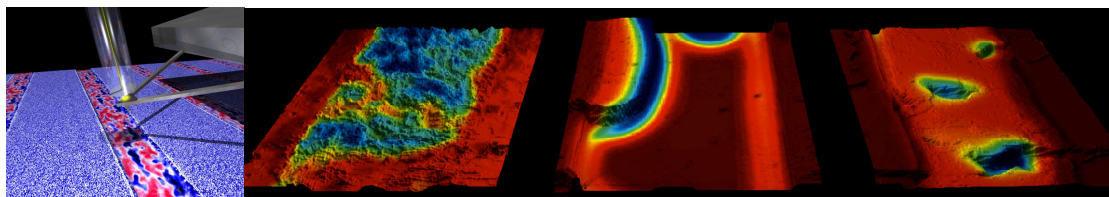


IGERT/Graduate Portfolio Seminar  
Wednesday, November 18, 12:00  
Meet with speaker 11:30  
NST 1.104

## What's going on down there?

Insights into fundamental processes in organic electronic materials and devices  
from electric force microscopy

John A. Marohn  
Department of Chemistry and Chemical Biology  
Cornell University, Ithaca, NY USA



Fabricating circuits and solar cells by solution-processing readily available organic compounds is a potentially revolutionary concept. Given the meager understanding of organic semiconductor materials, however, development of organic devices proceeds largely by trial and error. While tremendous effort is being expended to mass-produce organic devices, almost no attention has been devoted to developing a microscopic understanding of fundamental processes in organic semiconductors. To accelerate development, we need a better microscopic understanding.

We use electric force microscopy to make local measurements of electrostatic potential and capacitance in working organic devices. Measurements take place with devices in vacuum or in nitrogen, and in some cases over a large temperature range and under variable-wavelength irradiation. The resulting data has allowed us to address long-standing puzzles related to ion motion, metal-to-organic charge injection, and charge trapping in organic semiconductor materials. Case studies involving both small-molecule and polymeric semiconductors will be presented.

I will briefly present my group's work using scanned-probe microscopes to detect and image electric field *fluctuations* at nanoscale resolution.

Bio: Professor Marohn earned a B.S. in Chemistry and a B.A. in Physics from the University of Rochester (Rochester, New York), carried out his Ph.D. work with Daniel P. Weitekamp in the Division of Chemistry and Chemical Engineering at the California Institute of Technology (Pasadena, California), and did postdoctoral work as a U.S. National Research Council Postdoctoral Associate of the U.S. Army Research Laboratory (Adelphi, Maryland). He joined the Cornell faculty in 1999 and was promoted to Associate Professor in 2005. He is a member of the Cornell Center for Nanoscale Systems, the Cornell Center for Materials Research, and the Kavli Institute at Cornell for Nanoscale Science; he presently serves on the Executive Committees of the Cornell Center for Materials Research and the Cornell NanoScale Science and Technology Facility. Marohn has organized to and chaired two International Kavli Conferences on the topic of Routes to Three-Dimensional Imaging of Single Molecules.