

*Program*

***Advances in Boundary Lubrication  
and Boundary Surface Films***

**March 29 - April 3, 2009  
Seville, Spain**

**Conference Chair**

**Prof. Mitjan Kalin**  
University of Ljubljana, Slovenia

**Conference Co-chairs**

**Prof. Stephen Hsu**  
George Washington University, USA.

**Prof. Hugh Spikes**  
Imperial College London, UK.

**Prof. Nicholas D. Spencer**  
ETH Zürich, Switzerland

**Prof. Felipe Gutierrez Mora**  
University of Seville, Spain



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**Sunday, March 29, 2009**

17:00 – 18:00	Registration (Pabellón de Méjico)
18:00 – 20:00	Reception (Pabellón de Méjico)

***NOTES***

- All Technical sessions will be held at the Pabellón de Méjico in the conference room.
- Posters may be hung in the hall.
- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- Be sure to make any corrections to your name/contact information on the Master Participant List or confirm that the listing is correct. A corrected copy will be sent to all participants after the conference.

## **Monday, March 30, 2009**

*Session chair:* N. Spencer

09:00 - 09:20 **Conference opening**

09:20 - 10:00 Tribochemistry in boundary lubrication of materials  
S. M. Hsu (George Washington University, USA) - *Invited*

10:00 - 10:40 On the effort to discriminate the principal function of tribofilm on friction under the boundary lubrication condition  
M. Masuko (Tokyo Institute of Technology, Japan) - *Invited*

10:40 - 11:00 Experimental simulation of the organo - sulfur additives tribochemistry under boundary lubrication regime by gas phase lubrication  
M. De Barros Bouchet (Ecole Centrale de Lyon, France)

11:00 - 11:20 Chemical and tribological characterization of different chain length zinc polyphosphate glasses: an XPS study  
M. Crobu (ETH Zurich, Switzerland)

*Session chair:* J. Harrison

11:20 - 11:50 Coffee break

11:50 - 12:30 Types of boundary lubricating film; solid - like versus liquid - like  
H. Spikes (Imperial College, UK) - *Invited*

12:30 - 13:10 Surface chemical mechanisms of lubricants under sliding conditions  
W. T. Tysoe (University of Wisconsin-Milwaukee, USA) - *Invited*

13:10 - 13:30 Surface-modified palladium and gold nanoparticles for anti-wear applications  
J.C. Sanchez-Lopez (Instituto de Ciencia de Materiales de Sevilla (CSIC-US), Spain)

13:30 - 13:50 Effect of high - pressure rheology of lubricating oils on boundary lubrication  
N. Ohno (Saga University, Japan)

14:00 - 15:30 **Lunch**

*Session chair:* F. Mora

16:00 - 16:45 Short Oral Presentations of Posters

16:45 - 17:30 **Poster Session and Coffee Break**

*Session chair:* S. Mori

17:30 - 18:10 Designing hard coatings for ideal tribochemistry and superlubricity under boundary lubricated sliding conditions  
A. Erdemir (Argonne National Laboratory, USA) - *Invited*

18:10 - 18:50 Physical adsorption and wetting in lubricated friction of DLC coatings  
M. Kalin (University of Ljubljana, Slovenia) - *Invited*

18:50 - 19:10 Surface polishing effect on tribological characteristics of DLC - coatings under water lubrication  
M. Tokoro (Tokyo Institute of Technology, Japan)

