DEPARTMENT OF CHEMICAL & ENVIRONMENTAL ENGINEERING

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CARNEGIE MELLON UNIVERSITY

DEPARTMENTS OF ENGINEERING AND PUBLIC POLICY & CIVIL AND ENVIRONMENTAL ENGINEERING

Modeling Pollution From The Nanotech Revolution: Environmental Drivers, Particle Properties, And Model Design

The recent emergence of a global market for textiles, paints and pigments, cosmetics, packaging, and other products containing metal or metal oxide nanoparticles (NPs) has incited concerns about the potential ecotoxicity of these NPs following accidental release to the environment during product use or disposal. NP fate in rivers, lakes, and bed sediments is notoriously difficult to model, since rates of transport and surface transformation depend on complex relationships and feedbacks between nanoparticle properties (e.g., size) and environmental conditions (e.g., fluid flow, sediment transport, and redox conditions). This seminar introduces the field of environmental fate modeling for NPs and presents my contributions to the development of fate models that better facilitate risk assessment, policy development, and environmental management decision-making for the emerging nanotechnology industry. I describe three projects and the insights they provide: (1) a comparison of three frameworks for modeling NP "size effects" that represent tradeoffs between simulation runtimes and model accuracy, (2) an aquatic chemistry model of the influence of redox conditions and seasonal variation on nanosilver bioavailability in freshwater sediments, and (3) a coupled hydrologic, land use, and water quality model that explores the influence of overland flow, stream hydrology, and sediment transport dynamics on NP fate in a freshwater watershed.

Biosketch: Amy Dale is a Ph.D. candidate in the Departments of Engineering & Public Policy and Civil & Environmental Engineering at Carnegie Mellon University. Her research focuses on the development of next-generation environmental fate models of engineered metal and metal oxide nanoparticles in surface waters and sediments. Her publications related to this work include a recent Feature article in *Environmental Science & Technology*. She has been a Visiting Scholar in the Chesapeake Bay Program Office of the US EPA in Annapolis, Maryland and in the Safety and Environmental Technology group at ETH Zürich in Zürich, Switzerland. She is a national Udall Scholar, an ARCS Scholar, a former NSF IGERT Fellow, and a current EPA STAR Graduate Research Fellow. In 2015, she received an Innovyze Excellence in Computational Hydraulics/Hydrology Award. She received a B.S. in Bioinformatics from the University of Pittsburgh in 2011 and an M.S. in Civil and Environmental Engineering from Carnegie Mellon University in 2015.

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9:30—10:30 AM

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