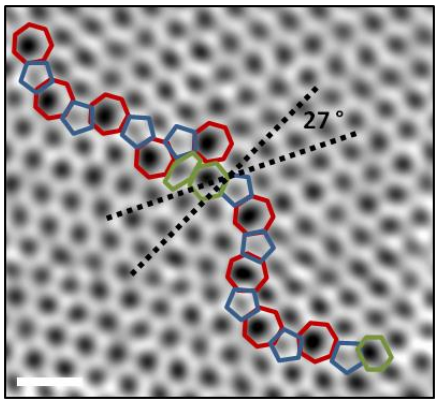
Department of Engineering
Seminar Program
Wednesday, February 12, 2014
Shanahan Teaching and Learning Center
Lecture Hall 1430, 4:15pm

"Materials Engineering in Flatland: How Do We See and Manipulate Materials That are Only 1 Atom Thick?"

Pinshane Huang, Cornell University

Summary:



Atoms stitching together a grain boundary in graphene

How do we see, understand, manipulate, and apply materials that are only a few atoms thick? These questions are at the forefront of the new field of 2D materials, where the discovery of graphene has captured the imagination of scientists and engineers across disciplines. To convert the promise of 2D materials to real-world applications, it is critical to develop techniques to characterize and control each and every atom. Rogue atoms, like defects and dopants, can have dramatic effects on the properties of materials that are a single atom thick. We show that using transmission electron microscopy, we can characterize the structure and properties of 2D membranes—down to imaging every atom at the grain boundaries—and test the local mechanical strength and electrical conductivity. Our atomic-scale studies of the grain structure of graphene have allowed us to create large sheets of graphene that are strong, flexible, and conductive. Now, we are exploring the possible applications of graphene origami that we can pick up, cut, and fold into 3D shapes.

Bio:

Pinshane Huang is a graduate student in the School of Applied & Engineering Physics at Cornell University. She has earned a M.S. in Applied Physics from Cornell University and a B.A. in Physics from Carleton College. She is a National Science Foundation Graduate Research Fellow and the recipient of numerous conference awards, including accolades from the Microscopy Society of America, American Ceramics Society, and Microbeam Analysis Society. She has also been awarded the 2013 William Nichols Findley Award for Exceptional Research from the Cornell University School of Applied and Engineering Physics and a fellowship from Cornell University's Center for Nanoscale Systems. Her research has been featured in National Geographic, BusinessWeek, CBS News, and Discover Magazine. Her work has also been highlighted in the Guinness Book of World Records for the discovery of the world's thinnest glass.