21:00 **Flamenco bar (Tour I)**

**Tuesday, March 31, 2009**

- Session chair:* J.-M. Martin
- 09:00 - 09:40 Boundary lubrication in water: biomimetic approaches  
N.D. Spencer (ETH Zurich, Switzerland) - *Invited*
- 09:40 - 10:20 Surfactant transport and wetting of steel surfaces by emulsions  
S.K.Biswas (Indian Institute of Science, India) - *Invited*
- 10:20 - 10:40 Biomimetic lubrication  
T. Ahlroos (VTT Technical Research Centre of Finland)
- 10:40 - 11:00 Tribological characteristics of ashless phosphorus and phosphorus - sulphur based antiwear additives  
J. Benedet (Imperial College, UK)
- 11:00 - 11:30 Coffee break
- Session chair:* H. Spikes
- 11:30 - 12:10 Study of silicon - based antiwear additives: film formation and wear properties  
M. Kasrai (University of Western Ontario, USA) - *Invited*
- 12:10 - 12:50 Effect of lubricant additives on the friction and durability performance of an a-C:15H coating in sliding/rolling contact  
A. Neville (Leeds University, UK) - *Invited*
- 12:50 - 13:10 Zinc polyphosphates used as ZDTP tribofilm models  
F. Dassenoy (Ecole Centrale de Lyon, France)
- 13:10 - 13:30 Experimental friction evaluation for cylinder liner/piston ring contact: methods and approach  
S. Johansson (Volvo Technology, Sweden)
- 14:00 - 15:30 **Lunch**
- 15:30 - 19:30 **Tour II (Guided visit to Solar Towers)**
- 21:00 **Dinner on your own (at suggested Tapas bars)**

## Wednesday, April 1, 2009

- Session chair:* W. Tysoe
- 09:00 - 09:40 Bridging the gap between macro- and nanotribology  
J. Krim (North Carolina State University, USA) - *Invited*
- 09:40 - 10:20 Lubricant-compliant DLC coatings: an EFTEM analysis  
J. M. Martin (Ecole Centrale de Lyon, France) - *Invited*
- 10:20 - 10:40 Thermal reactivity of environmentally friendly antiwear additives in oil solution  
F. Mangolini (ETH Zurich, Switzerland)
- 10:40 - 11:00 Tapping mode fluid cell atomic force microscopy for studying organic friction modifier behaviour  
S. Campen (Imperial College, UK)
- 11:00 - 11:30 Coffee break
- Session chair:* M. Masuko
- 11:30 - 12:10 *In situ* raman tribometry: probing the boundary between tribomechanics and tribochemistry  
I. L. Singer (Naval Research Lab, USA) - *Invited*
- 12:10 - 12:50 Chemical structure of boundary films analyzed by TOF - SIMS  
S. Mori (Iwate University, Japan) - *Invited*
- 12:50 - 13:10 Characterization of surface chemical boundary films  
Maria Cinta Lorenzo Martin (Argonne National laboratory, USA)
- 13:10 - 13:30 Tribo - rheology of magnetic fluids  
E. Andablo - Reyes (Universidad de Granada, Spain)
- 14:00 - 15:30 **Lunch**
- 16:00 - 17:00 **Poster Session & Coffee**
- Session chair:* A. Erdemir
- 17:00 - 17:40 Unraveling the mechanisms of boundary layer lubrication using MD  
J. Harrison (U. S. Naval Academy, USA) - *Invited*
- 17:40 - 18:20 Understanding the friction and wear of monolayer lubricants with large - scale simulations  
M. Chandros (Sandia National Laboratory, USA) - *Invited*
- 18:20 - 18:40 Thin lubricant films between gold surfaces: a molecular dynamics study  
A. Jabbarzadeh (The University of Sydney, Australia)
- 21:00 **Dinner on your own (at suggested Tapas bars)**

## **Thursday, April 2, 2009**

*Session chair: I. Singer*

09:00 - 9:40 Tribology - oxidation of transition metals in boundary lubrication of water: a case study of chemical mechanical polishing  
H. Liang (Texas A&M University, USA) - *Invited*

09:40 - 10:20 Influence of passive films on the mechanical and wear response of metals in tribocorrosion contacts  
S. Mischler (EPFL, Switzerland) - *Invited*

10:20 - 10:40 Influence of synovial fluid proteins and glycoproteins on the lubrication of artificial joint materials  
R. Crockett (EMPA, Switzerland)

