Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Vertical alignment of nanorods in thin film polymer nanocomposites MIGUEL A. MODESTINO, Dept. of Chemical Engineering, UC Berkeley, JEFFREY J. URBAN, Molecular Foundry, Lawrence Berkeley National Laboratory, RACHEL A. SEGALMAN, Dept. of Chemical Engineering, UC Berkeley — Controlling orientation of anisotropic nanocrystals in conjugated polymer nanocomposites can lead to hybrid materials with new or improved properties for optoelectronic applications. Here, we demonstrate that careful control of rod-rod interactions and solvent evaporation rates can yield polymer composites containing arrays of vertically aligned CdSe nanorods over large areas (>1 cm^2). Grazing incidence x-ray scattering together with transmission electron microscopy (TEM) results show the presence of hexagonally packed arrays of nanorods uniaxially oriented in thin films polymer composites and cross-sectional TEM shows a strong segregation of the arrays toward the surfaces of the films. Also, we demonstrate how systems with different polymer-rod and substrate-rod interactions exhibit equivalent behavior, while varying the rod-rod interactions has a significant impact in the self-assembly of the nanocrystals. The use of aligned nanorods in photovoltaic devices, polarized light emitting diodes and solar-to-fuel devices also will be discussed.

Miguel A. Modestino
UC Berkeley

Date submitted: 19 Nov 2009 Electronic form version 1.4