

Skating on Atomically Thin Ice – Toward Safe Design of Low-Dimensional Nanocarbons

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Speaker biosketch:

Robert Hurt is a Professor of Engineering at Brown University in Providence, Rhode Island and Director of Brown's materials and nanosciences institute, IMNI. He received a Ph.D. from the Massachusetts Institute of Technology in chemical engineering and held previous posts at Bayer AG in Leverkusen, Germany and Sandia National Laboratories in Livermore, California. He has received the Graffin Lecture Award and the Charles E. Pettinos Award of the American Carbon Society, and now serves as Editor-in-Chief of the materials science and nanotechnology journal, *Carbon*. His research focuses on carbon materials, the behavior of nanomaterials in living systems and the natural environment, safe material design, and novel materials assembled from graphene-based precursors.

Among the most promising nanomaterials for large-scale applications are low-dimensional carbons – both 1D fibrous forms (nanotubes, nanofibers) and 2D plate-like forms (graphene and related materials). The family of graphene-based materials includes not only the isolated monolayer, but also multilayer forms (few-layer graphene, ultra-thin graphite) and chemically modified forms (graphene oxide and its derivatives) that are emerging as high-volume-production materials with significant potential for human exposure. This talk describes recent research on the biological and environmental behaviors of emerging low-dimensional nanocarbons with emphasis on unique features that distinguish them from carbons in the natural environment. Among these unique engineered features is atomic thinness and extreme aspect ratio, which influence exposure pathways, lung deposition, cell uptake and vesicular packaging, lung clearance, toxicity, and biodegradation. Recent research on the behavior of these atomically thin carbon solids will be summarized and avenues for new research proposed and discussed.