

# Materials Chemistry Seminar

Monday, 3:30 pm  
October 24, 2016

Room 1315  
Chemistry Building



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### *“Materials and Measurements for Printed and Flexible Electronics”*

Since the discovery of semiconducting organic molecules in the 70's, they have enabled many new flexible electronics devices including transistors, solar cells, and displays. I will discuss the fundamentals of this technology and the important properties of materials that drive these exciting new applications. I will draw examples from the manufacturing of organic photovoltaics (OPV), a promising technology for low-cost solar cells. We have developed synchrotron-based X-ray scattering and a variety of benchtop spectroscopic methods to follow the structure evolution of these and other functional films as a printed ink dries. The measurements reveal the mechanisms by which the molecular design, formulation, and processing choices influence the nanoscale structure of the films.

The quest for structure-property relationships in OPV and other organic semiconductors has driven enormous advances in soft matter characterization over the past decade. Despite all the progress, surprisingly little consensus has been reached on what aspects of organic semiconductor film structure actually matter. Although order and orientation *must* matter, at what length scales are they relevant? I will discuss how a molecular-scale picture – the most difficult to obtain, particular in soft materials - may ultimately be required. We have recently made progress in developing new measurements that combine principles of spectroscopy, inelastic small-angle scattering, real-space imaging, and molecular simulation, which may at last provide a useful molecular scale structure measurement for soft materials and complex fluids.