3]ESRF BP, France)

< BREAK (15min) >

SESSION XIV ADDITIVE TRIBOCHEMISTRY (II) -EXPERIMENT AND THEORY-

*Chair: N.D. Spencer, Cochair: K.Kurihara*

10:25-10:50

O32 **The Role of Machining and Topography Cycling Micro-Sliding under Non-Lubricated and Boundary Lubricated Regime**

K.J. Kubiak[1,2], T.G. Mathia[2] ([1]University of Leeds, England; [2]Ecole Centrale de Lyon, Ecully, France)

10:50-11:15

O33 **Chemical Origin of Smart Material Behavior in Zinc-Based Anti-Wear Additives**

M. H. Müser[1], D. Shakhvorostov[1,2], N. J. Mosey[3] and P. R. Norton[2] ([1]University of Western Ontario, Canada,; [2]University of Western Ontario, Canada; [3]Queen's University, Canada)

11:15-11:40

O34 **Experiment Integrated Multi-Level Computational Chemistry for Tribology**

A. Miyamoto[1], T. Onodera[1], Y. Morita[1], T. Kuriaki[1], A. Suzuki[1], R. Sahnoun[1], M. Koyama[2], H. Tsuboi[1], N. Hatakeyama[1], A. Endou[1], H. Takaba[1], C. A. D. Carpio[3], M. Kubo[1] ([1]Tohoku University, Japan; [2]Kyushu University, Japan)

11:40 **CLOSING REMARKS**

11:55 **MEMORIAL PICTURE**

13:30/14:00

**SOCIAL TOUR (Kyoto Imperial Palace)**

13:30: **Japanese** guide group starts at the entrance of Hotel Garden palace

14:00: **English** guide group starts at the entrance of Hotel Garden palace

(Please note that Application is required to take part in the social tour in the groups to the forum secretariat, since permission is necessary in advance by the Household Agency of Palace to enter the palace. In detail, please see the page of the Social Tour in the website)

# POSTER SESSION

**< 14:05-16:05 September 3, 2009 (Thu)>**

P1 **Wear and Microstructural Studies of Hypo Eutectic Al-Si/Graphite Particulate Reinforced Composites Prepared by Stir Casting**

G. Rajaram, S. Kumaran, T. Srinivasa Rao (National Institute of Technology, India)

P2 **Study on Processing Parameters of Laser Strengthening on Farm Tools Steel Surface**

C. zhuojun[1,2], Z. Zuli[2] ([1]Shenyang Agricultural University, China; [2]Shenyang Ligong University, China)

P3 **Thermionic Emission from Metal Surface Being Irradiated by UV light**

T. Sakurai[1], Y. Momose[2] and K. Nakayama[3,4] ([1]Ashikaga Institute of Technology, Japan; [2]Ibaraki University, Japan; [3]Chiba Institute of Technology, Japan; [4] National Institute of Advanced Industrial Science and Technology Japan (AIST), Japan)

P4 **Temperature Dependence of Photoemission from Iron Surfaces**

Y. Momose[1], D. Suzuki[1], T. Sakurai[2] and K. Nakayama[3,4] ([1]Ibaraki University, Japan; [2]Ashikaga Institute of Technology, Japan; [3]Chiba Institute of Technology, Japan; [4]National Institute of Advanced Industrial Science and Technology (AIST), Japan)

P5 **Zinc and Iron Bulk Polyphosphate Glasses: Tribological Behaviour**

M. Crobu[1], A. Rossi[1,2] and N. D. Spencer[1] ([1]ETH Zurich, Switzerland; [2]Università degli Studi di Cagliari, Italy)

P6 **Computational Chemistry Study on Mechanism of Superlubricity of Molybdenum Disulfide**

Y. Morita[1], T. Kuriaki[1], T. Onodera[1], A. Suzuki[1], M. Koyama[2], H. Tsuboi[1], N. Hatakeyama[1], A. Endou[1], H. Takaba[2],C. A. Del Carpio[1], M. Kubo[1], A. Miyamoto[1] ([1]Tohoku University, Japan; [2]Kyushu University, Japan)