

New Frontiers for Materials: From Health to Energy and the Environment

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ABSTRACT: This paper presents some new frontiers for multifunctional materials and structures for applications in medicine, energy systems and the environment. These include: nanoparticles and biomedical devices for disease detection and treatment; organic solar cells and light emitting devices, and multi-scale structures for environmental remediation. The talk is divided into three parts. In the first, magnetite and gold nanoparticles are presented for the specific targeting and treatment of breast and prostate cancer. Thermodynamics concepts are used to explain the size limits of nanoclusters that can enter into cancer cells. Nano-scale and micron-scale drug delivery concepts are then presented for the localized delivery of drugs for the treatment of cancer and cardiovascular disease. In the second part of the talk, pressure-assisted fabrication is shown to improve the performance of organic light emitting devices and organic solar cells. The role of adhesion and contacts is explored before presenting some case studies of emerging applications of light emitting devices and solar cells. Finally, in the third part of the talk, some ideas are presented for the recycling of earth-based materials into sustainable buildings and water filters. Bio-inspired concepts are also presented for environmental remediation at the nano-, micro- and the macro-scale.

BIOGRAPHY: Wole Soboyejo received a BSc in mechanical engineering from King's College London in 1985. He then went on to Cambridge University where he obtained a PhD in 1988. Between 1988 and 1992, he worked as a Research Scientist at the McDonnell Douglas Research Labs. He then moved to become a faculty member in the Department of Materials Science and Engineering at The Ohio State University, where he worked from 1992 until 1999. Between 1997 and 1998, he spent a year as a sabbatical year as a Visiting Martin Luther King Associate Professor at MIT. He was appointed as a Professor of Mechanical and Aerospace Engineering at Princeton University in 1999. Soboyejo is the recipient of National Young Investigator Awards from the National Science Foundation and the Office of Naval Research. He is also a recipient of ASM's Bradley Stoughton Award for excellence in the teaching of materials science. Soboyejo is a Fellow of the ASME and the Nigerian Academy of Science. He is the author of 3 textbooks and more than 300 journal papers. He recently served as the President of the African University of Science and Technology in Abuja, Nigeria. Soboyejo was also recently appointed to the UN secretary-general's scientific advisory board. Soboyejo is now back at Princeton, where he is engaged in research on materials for health, energy and the environment.



EVENT DETAILS

DATE:

Wednesday, December 3, 2014

TIME:

1:00 PM

LOCATION:

Babbio 319
Stevens Institute of Technology

ATTENDANCE:

This event is open to Stevens' Faculty, Students, Staff, and Invited Guests