

**MECHANICAL ENGINEERING DEPARTMENT
ME/IE 8773-8774**

**THERMODYNAMICS AND HEAT TRANSFER SERIES
Topic: NANO-HEAT TRANSFER
Hosts: Sean Garrick and Terrence W. Simon**

Synthesis and Processing of Nanomaterials in Dusty Plasmas

by

**Themis Matsoukas, Associate Professor
Department of Chemical Engineering
Fenske Laboratory
Pennsylvania State University
University Park, PA**

**Wednesday, November 30, 2005
3:30-5:00 pm
Room 1130 ME**

Coffee and refreshments will be available at 3:15 pm in Room 1130 ME before the seminar.

ABSTRACT — In the early 90's scientists in the microelectronics area noticed that process plasmas often produce particles that tend to remain trapped in the plasma over long periods of time. They called these systems "dusty plasmas" and soon a new research field was born with the goal of understanding the physics of particle-laden plasmas and the new phenomena that arise from the interaction between charged particles and plasma. We have developed a radio-frequency dusty plasma that allows us to produce thin films, ranging from ultra-low thicknesses of few nm to upwards of 100 nm onto nanoparticles and nanowires suspended electrostatically in the plasma. We seed the plasma with micron and submicron silica particles and induce surface deposition of plasma-generated polymers produce by the decomposition of various hydrocarbon molecules. In this talk we discuss experimental studies and numerical simulations of film deposition in such discharges.

BIO — Themis Matsoukas received a B.S. degree in Chemical Engineering (1983) from the National Technical University, Greece, and Ph.D. degree in Chemical Engineering (1989) from the University of Michigan, Ann Arbor. After completion of his doctorate degree, he worked as a Postdoc in the Department of Chemical Engineering, University of California, Los Angeles. He is currently an Associate Professor in the Chemical Engineering Department at The Pennsylvania State University. Prof. Matoukas received the Penn State Engineering Society (PSES) Outstanding Advising Award (2004), an NSF Career Award (1997). Students supervised by Prof. Matsoukas have received various distinctions including: Jin Cao (first place, Graduate Research Exhibition, Penn State 2002), Danijela Vorkapic (first place, Graduate Research Exhibition, Penn State 1998). His research interests include: Plasma processing of materials, nanoparticles and nanocolloids, and population balances and statistical mechanics of dispersed phases which have been funded by NSF and Air Products. Prof. Matsoukas' teaching interests include thermodynamics, statistical mechanics, and air pollution.

Informal Faculty Luncheon: Wednesday, November 30, 2005, 12:00 noon. Meet in 1100 ME and walk to lunch with other faculty. Prof. Matsoukas will be able to attend.