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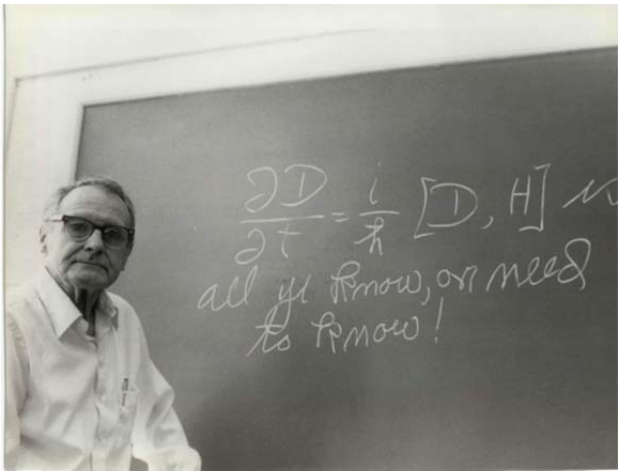

Professor Richard K. Osborn

Nuclear Engineering & Radiological Sciences
And
Materials Science & Engineering

Present the First Annual

Richard K. Osborn Lecture
by Professor Ju Li

Massachusetts Institute of Technology (MIT)
Department of Nuclear Science and Engineering
Department of Materials Science and Engineering

"Plumber's Wonderland Found on Graphene"

Friday, September 23, 2011

4 – 5 p.m.
Stamps Auditorium
Walgreen Drama Center
1226 Murfin Avenue

Refreshments 3:45 p.m.

The First Annual
Richard K. Osborn Lecture*
By Professor Ju Li
"Plumber's Wonderland Found on Graphene"

Curvy nanostructures such as carbon nanotubes and fullerenes have extraordinary properties but are difficult to pick up and assemble into devices after synthesis. We have performed experimental and modeling research into how to integrate curvy nanostructures on flat graphene, taking advantage of the fact that graphene bends easily after open edges have been cut on it, which can then fuse with other open edges, like a plumber connecting metal fittings. By applying electrical current heating to few-layer graphene inside an electron microscope, one effectively anneals out the radiation damage and observes the *in situ* creation of many interconnected, curved carbon nanostructures, such as graphene bilayer edges (BLEs) aka "halfnanotubes", BLE polygons and nanotube-BLE junctions connecting multiple layers of graphene. A novel piezoelectric effect causes the BLEs to have large permanent electric dipoles of 0.87 and 1.14 Debye/Å for zigzag and armchair inclinations, respectively. Unlike carbon nanotubes, which fold graphene by 2 protation and are highly poly-disperse in chiralities and radius, BLEs are highly mono-disperse structures due to the protation and a lattice orientation constraint during processing. Further investigations indicate that multiple-layer graphene offers unique opportunities for tailoring carbon-based structures and engineering novel nano-devices with complex topologies.

Ju Li is a Professor of Nuclear Science and Engineering and Materials Science and Engineering at MIT. His group (http://li.mit.edu) performs theoretical and computational research on mechanical properties of materials, and energy storage and conversion. Ju obtained a PhD degree in nuclear engineering from MIT in 2000, and Bachelor's degree in Physics from University of Science and Technology of China in 1994. He has more than 130 peer-reviewed papers (h-index 34), and is the winner of the 2005 Presidential Early Career Award for Scientists and Engineers, 2006 MRS Outstanding Young Investigator Award, and 2007 TR35 award from *Technology Review*.

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