Physical Chemistry Seminar

Tuesday, February 23, 2016 | **11:00 am** | **Room 1315 Chemistry Building**

Structure, Dynamics, and Disorder in Excited States of Photoresponsive Conjugated Materials

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Host: Etienne Garand

Conjugation is a key attribute of many organic materials (e.g. photovoltaics and photoswitches) and there is continued interest in tailoring conjugated moieties and their interactions in order to control their photoresponses. A critical step in this direction is to understand relationships between structure at the intra- and intermolecular levels and photoinduced behaviors (dynamics). In this talk we present our efforts to illuminate structural properties and dynamics of excited states in conjugated materials as well as structure-dynamics relationships that underlie their photoresponsive behaviors. Experimentally we utilize femtosecond stimulated Raman spectroscopy in combination with time-resolved electronic spectroscopies to interrogate variations in local structure and delocalization and to probe nuclear dynamics induced by excitation. We present work with poly- and oligothiophenes demonstrating that ultrafast evolution in excited-state conformation and exciton localization can be tracked through time-dependence in Raman frequencies and in mode-specific resonance enhancements (bottom left). We further illustrate that resonance enhancement enables photoselectivity for interrogating the nature of various structural motifs that support localized excited and charge-separated states in aggregated materials (center). Finally we describe multiplicity-specific, isomer-dependent switching mechanisms in thiophene-based photoswitches (right); the role of multiexcitonic states in switch activation and implications for photoswitch design are discussed.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students can meet with the speaker in Room 8305F at 1:00 pm