Time & Location: April 6, 2015 at 1:00 PM in EGN1 381J
Title: Evaporative Vapor Deposition for Depositing 2D Materials

The development of a new deposition technique called evaporative vapor deposition (EVD) is reported, allowing deposition and formation of atomically-thin, large area materials on arbitrary substrates. This work focuses on the highly popular monolayer material -- graphene oxide (GO). A droplet of a GO solution is formed on a heated polymer substrate, and maintained at steady-state evaporation (all droplet parameters are held constant over time). The polymer substrate is laser patterned to control the droplet's contact line dynamics and the droplet's contact angle is maintained using a computer controlled syringe pump. A room temperature silicon wafer is translated through the vapor field of the evaporating GO droplet using a computer controlled translation stage. Dropwise condensation formed on the silicon wafer is monitored using both optical and infrared cameras. The condensation rate is dependent on both substrate translation speed and height difference between the droplet's apex and substrate surface. Nano-sized GO flakes carried through the vapor phase are captured in the condensate, depositing on the translating wafer. Deposition rate is dependent on the stability of the solution and droplet condensate size. Characterization with Raman spectroscopy show expected shifts for graphene/graphite. The presented EVD technique is promising toward formation of large scale 2D materials with applications to developing new technologies.

Major: Aerospace Engineering

Educational Career:
Bachelor's of Aerospace Engineering, BS, 2014, University of Central Florida

Committee in Charge:
Shawn Putnam, Chair, Mechanical and Aerospace Engineering
Lei Zhai, Nanoscience Technology Center & Department of Chemistry
Weiwei Deng, Department of Mechanical and Aerospace Engineering

Approved for distribution by Shawn Putnam, Committee Chair, on March 19, 2015.

The public is welcome to attend.