

Carnegie Mellon

Materials Science and Engineering Seminar Series

Frank S. Bates

Department of Chemical Engineering and Materials Science
University of Minnesota

“Block Copolymers: Designer Materials at Commodity Prices”

Friday, April 25, 2008
11:30 A.M. Seminar in Baker Hall A51

Block copolymers have produced some of the most intriguing and complex nanoscale morphologies reported in the field of soft materials over the past several years. This class of macromolecules includes a plethora of molecular architectures (linear, branched, grafted) formed from a wide range of monomers, which can be combined into a nearly unlimited variety of precisely tailored molecular structures. Versatile synthesis techniques, notably anionic and living free-radical polymerization, afford exquisite control over the molecular composition, block sequencing, and molecular weight and polydispersity. Post polymerization catalytic modification such as hydrogenation offers the opportunity to further enhance physical properties. This presentation will examine the basic thermodynamic factors responsible for microphase separation and ordering in model block copolymers, followed by a discussion of several new applications of block copolymers in commodity materials.

Frank S. Bates is a Regents Professor and Head of Chemical Engineering and Materials Science at the University of Minnesota. He received a B.S. in Mathematics from SUNY Albany in 1976, and M.S. and Sc.D. degrees in Chemical Engineering from MIT in 1979 and 1982. Between 1982 and 1989 Bates was a member of the technical staff at AT&T Bell Laboratories, then joined the University of Minnesota as an Associate Professor. He was promoted to Professor in 1991, named a Distinguished McKnight University Professor in 1996, and a Regents Professor in 2007. Professor Bates conducts research on a range of topics related to polymers, with a particular focus on the thermodynamics and dynamics of block copolymers and blends. In 1988 Bates was named a Distinguished Member of the Technical Staff at Bell Labs, in 1989 he received the Dillon Medal and in 1997 the Polymer Physics Prize, both from the American Physical Society where he is a Fellow. He won the 2004 David Turnbull Lectureship Award from the Materials Research Society, shared the ACS Cooperative Research Award in 2008, and has been awarded the 2008 Sustained Research Prize by the Neutron Scattering Society of America. In 2002 Bates was elected to the US National Academy of Engineering and in 2005 he was elected a fellow of the American Association for the Advancement of Science.