

# AES Distinguished Lecture Series

## Mechanics as an Enabling Tool in Bioinspired Materials and Biological Interactions of Nanomaterials

Huajian Gao

Walter H. Annenberg Professor of Engineering, Brown University

Friday, April 1 | 3:00 PM Reception in Atrium; 4-5 PM Lecture | Benson 180

Low-dimensional nanomaterials, including nanoparticles, nanowires, nanofibers, nanotubes, and atomically thin plates and sheets have emerged as candidates as building blocks for the next generation electronics, microchips, composites, barrier coatings, biosensors, drug delivery, and energy harvesting and conversion systems. There is now an urgent societal need to understand the biological and environmental interactions of low-dimensional nanomaterials which are being produced and released into the environment by thousands of tons per year.

This talk aims to discuss mechanics as an enabling tool in this field of study. Discussions will touch on recent experimental, modelling and simulation studies on the mechanisms of cellular uptake of low-dimensional nanomaterials and their effects on cell behaviors.

In parallel, rapid technological developments such as 3D printing make it possible to fabricate materials and structures that closely mimic load-bearing biological materials including shells, nacre, bone, mineralized tendon and wood which have achieved superior mechanical properties through their hierarchical composite structures consisting of hard and soft structural components. While most existing studies have focused on the role of soft materials in enhancing toughness of biomaterials, here we show hard structural components may play even more important roles.

**Huajian Gao** received his B.S. from Xian Jiaotong University of China in 1982, and his M.S. and Ph.D. degrees in Engineering Science from Harvard University in 1984 and 1988, respectively. He served on the faculty of Stanford University between 1988 and 2002. He was Director at the Max Planck Institute for Metals Research between 2001 and 2006, when he joined the faculty of Brown University. At present, he is the Walter H. Annenberg Professor of Engineering at Brown.

Gao's research focuses on the understanding of basic principles that control mechanical properties and behaviors of materials in engineering and biological systems. He is a Member of the National Academy of Engineering, a Foreign Member of the Chinese Academy of Sciences and the Editor-in-Chief of Journal of the Mechanics and Physics of Solids, the flagship journal of his field. He is also the recipient of numerous academic honors, including a John Simon Guggenheim Fellowship, the Rodney Hill Prize in Solid Mechanics from the International Union of Theoretical and Applied Mechanics, the Prager Medal from Society of Engineering Science and Nadai Medal from American Society of Mechanical Engineers.

