

UNH Materials Science Seminar

11:00-12:00, Thursday, September 29, 2005

DeMeritt Hall 209B

University of New Hampshire

Characterization of Nanostructured Polymer Particles

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Composite lattices with specific particle morphologies have long been used in various applications such as coatings, impact modifiers and adhesives. The widespread use of these types of products provides an impetus for understanding the factors that control morphology and product performance. A central requirement for this research is the ability to characterize the morphology to a high degree of detail and confidence. We have often seen that morphology characterization is not straightforward. Observations can easily lead to false or incomplete conclusions about the particle morphology and thus to incorrect interpretations of basic structure-property relationships.

It is impossible to obtain a complete understanding of the particle morphology from a single analytical technique. Transmission electron microscopy is by far the most widely used technique for this type of analysis, but is often plagued by artifacts introduced during sample preparation and is not well suited to many latex systems. Other techniques to determine latex morphology include SEM, AFM, differential scanning calorimetry (DSC), dynamic mechanical analysis (DMA), solid state NMR, scanning transmission x-ray microscopy (STXM), cryo-fracture SEM and surfactant titration. Each of these techniques will be discussed within the context of an interlaboratory "Round Robin" study. The advantages, disadvantages and limitations of each technique, as applied to the determination of latex morphology, will be presented.