10:40 - 11:00 Molecular dynamics simulations of water confined between matched pairs of hydrophobic and hydrophilic self - assembled monolayers  
C. D. Lorenz (King's College London, UK)

11:00 - 11:30 Coffee break

*Session chair: H. Liang*

11:30 - 12:10 Inorganic nanotubes (INT) and fullerene - like structures (IF): progress report  
R. Tenne (Weizmann Institute of Science, Israel) - *Invited*

12:10 - 12:30 Friction measurements on MoS<sub>2</sub> »mama«-tubes by UHV-AFM  
M. Remskar (Jozef Stefan Institute, Slovenia)

12:30 - 12:50 Reduction of friction by onion - like carbon added to lubricating oil  
N. Matsumoto (Kobe University, Japan)

12:50 - 13:10 Tribological evaluation of lubricating oils containing various nanoparticles as additives for boundary lubrication conditions  
M. Kalin (University of Ljubljana, Slovenia)

14:00 - 15:30 **Lunch**

18:00 - 21:00 **Tour III: Guided visit to Alcazar**

21:00 **Conference Dinner**



**Friday, April 3, 2009**

- Session chair:* S. K. Biswas
- 09:00 - 09:20 Investigations on lubricity of "tailor - made fuels from biomass"  
A. Fatemi (RWTH Aachen University, Germany)
- 09:20 - 09:40 Experimental detection of boundary layer friction in dynamic sealing contacts  
M. Wangenheim (Leibniz University of Hannover, Germany)
- 09:40 - 10:00 Molecular dynamics simulations of boundary lubricant failure  
S. Eder (AC2T research GmbH, Austria)
- 10:00 - 10:20 The influence of viscosity on the friction in lubricated DLC contacts at various sliding velocities  
I. Velkavrh (University of Ljubljana, Slovenia)
- 10:20 - 10:40 Methodology for determination of Marangoni effect on machine elements  
S. Klien (V-Research, Austria):
- 10:40 - 11:10 Coffee break
- Session chair:* M. Kalin
- 11:10 - 11:30 Electrophoretic painting as a delivery system for dry film lubrication  
P. Hope (LVH Coatings Ltd., Germany)
- 11:30 - 11:50 A novel method to study ultra - low wear rates of multiphase alloys  
D. Shakhvorostov (University of Western Ontario, Canada)
- 11:50 - 12:10 When alternative lubes meet alternative fuels  
A. Igartua (Fundacion TEKNIKER, Spain)
- 12:10 - 12:30 Surfactant/polymer boundary lubricant films  
C. Drummond (CNRS-Université de Bordeaux, France)
- 12:30 Wrap-up Discussion and Closure of Conference

## Short Oral and Poster Presentations

1. Tribochemistry of phosphites additives: evidence of tribo - activated surface role on the formation of iron phosphide  
D. Phillippon (Ecole Centrale de Lyon, France)
2. Effects of load and sliding speed on tribological behaviour of plasma sprayed bronze-alumina coatings  
H. Bolvardi (Toosi University of Technology, Iran)
3. Tribology of laser - smoothed ceramics;  
S. Klien (V-Research, Austria)
4. The adsorption of alcohols on DLC coatings;  
I. Velkavrh (University of Ljubljana, Slovenia)
5. Tribological effects of different nitrocarburization methods;  
T.F. Hanisch (V-Research GmbH, Austria)
6. Marie Curie ITN Minilubes - mechanisms of interactions in nano-scale of novel ionic lubricants with functional surfaces  
S. Eder (AC2T Research GmbH, Austria)
7. Testing novel nanoscale additives as friction reducer in boundary lubrication regime  
F. Abate (University of Salerno, Italy)
8. Model test of an aluminium cold forming tool  
A. Diem (V-Research GmbH, Austria)
9. Formulation, development and testing of biodegradable sunflower-based hydraulic fluids  
B. Fernandez-Diaz (Fundacion TEKNIKER, Spain)