Department of Physics and Astronomy

Special Seminar on 01/13/2017

Exciton Delocalization and Magnetic Interactions in Crystalline Organic Thin Films

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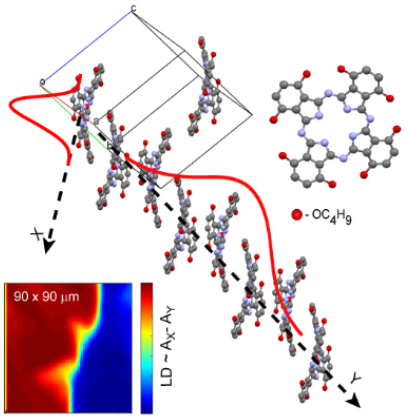
Organic electronics, an interdisciplinary research area traditionally more connected to organic synthetic chemistry and polymer science than condensed matter physics, is currently undergoing a major transformation. The advent of high mobility small molecule semiconductors and new avenues for scalable thin film and device fabrication introduce a new paradigm in a research field that was historically overwhelmingly focused on polymer-based materials.



At the University of Vermont my research group focuses on exploring excitonic states, low temperature magnetism and spin-dependent exchange interactions in metal and metal-free octabutoxy phthalocyanine (OBPc) crystalline semiconducting thin films that belong to an intermediate regime between a fully localized (Frenkel) and fully delocalized (Wannier) picture of the excitonic behavior. We employ condensed matter experimental approaches (in particular low temperature, polarization-resolved, ultrafast, magneto-spectroscopy) on a quest for signatures of long range interactions such as exciton coherence and spin exchange in these systems. Recent results include: i) the observation of a low temperature coherent exciton state [1] ii) the surprising discovery of excitonic states localized at the grain boundary that may provide new insight on exciton diffusion in these systems,[2] and iii) the direct observation of an MCD signature of an exchange between d-shell electrons of the metal ion and the delocalized π-orbitals of the ligand in transition metal species of MOBPc [3].

Date: January 13, 2017, Friday
Time: 12:10 p.m. (Refreshments in Rm. 103 @ 12:00 p.m.)
Place: Rm. 103, Thirkield Hall, Howard University
Host: Dr. Pratibha Dev

1. Rawat, N., et al. J. Phys. Chem. Lett. 2015, **6**(10), 1834-1840.
2. Pan, Z., et al. Nat. Commun. 2015, **6**.
3. Rawat, N., et al., Sci. Rep. 2015, **5**, 16536.

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