

Message from the Scientific Organizers

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This volume of Tribology Letters contains articles that were presented at the 428th Wilhelm and Else Heraeus Seminar “Physics of Tribology—Understanding Friction and Wear in technical systems”. The seminar took place at the “Physikzentrum” in Bad Honnef, Germany from 23rd to 25th of March, 2009 with 60 participants from 14 countries.

The purpose of the seminar was to present and discuss the physics of friction and wear in a multi-scale approach from the atomic level up to the size of an engine component.

Within this topical setting, several contributions dealt with plastic deformations and third-body formation caused by sliding friction and by manufacturing (grinding). Insights into how nanocrystalline microstructures in bcc and fcc metals are generated as an effect of cyclic straining is steadily being gained. In addition, the importance of on-line wear measurement and ultra-low wear rates was discussed in several talks. Another important topic for macroscopic systems was the use of novel water based lubricants and of polyols.

On the simulation side, several presentations dealt with elastic contact mechanics. A new theory now allows the exact calculation of the contact area even between

millimeter-sized technical (e.g., aluminum–silicon alloys) surfaces. A novel reactive potential allows more realistic MD simulations of diamond-like carbon (DLC).

On the atomic scale the experimental focus was on friction force microscopy. New experimental results showed a link between atomic friction measured on graphene and electron–phonon coupling for the first time. Another talk showed that the widely used Prandtl–Tomlinson model is over-simplifying the fast motion of the AFM tip apex.

The poster session also allowed younger researchers to present their work. The poster prize was awarded to a contribution from Jülich which dealt with experiments on rubber sealing and was an impressive example of intelligent research on a small budget.

Overall the seminar showed how atomic-scale experiments and simulations are able to stimulate engineering tribology and vice versa. It therefore seems that future workshops of this kind may help to fertilize all disciplines of tribology.

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