

Wednesday Afternoon, April 22, 2026

Awards Ceremony and Honorary Lecture

Room Town & Country A - Session HL-WeHL

Bunshah Award Honorary Lecture

5:45pm HL-WeHL-1 “Chameleon” Adaptive Tribological Coatings: Lessons Learned and Future Outlook, **Andrey A. Voevodin** [Andrey.Voevodin@unt.edu]¹, University of North Texas, USA **INVITED**

Tribological contact surfaces, which can operate in oxidative and high temperature environments are of a practical importance for aerospace applications, where extremes of temperature, pressure, and environments limit liquid lubrication and requires solid lubricants and robust wear-protective coatings. This presentation discusses surface engineering concepts for preparing self-adaptive coatings and contact surfaces, called “chameleon”, for friction and wear reduction under oxidative environments and high temperatures. Several key mechanisms which can be self-evoked by the tribological contact mechanical, chemical and temperature stimuli are discussed, including straining, re-orientation, phase transformations, diffusion, and oxidation, and how these mechanisms can be guided to reduce friction and wear of contacts in environments with variable and cycled environments and temperatures. Surface engineering concepts and coating designs which may allow for such mechanism operations are used as examples for the discussion. These include composite coatings made of hard nano-crystalline carbide, nitride and oxide matrices with nano-sized inclusions of solid lubricants and transition metals capable of surface diffusion or forming high-temperature lubricating oxides, duplex coatings based on plasma electrolytic oxidation with controlled surface morphology and embedded adaptive lubricants, solid lubricants made of intrinsically layered solids allowing hexagonal plane reorientation and self-assembly, and other. Lessons learned in exploring and testing such conceptual mechanisms are applied to outline future perspectives and opportunities for engineering self-adaptive tribological surfaces.

¹ R.F. Bunshah Awardee Honorary Lecture

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