

WK6: Tribology of 2D Materials: From Nanoscale to Macroscale

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The purpose of this workshop is to bring together experts from academia, national labs and industry to discuss the latest developments in the tribology of 2D materials from nano/micro-scale to meso-macroscale. The emphasis will be on uncovering fundamental mechanisms of wear/friction at atomic scales and finding a link to translate at the macroscale. Another aspect includes showcasing CNM's unique multifunctional tribometer to the tribology community and fostering new collaborations through the CNM user proposal mechanism.

Workshop topics:

- Superlubricity using 2D materials
- Physical/chemical interactions between 2D material layers and bulk substrates
- Theory/simulations for understanding mechanisms of sliding/shearing
- 2D materials as solid lubricants
- 2D materials as additives in composites and in liquid lubricants
- Advances in tribological testing techniques
- Tribological properties of 2D materials and the mesoscopic link between nano and macro scales
- Environmental considerations

The CNM has expertise and state-of-the-art facilities in the synthesis, functionalization and characterization of 2D materials with tribological properties, with particular emphasis on understanding from nano-to-micro-to-macro scale. Applications may include new solid lubricant materials for NEMS/MEMS (nano-micro) to moving electrical contacts, sliding/rolling, rotating and bearings, etc.(meso-macro). This workshop will include topics covering fundamental studies on the development of 2D materials and their systematic characterization to understanding their structural, chemical, mechanical, and tribological properties. Also welcome are theoretical and modeling approaches that can provide in-depth understanding of tribo-physical and chemical interactions with the substrate and interfaces under severe contact pressure and shear stress; issues related to tribo-chemical changes, and substrate interactions.

This workshop is expected to provide an excellent platform for academics, scientists, and students to exchange ideas, foster collaborations with user facilities at Argonne and embark upon new challenges in nanoscience.