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We invite you to

ACMiN SEMINAR

seminar topic:

"Early-stage wear of layered materials on the nanoscale"

speaker

prof. Enrico Gnecco

(Faculty of Physics, Astronomy and Applied Computer Science, Jagiellonian University, Krakow, Poland)

Date: 9th May 2024 at 2:00 PM
ACMiN seminar room no.: 0A.01.0, bldg. D-16
(Kawiory Street 30)

online:

Abstract:

I will report on our ongoing investigations of early-stage plowing wear of layered materials based on atomic force microscopy (AFM). While MoS2, WSe2, and HOPG multilayers undergo nanoexfoliation that is characterized by the peeling of chips and crack propagation not necessarily along the scratch direction, other materials such as muscovite mica form well-defined wear tracks with surface atoms removed layer-by-layer from the track only. The observed features can be associated to specific mechanical properties (bending stiffness, interlayer adhesion, and tensile strength) of the investigated materials. The results of similar nanowear tests conducted on monolayer MoS2 will be also presented. In this case, we observed that the exfoliated layer can be completely folded back on itself. In addition, partial detachment of the layer (without folding) is found to occur with a regular repetition rate, which is possibly related the surface rippling of the underlying (silicon) substrate. Apart from shedding light on fundamental physical mechanisms governing abrasive wear at the nanoscale, our results can be valuable for better control of micro- and nano-machining processes involving the aforementioned materials.