Abstract

Growth and development of emerging technologies is driven to advance our global society and economy. Yet, history presents many salient examples that elicit concern over potential adverse consequences that can result from indiscriminate advancement. Nanotechnology serves as a current case study and presents an opportunity to demonstrate the utility of a proactive approach to sustainable material design. Discoveries of novel nano-scale phenomena motivated the rapid emergence and continued development of nanotechnologies, in which engineered nanomaterials (ENMs) are incorporated into products to impart improved or novel functionality. There are an increasing number of ENM-enabled products being proposed and on the market, serving industries that range from electronics to textiles to agriculture. While ENMs offer significant benefits in many of these applications, there are tangible concerns over the environmental and human health adverse consequences that could arise from their use and across their life cycle - from upstream production to end-of-life handling. In this seminar, I will introduce a sustainable nanomaterial design framework developed to enable tailoring of ENM properties to control their intended function and inherent hazard. The focus will be on carbon-based nanomaterials, including carbon the analogs, nanotubes and graphene. In addition to molecular-level manipulations to achieve sustainable material design, I will touch on research efforts at the product-level, using life cycle assessment as a way to guide design for net benefit realization.

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Dr. Gilbertson is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Pittsburgh. Before joining the faculty, Dr. Gilbertson was a postdoctoral associate in the Center for Green Chemistry and Green Engineering at Yale University where she focused on elucidating and validating engineered nanomaterial structure-property-function and structure-property-hazard parametric relationships. She received her MS and PhD degrees from Yale University in the Department of Chemical and Environmental Engineering, supported through an NSF Graduate Research and EPA STAR Fellowships. She received her bachelor's degree in chemistry with a minor in education from Hamilton College in 2007, after which she spent several years as a secondary school teacher before returning to graduate school. Her research group at the University of Pittsburgh is currently engaged in projects aimed at informing sustainable design of emerging materials and technologies proposed for use in areas at the nexus of the environment and public health. Dr. Gilbertson was recently recognized for her research efforts as recipient of the 3M non-tenured faculty award and the Ralph E. Powe Junior Faculty Enhancement Award. To find out more about her research group, please visit leannegilbertson.com and follow her on Twitter @lmgLab.

Date: December 8, 2017 Time: 12:15-1:15 PM
Location: 223 Jarvis Hall, North Campus, University at Buffalo