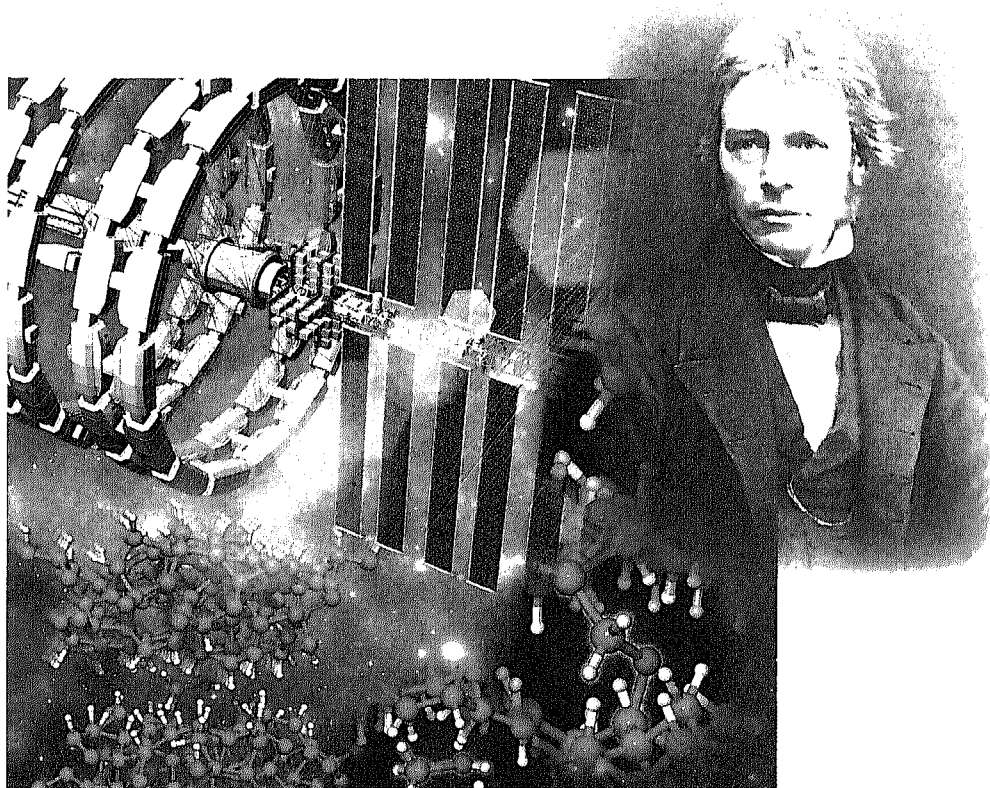


Tribology

University of Southampton,
United Kingdom

2–4 April 2012



FARADAY DISCUSSIONS

Volume 156, 2012

RSC Publishing

Tribology

Faraday Discussions

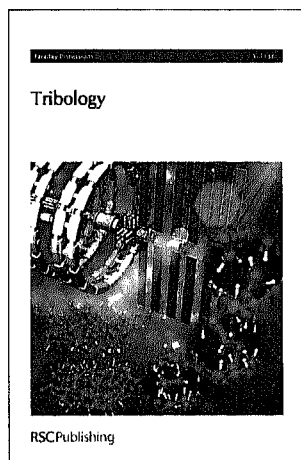
www.rsc.org/faraday_d

A General Discussion on Tribology was held at the University of Southampton, United Kingdom on the 2nd, 3rd and 4th of April 2012.

RSC Publishing is a not-for-profit publisher and a division of the Royal Society of Chemistry. Any surplus made is used to support charitable activities aimed at advancing the chemical sciences. Full details are available from www.rsc.org

CONTENTS

ISSN 1359-6640; ISBN 978-1-84973-447-9



Cover

See Kubo *et al.*, *Faraday Discuss.*, 2012, **156**, 137–146.

Diamond-like carbon (DLC) is one of the most promising solid lubricants for aerospace instruments. Our tight-binding quantum chemical molecular dynamics simulations reveal that the chemical reactions of a methanol molecule sandwiched between DLC films lead to OH-termination of the DLC surface, leading to good low friction properties.

Image reproduced by permission of Dr Momoji Kubo, from *Faraday Discuss.*, 2012, **156**, 137.

