SCHOOL OF CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING
And
UNIVERSITY OF OKLAHOMA BIOENGINEERING CENTER
100 E. Boyd, Sarkeys Energy Center, T-335
405-325-5811
The University of Oklahoma
Norman, Oklahoma

2010 – 2011 Seminar Series

DR. MATTEO PASQUALI

PROFESSOR IN CHEMICAL AND BIOMOLECULAR ENGINEERING
DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING
DEPARTMENT OF CHEMISTRY
THE SMALLEY INSTITUTE FOR NANOSCALE SCIENCE AND TECHNOLOGY
THE KEN KENNEDY INSTITUTE FOR INFORMATION TECHNOLOGY
RICE UNIVERSITY, HOUSTON, TEXAS

Will present a seminar on

"FLUID PHASES OF NANO-CARBON"

Nanoscale carbon—including Single-Walled Carbon Nanotubes (SWNTs) as well as graphene, i.e., graphite in its single layered form—has remarkable electrical, thermal, and mechanical properties, more so than previously known polymer molecules or colloidal particles. Realizing these properties in applications requires understanding and controlling the behavior fluid phases of nano-carbon. Biological and environmental applications are likely to require dilute phases of nano-carbon; material processing, e.g., production of coatings and fibers, will require more concentrated phases.

Difficult fluid handling is one of the most important frontiers of applied research in SWNTs and graphene. Nano-carbon fluids are almost considered an oxymoron because dispersing or dissolving SWNTs and graphene into fluid phases is exceedingly difficult.

In this lecture, I will discuss how SWNTs as well as graphene can and should be viewed as hybrids between polymer molecules and colloidal particles. Even at low concentrations (few parts per million), SWNTs form complex fluid phases with intriguing properties. Their interaction can be mediated by polymers and surfactants to produce complex individual architectures. In superacids, SWNTs as well as graphene dissolve spontaneously. At low concentration, these fluids can be used for making transparent, conducting films and coatings. At sufficiently high concentrations, they form liquid crystals that can be spun into well-aligned, macroscopic fibers. Intriguingly, the self-assembly of SWNTs into liquid crystalline phases can be understood by "hybridizing" Onsager's theory for colloidal rods with Flory's theory for rod-like polymers.

The work on graphene is done in collaboration with the research group of Prof. James Tour (Rice University); cryo-microscopy of nano-carbon fluids is done in collaboration with the research groups of Profs. Yeshayahu Talmon and Yachin Cohen (Technion).

THURSDAY, OCTOBER 28, 2010
COOKIES AND COFFEE -- 2:45 P.M.
SEMINAR -- 3:00 P.M.
SARKEYS ENERGY CENTER, ROOM M-204

THIS IS A REQUIRED SEMINAR FOR CHE 5971

Accommodations on the basis of disability are available by contacting the office above three days before the event.