University of Minnesota
Driven to Discover℠

Department of Chemistry

Seminar

9:45 a.m. Thursday, December 20, 2012 • 231 Smith Hall

Postdoctoral Fellow

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Northwestern University

Probing and Chemically Manipulating 2D Carbon Based Electronic Materials in Time and Space

Abstract

Carbon based systems such as graphene and polymers have been proposed as successors to silicon and other inorganic semiconductors in a number of applications including solar cells, and microelectronics; however, several persistent chemical issues prevent their wide scale incorporation into real world devices. The first part of this talk will examine one such problem, namely the nature of ultrafast charge localization in organic semiconductors, a problem which plagues organic photovoltaics and organic electronics. Ultrafast angle-resolved photoemission experiments can be used to follow the excited state electron dynamics in these systems. By comparing the electronic dynamics of two model organic chromophores, sexithiophene and its alkylated counterpart dihexyl sexithiophene, it will be shown that the alkyl units are not simple spectator units, but that they efficiently localize charges into small polarons within 250 femtoseconds.

The second part of this talk will focus on recent work adding chemical functionality to graphene. Although graphene is a remarkable material with superlative electronic and thermal properties, its lack of a band gap and its chemical inertness present severe obstacles to its incorporation into the semiconductor industry. I will present recent work investigating the reversible chemistry of graphene with atomic radicals and organic molecules using scanning tunneling microscopy and Raman spectroscopy.

Host: Aaron Massari
Refreshments will be served prior to the seminar.