INTRODUCTORY LECTURE

- 9 **Bio-tribology**
Duncan Dowson

PAPERS AND DISCUSSIONS

- 31 **Cell friction**
T. E. Angelini, A. C. Dunn, J. M. Urueña, D. J. Dickrell, III, D. L. Burris and W. G. Sawyer
- 41 **Dynamic surface microstructural changes during tribological contact that determine the wear behaviour of hip prostheses: metals and ceramics**
W. Mark Rainforth, Peng Zeng, Le Ma, Akemi Nogiwa Valdez and Todd Stewart
- 59 **A stratified approach to pre-clinical tribological evaluation of joint replacements representing a wider range of clinical conditions advancing beyond the current standard**
John Fisher
- 69 **Synovial fluid lubrication of artificial joints: protein film formation and composition**
Jingyun Fan, Connor Myant, Richard Underwood and Philippa Cann

- 87 **General discussion**
- 105 **Predictive modelling of fatigue failure in concentrated lubricated contacts**
H. P. Evans, R. W. Snidle, K. J. Sharif and M. J. Bryant
- 123 **Physio-chemical hydrodynamic mechanism underlying the formation of thin adsorbed boundary films**
W. W. F. Chong, M. Teodorescu and H. Rahnejat
- 137 **Fate of methanol molecule sandwiched between hydrogen-terminated diamond-like carbon films by tribochemical reactions: tight-binding quantum chemical molecular dynamics study**
Kentaro Hayashi, Seiichiro Sato, Shandan Bai, Yuji Higuchi, Nobuki Ozawa, Tomomi Shimazaki, Koshi Adachi, Jean-Michel Martin and Momoji Kubo
- 147 **Anticorrosion imidazolium ionic liquids as the additive in poly(ethylene glycol) for steel/Cu–Sn alloy contacts**
Meirong Cai, Yongmin Liang, Feng Zhou and Weimin Liu
- 159 **Does ultra-mild wear play any role for dry friction applications, such as automotive braking?**
Werner Österle, A. I. Dmitriev and H. Klob
- 173 **On the three-term kinetic friction law in nanotribological systems**
András Vernes, Stefan Eder, Georg Vorlauffer and Gerhard Betz
- 197 **General discussion**
- 217 **Hydration lubrication: exploring a new paradigm**
Anastasya Gaisinskaya, Liran Ma, Gilad Silbert, Raya Sorkin, Odeya Tairy, Ronit Goldberg, Nir Kampf and Jacob Klein
- 235 **Fabrication and characterization of multi-level hierarchical surfaces**
Bharat Bhushan and Hyungoo Lee
- 243 **Friction on ice: stick and slip**
Jane R. Blackford, Gerasimos Skouvaklis, Marc Purser and Vasileios Koutsos
- 255 **Sliding friction at soft micropatterned elastomer interfaces**
Elise Degrandi-Contraires, Christophe Poulard, Frédéric Restagno and Liliane Léger
- 267 **Why can TiAlCrSiYN-based adaptive coatings deliver exceptional performance under extreme frictional conditions?**
Ben D. Beake, German S. Fox-Rabinovich, Yannick Losset, Kenji Yamamoto, Myriam H. Agguire, Stephen C. Veldhuis, Jose L. Endrino and Anatolii I. Kovalev
- 279 **Mechanism of ultra low friction of multilayer graphene studied by coarse-grained molecular simulation**
Hitoshi Washizu, Seiji Kajita, Mamoru Tohyama, Toshihide Ohmori, Noriaki Nishino, Hiroshi Teranishi and Atsushi Suzuki
- 293 **General discussion**
- 311 **The origin of anti-wear chemistry of ZDDP**
Jean Michel Martin, Tasuku Onodera, Clotilde Minfray, Fabrice Dassenoy and Akira Miyamoto
- 325 **The mechanics of nanometre-scale molecular contacts**
Katerina Busuttill, Nikolaos Nikogeorgos, Zhenyu Zhang, Mark Geoghegan, Christopher A. Hunter and Graham J. Leggett

- 343 **Semi-deterministic chemo-mechanical model of boundary lubrication**
Joel Andersson, Roland Larsson, Andreas Almqvist, Mattias Grahn and Ichiro Minami
- 361 **Tribology and energy efficiency: from molecules to lubricated contacts to complete machines**
Robert Ian Taylor
- 383 **Complex frictional analysis of self-lubricant W-S-C/Cr coating**
Tomas Polcar, Fredrik Gustavsson, Thomas Thersleff, Staffan Jacobson
and Albano Cavaleiro
- 403 **Polyelectrolyte brushes: a novel stable lubrication system in aqueous conditions**
Motoyasu Kobayashi, Masami Terada and Atsushi Takahara
- 413 **General discussion**

CONCLUDING REMARKS

- 435 **Tribology**
Nicholas D. Spencer

ADDITIONAL INFORMATION

- 439 **Poster titles**
- 441 **List of Participants**
- 443 **Index of Contributors**