



Department of Chemical Engineering

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Transparent Materials, LLC

**Directed Assembly of Nanomaterials:
Overcoming Barriers to Commercialization**

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2:15 p.m.

101 Goergen Hall

Nanomaterials have great potential for, among others, high-strength composites and biomedical composite implants. They have been shown to dramatically increase strength, hardness, wear resistance and the flexural strength of polymers when formulated as composites, and to improve integration (especially osseointegration) when formulated into biomedical composites.

However promising, nanotechnology still faces many severe obstacles with respect to manufacturability and integration that have limited commercial applications. There is a fundamental problem associated with the application of nanomaterials. Briefly stated, due to their tremendous surface area, nanomaterials are homogeneously dispersed only with great difficulty (or not at all) into polymers/polymer precursors, since at high concentrations viscosity rises exponentially. Transparent materials, LLC has developed a methodology, and a manufacturing process, for producing "nanomaterial aggregates" that allows for the control of surface area, that greatly facilitates dispersion of nanomaterials, and most importantly, does so with retention of the nanoscale properties of the components. This process has potential to expand and simplify applications for nanomaterials.

This talk will focus on this methodology for the controlled simultaneous assembly (CSA) of nanomaterials that enables control of surface charge and surface energy. The chemical and physical forces that govern assembly, and commercial applications of the technology, will be discussed.