LIQUID CRYSTAL MATERIALS RESEARCH CENTER

SPECIAL SEMINAR SERIES

Exciton Engineering for Improved Quantum Dot Photovoltaics

Mark T. Lusk

Department of Physics
Colorado School of Mines

Recent advances in the synthesis of inorganic quantum dots (QDs) opens up an intriguing opportunity for exploiting quantum confinement as a means of improving photovoltaic energy conversion efficiency. The design space is rich since size, shape and surface termination of these robust nanostructures can be used to change the nature of quantum confinement and thus modify the character of photon absorption/emission and excitonic relaxation rates. As an alternative to immediate charge separation, quantum confinement can also be exploited to design assemblies that promote exciton transport between quantum dots. Within this setting of nanostructured exciton dynamics, two facets of exciton engineering will be discussed. The first is multi-exciton generation (MEG), the production of more than one exciton from a single photon, and the MEG rate is quantified as a function of dot size. The second topic, exciton transport, elucidates the way in which dot size and surface termination modify inter-dot transport dynamics. In both cases, we show that the relevant process efficiency increases as dot size decreases. Excitonically speaking, photo-energy conversion favors assemblies composed of smaller quantum dots.

Wednesday, February 22nd at 1:30 p.m.
Duane Physics G1B31

Sponsored by the Liquid Crystal Materials Research Center
Department of Physics, University of Colorado.

http://lcmrc.colorado.edu