



## MMAE SEMINAR

Wednesday, May 2, 2007  
E-1 BUILDING – CRAWFORD AUDITORIUM  
3:30 – 4:30 PM

### **Modeling and Simulation of Nanoparticle Formation & Growth in Turbulent Reacting Flows**

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#### **Abstract**

Nanoparticles are considered to be one of the building blocks to the formation of nano-structured materials. The economical and efficient production of nanoparticles with prescribed/desired properties is a critical element to the implementation of nano-structured materials. For example, the most common method for large-scale production of nanoparticles is combustion synthesis. This is due, in part, to its overwhelming cost and control advantages over other methods when scaled-up for the production of bulk quantities. Unfortunately there is little understanding of the underlying phenomena due to the complex nature of the process, which ultimately hampers further refinements. The difficulties, both experimentally and computationally, result from the vast range of length (and time) scales encompassing particle growth - from less than 1nm (a few atoms) to 100nm where processes transition from a molecular, to clusters, to bulk, to integral length-scales found in fluid processes. Professor Garrick's work utilizes theory, numerical methods and experimental observations in the areas of fluid dynamics, combustion, and particle formation & growth processes to create computational tools that describe nanoparticle dynamics in a wide variety of flow-regimes, with a goal characterizing and controlling the properties and morphology of nanoparticles given the local thermo-chemical and thermo-physical histories. This seminar will feature recent work on nanoparticle nucleation, flame synthesis as well as the effects of fluid turbulence on nanoparticle formation and growth.