NU Mechanical and Industrial Engineering Colloquium Series – Spring 08

WEDNESDAY Jan 23, Egan 440

PROGRAM

12:50 - 1:00 p.m. Pre-seminar/Intro
1:00 - 1:50 p.m. Lecture (typical)
1:50 - 2:00 p.m. Q&A and Discussion

ABSTRACT

When the grain size of a metal is refined to a scale on the order of just a few nanometers, its strength, hardness, wear resistance, and other properties improve in dramatic ways. There is therefore significant interest in designing and deploying such nanocrystalline alloys for structural applications. However, refining the grain structure is a struggle against equilibrium, and nanocrystalline materials are often quite unstable; the grains grow given time even at room temperature, and the associated property benefits decline over time in service. In this talk, our efforts to design a stable family of nanocrystalline alloys will be described. We rely on selective alloying as a method to lower the energy of grain boundaries, bringing the nanocrystalline structure closer to equilibrium. The result is a suite of coatings with highly desirable properties, easy processability, and with long-term stability against structural coarsening. The science of alloy design and characterization will be discussed, as will the commercial applications of the technology.

SEMINAR TITLE

"Design of Stable Nanocrystalline Alloys for Coating Applications"

SEMINAR SPEAKER

Prof. Christopher A. Schuh
Salapatas Associate Professor of Metallurgy
Department of Materials Science and Engineering
Massachusetts Institute of Technology

BIOGRAPHIC PROFILE

Christopher A. Schuh is the Salapatas Associate Professor of Metallurgy in the Department of Materials Science and Engineering at MIT. He joined MIT in 2002, having received a B.S. degree at the University of Illinois at Urbana-Champaign (1997), and a Ph.D. at Northwestern University (2001), both in the field of Materials Science and Engineering. Prof. Schuh also held the Ernest O. Lawrence postdoctoral fellowship at Lawrence Livermore National Laboratory in 2001-2002. Prof. Schuh's research is focused on structural metallurgy, and seeks to control disorder in metallic microstructures for the purpose of optimizing mechanical properties. He works with disorder at many scales, including the atomic level (in amorphous metals), the nano-scale (in nanostructured metals), as well as at more conventional microstructural scales (in grain boundary engineered materials). Prof. Schuh's work has received international attention through several awards, including the Robert Lansing Hardy Medal of the Metals, Minerals, and Materials Society.

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