

The Chemistry and Physics of Condensed Matter Specialization presents:

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Excitons in the Rubrene Single Crystal: Fission, Fusion, Diffusion, and Dissociation

Abstract:

This talk will present an overview of recent discoveries about the properties of singlet and triplet excitons and their interaction in rubrene, a molecular crystal currently under intense study as an organic semiconductor for electronic and optoelectronic applications. I will first highlight how photon absorption in this material directly results in the creation of singlet excitons, and how radiative recombination of singlet excitons results in photoluminescence spectra that are strongly affected by the anisotropic crystal properties. Then, I will show how the space and time dependence of the same photoluminescence is influenced by a peculiar exciton dynamics that is characteristic of organic crystals: The very efficient spin-conserving transformation of singlet excitons into triplet excitons (fission) and vice-versa (fusion). From this I will move to the problem of exciton diffusion in molecular materials and show how we have been able to directly observe the diffusion of long-lived triplet excitons in rubrene. Finally, I'll discuss the triplet exciton dissociation, its surprising effects on the photocurrent dynamics observed in rubrene after pulsed excitation, and its relevance for organic photovoltaics.

Date: Tuesday, November 5, 2013

Time: 4:00 PM – 5:00 PM

Location: Science Complex, P-317

