

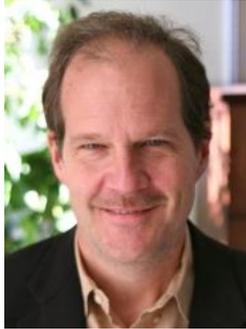


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March 2018 Nanolecture Series Event

Safe Design of Two-Dimensional Materials



Robert Hurt

*Professor of Engineering
Brown University*

Date: Mar 7th, 2018

Time: 1:00-2:00 pm

Location: 665 Huntington Ave, Building 1, Room 1302
Boston, MA, 02115

Abstract: Ultrathin sheet-like 2D materials are an important and rapidly growing class of synthetic nanostructures. The premise of our research is that the biological responses to 2D materials are initiated by specific molecular events at the material-fluid interface that can be understood through fundamental materials chemistry and physics. Their extreme geometries, which combine atomic-scale thickness with micron-scale lateral dimension, are uncommon in nature, and the resulting geometric mismatch with natural biological tissue gives rise to novel modes of mechanical interaction and stress during cellular uptake and processing. A recent thermodynamic analysis shows that many emerging 2D materials will become non-equilibrium structures when introduced into biological fluid phases, and will undergo chemical transformations in parallel with the biological response. Of particular importance are dissolution processes that destroy the nanosheet geometry and create pools of biodissolution products that can be main drivers of the biological response. This talk will consider the fundamental properties and behaviors that govern the safe design of 2D materials. Case studies on graphene, MoS₂, and MoO₃ will emphasize bio-transformations and persistence as well as unusual shape-dependent effects on membranes during cellular uptake and vesicular packaging.

Biographical Sketch: Robert Hurt is a Professor of Engineering at Brown University in Providence, Rhode Island, and Editor-in-Chief of the scientific journal *Carbon*. He received a B.S. from Michigan Technological University and a Ph.D. from the Massachusetts Institute of Technology, both in chemical engineering. Before coming to Brown, he held posts at Bayer AG in Leverkusen, Germany, and Sandia National Laboratories in Livermore, California. He was the founding Director of Brown's materials and nanosciences institute, IMNI, and served 2004-2010 as Editor of *Carbon* before becoming Editor-in-Chief in 2013. He has been Technical Program Chair for the International Carbon Conference and Graffin Lecturer of the American Carbon Society. He received the Tau Beta Pi teaching award at Brown, the Charles E. Pettinos Award of the American Carbon Society in 2013, and the 2017 Graphene Award of the International Association of Advanced Materials. He has co-authored 140 scientific publications and his current research focuses on environmental nanotechnology, graphene, and other 2D materials, the nanobio-interface, and safe material design. He currently directs the NIH-supported Superfund Research Program Center at Brown on environmental health.

Light lunch will be provided

For more information: <http://hsph.harvard.edu/nanosafety/>