

# **UNH Materials Science Seminar**

11:10-12:00, Thursday, January 27, 2005

DeMeritt Hall 209B

University of New Hampshire

## **Baroplastics: low temperature plastics processing by pressure-enhanced mixing**

Professor Anne M. Mayes

Department of Materials Science and Engineering

Massachusetts Institute of Technology

With the aim to reduce energy consumption in plastics manufacturing and improve plastics recyclability, we are developing a new class of plastics that can be processed at low temperatures through the application of pressure. These nanophase materials, termed “baroplastics”, incorporate glassy and rubbery polymer components that exhibit pressure-enhanced miscibility. Baroplastic block copolymers and core-shell nanoparticles have been synthesized and processed as low as 25°C into transparent, molded objects from the as-dried, powdered state. Small-angle neutron scattering (SANS), differential scanning calorimetry (DSC) and transmission electron microscopy (TEM) analyses on the materials before and after molding suggest the transformation to a semi-solid state under pressure that facilitates low temperature molding but partially preserves the glassy domains, lending good mechanical properties to the processed object. Preliminary findings on the mechanical properties and recyclability of these materials will also be described.

## Biography

Anne M. Mayes is currently Toyota Professor of Materials Science and Engineering in the Department of Materials Science and Engineering at M.I.T. She received her Bachelor's degree from M.I.T. in 1986 and her Ph.D. from Northwestern University in 1991, both in the field of Materials Science and Engineering. Following a two-year appointment as Visiting Scientist at IBM Almaden Research Center, she joined the M.I.T. faculty in 1993 as Assistant Professor. She was promoted to Associate Professor in 1997 and to Professor in 2001. Her research interests in self-organizing polymeric materials span applications in battery electrolytes, biomaterials, pressure-processed plastics and water filtration membranes. Mayes is author or coauthor of over 90 publications and 10 patents issued or pending. She has served as a member of the DOE Basic Energy Sciences Advisory Committee from 1999-2003, the Materials Research Society Board of Directors 1999-2002, Treasurer of the Neutron Scattering Society of America 1999-2002, and 2003 Program Chair for the Division of Polymer Physics (DPP) of the American Physical Society, and is currently the DPP Vice Chair Elect. For outstanding service contributions she received the MRS Woody Award (2002) and the NSSA Exceptional Service Award (2004). Her research contributions have been recognized through the NSF Young Investigator Award (1993), the MRS Outstanding Young Investigator (1998), the APS Dillon Medal for Polymer Physics (1999), and election as a Fellow of the APS (2004). She was appointed MacVicar Faculty Fellow in 2001 for her contributions to undergraduate teaching at MIT.