

# IOWA STATE UNIVERSITY

## Center for Multiphase Flow Research and Education

### Nanoparticle Stability and Dynamics in Polymer Matrices

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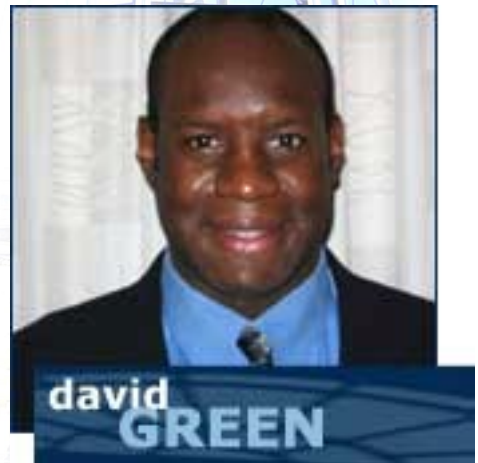
Wednesday, April 10, 10 am, 2004 Black Engineering

#### Abstract

A driving paradigm of nanomaterials design is the bottom-up assembly of nanoscale components into useful structures. Meeting this gold standard requires control over material interactions at nano, meso-, and macroscopic length scales. In polymer nanocomposites one method of exerting control over particle dispersion and assembly is through synthetic control over the graft polymer, or polymer brush, which experiences wetting transitions that dictate the stability and dynamics of the particles in polymer solutions and melts. Using a range of techniques including controlled-radical polymerizations, static and dynamic laser and x-ray scattering, micro- and macro-rheology, and self-consistent mean field theories, we formulate systems of fundamental and industrial relevance to elucidate the effects of graft polymer wetting at low and high graft densities. In this talk we will show that the wetting and flow behaviors can be quantifiably linked to the particle microstructure and viscoelastic properties. Overall, these studies represent robust ways of quantifying the factors that control the interactions of polymer-grafted nanoparticles in polymer solutions and melts.

#### Biography

David Green is an Associate Professor in the departments of Materials Science and Chemical Engineering at the University of Virginia. The overarching theme of his studies is to elucidate and quantify how polymers at interfaces control the actions of nanoparticles and polymer droplets in polymer solutions, melts, and blends with applications towards all facets of nanotechnology. He received his PhD at the University of Maryland at College Park (UMCP) in Chemical Engineering and his BS from Boston University in Mechanical Engineering. Dr. Green has won a number of awards including a Sloan PhD Fellowship, NSF International Postdoctoral Fellowship, and an NSF CAREER Award.



***This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.***

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