School of Industrial Engineering

CENTER FOR MATERIALS PROCESSING AND TRIBOLOGY DISTINGUISHED SEMINAR

Molecular Mechanisms that Control Material Properties in Hierarchical Biological Composite Materials: Abalone Shell and Bone

Paul Hansma, UC Santa Barbara, Physics

Monday, April 11, 2011 – 4 PM
Potter 234, The K.S. Fu Room

Abstract
Fundamental nanoscale studies show that there are adhesive molecules in abalone shell, bone and other materials that use the nanoscale mechanism of sacrificial bonds and hidden length to dissipate energy. These molecules are present in the gel matrix that binds together the mineralized collagen fibrils of bone. Bone fracture begins with the separation of the mineralized collagen fibrils at nanometer length scales.

New instruments can now test how well bone resists this nanoscale separation of mineralized collagen fibrils – even in living patients! The results of these tests distinguish between the bone of patients with and without fractures. Thus, these instruments have the potential to diagnose bone fragility and to guide the development of therapies for decreasing bone fragility.

Biographical Information
Professor Hansma got his PhD at UC Berkeley, and has had a research career at UC Santa Barbara of building gadgets including superconducting devices, scanning tunneling microscopes, atomic force microscopes, scanning ion conductance microscopes and most recently, bone and tissue diagnostic instruments. He has used these gadgets to study Hierarchical Biological Composite materials such as abalone shell and bone.

He is a Fellow of the American Association for the Advancement of Science, the American Physical Society and the Institute of Physics. He received the Biological Physics Prize from the American Physical Society and is a member of ASBMR and ORS.

Refreshments prior to the seminar at 3:45 PM

Contacts: S. (Chandy) Chandrasekar (chandy@ purdue.edu) or Tim Lescun (tlescun@purdue.edu)