

## University of Pittsburgh

### Petersen Institute of NanoScience and Engineering Seminar

- Speaker:** Professor Richard Kaner  
Department of Chemistry, University of California, Los Angeles
- Title:** *Synthesis, Characterization and Applications of Chemically Converted Graphene*
- Time/Date:** 12:00 noon, Monday, September 21, 2009  
(refreshments at 12:00noon - 12:15pm)
- Place:** Kresge Conference Center, 1175 Benedum Hall

Single layer graphene is of great interest for electronic applications as an atomically thin, zero band gap semiconductor. Experimental results so far have been limited due to the difficulty of creating large, single layer samples. Here we report a competitive approach to the large-scale production of single layer chemically converted graphene (CCG). By dispersing graphite oxide paper in pure hydrazine, we are able to remove oxygen functionalities while preserving the integrity and restoring the planar geometry of single sheets. The CCG sheets produced with this method have among the largest areas of any yet reported (up to 20 x 40  $\mu\text{m}$ ), making them relatively straightforward to process. Field effect devices have been fabricated by conventional photolithography and display currents that are three orders of magnitude higher than those previously reported for CCG. The versatility of solution processing also enables single layer graphene sheets to be registered using a PDMS stamping technique. Through surface energy manipulation, large-scale registration of graphene is now possible. Raman spectroscopy has been used to confirm uniform registrations across large areas. Due to the large size of these sheets, comprehensive studies including optical microscopy, AFM, SEM and FET device characterization can all be performed on the same specimen. This solution processing thus holds great promise for nanoelectronic applications.

#### Biographical Sketch

**Dr. Richard B. Kaner** received a Ph.D. in inorganic chemistry from the University of Pennsylvania in 1984 working with Prof. Alan MacDiarmid (Nobel Laureate 2000). After carrying out postdoctoral research at the University of California, Berkeley, he joined the University of California, Los Angeles (UCLA) in 1987 as an Assistant Professor. He was promoted to Associate Professor with tenure in 1991 and became a Full Professor in 1993. He has published over 220 papers in top peer reviewed journals and holds 11 U.S. patents with 16 more pending. Professor Kaner has received awards from the Dreyfus, Fulbright, Guggenheim and Sloan Foundations as well as the Exxon Fellowship in Solid State Chemistry and the Buck-Whitney Research Award from the American Chemical Society for his work on refractory

materials including new synthetic routes to ceramics, intercalation compounds, superhard materials, graphene and conducting polymers. Along with appointments in the Departments of Chemistry and Materials Science & Engineering, Professor Kaner serves as the Associate Director of the new California NanoSystems Institute whose \$170M building was dedicated just over a year ago.