

The John D. Ferry Lectureship in Macromolecular Science

Friday, February 19

3:30 p.m.

Room 1315 Chemistry



TOUGH PLASTICS BY MOLECULAR DESIGN

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Perhaps the most ubiquitous requirement for commercial polymer products is mechanical integrity. Conventional approaches to imparting toughness to solid polymers include the addition of rubber particles to glassy plastics such as polystyrene or increasing the amorphous content in semicrystalline materials like polyethylene. Both methods necessitate balancing tradeoffs between toughness and other important properties such as clarity and stiffness. Block copolymers provide a unique opportunity to design tough plastics without sacrificing other desirable material features. A plethora of morphologies can be developed with one-, two-, or three-dimensional order and with morphological dimensions between 5 and 50 nm in scale. These compounds find applications as neat (undiluted) materials or as additives to reactive monomers or bulk homopolymers. This presentation will address two categories of brittle plastics that benefit from block copolymer modification: poly(cyclohexylethylene), a new optically pristine plastic now under commercial development, and thermosetting epoxy, a high volume commodity material that finds myriad applications across innumerable technological disciplines. Optimal results require a combination of molecular (architectural) and morphological design, which rely on a fundamental understanding of the principles that govern block copolymer self-assembly.

A reception will follow the seminar in the Atrium

Please contact Prof. Mahesh Mahanthappa, mahesh@chem.wisc.edu, with questions