

CORE-CM SEMINAR

Michigan State University

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Understanding and Optimizing Solution-Processed Systems

Solution- and slurry-processing techniques offer possibilities for scalable and low-cost manufacturing. Today, these techniques enable technologies such as lithium ion batteries and promise to play a future role in a wide variety of electronic, photonic, and electrochemical systems. Materials and devices made from these approaches often have hierarchical structures and complex interfaces. To realize the full potential of solution-processed systems, understanding structure-performance relationships is critical.

In this talk, I will present two examples of how my group uses neutrons, electrons, and photons to characterize structure at different length scales and to gain insights into performance limitations of solution-processed systems. My group then applies these findings to develop design guidelines for systematic improvement of materials and devices. First, I will describe how x-ray tomography has enabled us to quantify microstructure in lithium ion batteries and understand transport limitations. Second, I will explain how combining results of quasi-static and capacitive electronic measurements with inelastic neutron scattering and ab-initio molecular dynamics investigation of phonon density of states has allowed us to understand why specific surface treatments applied to nanocrystalline materials improves their performance in optoelectronic devices.

Thursday, April 27, 2017

12:00 NOON

Room 1400 – Biomedical & Physical Sciences

Richard Lunt - Host