Monday Morning, April 24, 2017

Plenary Lecture
Room Town & Country - Session PL

Plenary Lecture

8:00am **PL-1 Grain Boundary Segregation: A Key Tool for Stabilizing Nanostructure in Next-Generation Coatings**, *Chris Schuh*, Massachusetts Institute of Technology, USA   **INVITED**
The performance of many coatings depends on the development of an internal nanostructure for optimal properties, but nanoscale structures are frequently thermodynamically unstable. The future of nanostructured coatings, therefore, lies in our ability to stabilize their structure. This talk will review the proliferating strategy of stabilizing nanostructure *via* grain boundary segregation, not only as a means of kinetically slowing structural evolution, but as a means of bringing a nanostructured state closer to thermodynamic equilibrium. After a review of the basic science, a general strategy for coating design will be established, illustrating how market and scientific considerations can combine to guide the development of nanostructured coatings. A series of coating design case studies will be presented for both electrodeposited and physical vapor deposited coatings, and the scientific issues underlying alloy configuration and structural stability will be examined. Commercial applications and adoption trajectories of several of these coating systems will be reviewed. Finally, future augmentations to the design strategy, such as the incorporation of meso-scale super-grain structure within the coating, will be speculated upon.

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