Seminar Series

Sponsored by
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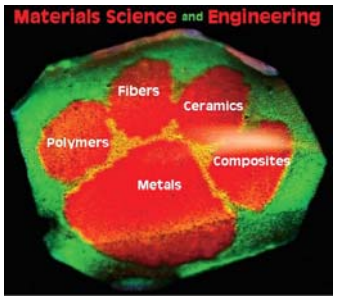
5:00 PM – Room 200 Olin Hall



The Challenges of Designing Nanoparticle / Polymer Nanocomposites: The Infamous Interface

Linda S. Schadler
Professor, Materials Science and Engineering Department

Rensselaer Polytechnic Institute

Abstract:

In traditional composites, technical expertise developed over decades (millennia?) has resulted in the ability to design traditional composites to fit specific applications and functions. While this is also true to some extent in carbon black and silica based nanocomposites, our understanding of nanocomposite behavior and our ability to tailor or predict properties is limited. This talk will present some intriguing results on the behavior of nanoparticle filled polymers and will outline the significant challenges and rewards as we make progress towards developing materials design expertise. One compelling challenge is the ability to tailor the interface region through particle surface modification. This is an essential element to design because the interface region occupies at least as much volume as the nanofiller. In this light, we have made a quantitative connection between thin film response and nanocomposite behavior and are exploiting this understanding to control properties. Examples of this control will be highlighted through examples of the tribological, thermomechanical, and dielectric properties of nanoparticle filled polymers.

Bio:

Dr. Linda S. Schadler joined Rensselaer in 1996 and is currently a full Professor in Materials Science and Engineering. She graduated from Cornell University in 1985 with a B.S. in materials science and engineering and received a PhD in materials science and engineering in 1990 from the University of Pennsylvania. After two years of post-doctoral work at IBM Yorktown Heights, Schadler served as a faculty member at Drexel University in Philadelphia, PA before coming to Rensselaer.

Active in materials research for 20 years, Schadler is an experimentalist and her research has focused on the micromechanical behavior of two-phase systems, primarily polymer composites. Her most recent focus is on the mechanical and electrical behavior of nanofilled polymer composites. Schadler has co-authored more than 100 publications and one book. Dr. Schadler received a National Science Foundation National Young Investigator award in 1994 and the ASM International Bradley Staughton Award for Teaching in 1997. She received a Dow Outstanding New Faculty member award from the American Society of Engineering Education in 1998 and was recently elected an ASM Fellow.

Linda is a current member of the National Materials Advisory Board and is the education and outreach coordinator for the National Science Foundation's Center "Directed Assembly of Nanostructures" headquartered at Rensselaer. As part of that positions she was one of the executive producers for the Molecularium – a new style of planetarium show that takes the audience (primarily students in K-5) on a magical musical adventure into the world of atoms and molecules with the help of oxy, hydro and hydra (www.molecularium.com). Children learn that "everything is made of atoms and molecules" and about the three states of matter "solids slow, liquids flow, gas is fast!"