

The Department of Mechanical Engineering/College of Engineering and Applied Sciences
Stony Brook University

Mechanical Engineering Seminar



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Lecture Title: The deformation and fracture of nacre and other hard biological materials

Thursday, April 24, 2008, 2:00 PM, Room 301 Engineering Building

Abstract

Many organisms use hard mineralized tissues for mechanical support (bones), cutting and crushing aliments (teeth) or protection against predators (mollusk shells). Some of these natural materials exhibit surprising combinations of stiffness, hardness and toughness in some cases unmatched by man-made materials. In this talk I will discuss nacre (mother-of-pearl) from seashells. This material is 3,000 tougher than the brittle mineral of which it is made, thanks to an extremely well designed microstructure. Combinations of mechanical experiments and modeling were used to identify the exact features and micro-mechanisms leading to this performance, and the findings are now implemented into synthetic “bio-inspired” composites. Similar experimental and modeling approaches will be used for teeth, another example of high-performance mechanical system. Biomimetics - the science of imitating nature - is a growing source of inspiration for engineers, and it is now leading to materials with remarkable mechanical properties

Biography

Francois Barthelat joined the Department of Mechanical Engineering at McGill University in September 2006 as an Assistant Professor. He obtained his Ph.D. from Northwestern University and his Master’s from the University of Rochester, both in Mechanical Engineering. He has been working on the mechanics of a variety of material including ceramics, polymers, titanium foams for bone implants and growth plate cartilage. He now focuses on biomimetics and on the mechanics of hard biological materials, using combinations of small-scale experiments and modeling.

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