

Invitation

to the virtual meeting of the working group micro- and nanomechanics of the Dresden Fraunhofer Cluster Nanoanalysis in cooperation with SYNERGY

We are cordially inviting you to the following scientific presentations:

“The key role of stick-slip in friction and wear processes on the nanoscale”

*by Prof. Dr. Enrico Gnecco,
Otto Schott Institute of Materials Research, Friedrich Schiller University Jena*

“Microscale impact of macroscale tribological experiments”

*by Dr. Dominic Linsler
Mikrotribologie Centrum μ TC,
Fraunhofer-Institut für Werkstoffmechanik IWM, Karlsruhe*

The seminar is scheduled for
Wednesday, April 28th, 2021, 13:00 – 15:00 (CET)
as online seminar via MS Teams (link will be provided by email).

We would like to invite for discussions after the seminar.

Dr. André Clausner
Fraunhofer IKTS

Dr. Alexander Croy
TU Dresden

Prof. Dr. Ehrenfried Zschech
Dresden Fraunhofer Cluster
Nanoanalysis

“The key role of stick-slip in friction and wear processes on the nanoscale”

*by Prof. Dr. Enrico Gnecco,
Institute of Mechanics of Functional Materials, Friedrich Schiller University Jena*

Abstract

Atomic force microscopy (AFM) is one of the most efficient tools for investigating sliding friction and related phenomena down to the molecular scale. Here, a sharp probe can be used to manipulate nanostructures already existing on a surface or to forge new ones by repeatedly scraping the surface itself. In this talk, I will first present results on polyfluorene chains, graphene nanoribbons and single-stranded DNA manipulated on metal surfaces in an ongoing collaboration with the University of Basel, and on metal clusters forming contacts with various degrees of commensurability recently studied by my group. If the surface itself is “manipulated” by the AFM tip, it becomes possible to observe and quantify early stages of abrasive wear on the nanoscale, which is of utmost importance for assessing the quality of technical surfaces and possible environmental issues. Particularly instructive in this context are the cases of compliant polymers and layered materials, where ripples, round-shaped nanoparticles, and flakes are easily generated out of the nanoscratch processes. The common denominator of the processes presented in the talk is the stick-slip mechanism determining the evolution of the friction forces in the sliding contacts. It will be also discussed in its simplicity and beauty based on a model originally developed by Ludwig Prandtl and extended in various ways to describe most of the previous experimental situations.

“Microscale impact of macroscale tribological experiments”

*by Dr. Dominic Linsler
Mikrotribologie Centrum μ TC,
Fraunhofer-Institut für Werkstoffmechanik IWM, Karlsruhe*

Abstract

Friction and wear are inherently connected with the systems they appear in. In many of those systems, the tribological behavior is influenced by factors that have to be described on different length scales. Model experiments are often designed to reduce the complexity of the system and to decrease the number of influencing length scales. In the presentation, we discuss our approaches to understand the mutual influence of tribology and (sub-)surface properties. Results from experiments with different levels of abstraction will be shown.