Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Co-assembly of Nanorods and Photosensitive Polymer Blends[1]
YA LIU, OLGA KUKSENOK, ANNA BALAZS, University of Pittsburgh — Using computational modeling, we establish means of controlling structure formation in nanocomposites comprising nanorods and a photosensitive binary blend. The complex cooperative interactions in the system include the preferential wetting between the rods and one of the phases in the blend, steric repulsion between the coated rods and the response of the binary blend to light. Namely, under uniform illumination, the binary mixture undergoes both phase separation and a reversible chemical reaction, leading to a morphology resembling that of a microphase-separated diblock copolymer. When a second, higher intensity light source is rastered over the sample, the binary blend and the nanorods co-assemble into regular, periodically ordered structures. In particular, the system displays an essentially defect-free lamellar morphology, with the nanorods localized in the energetically favorable domains. By varying the speed at which the secondary light is rastered over the sample, we can control the directional alignment of rods within the blend. Our approach provides an effective route for achieving morphological control of both the polymeric components and nanoparticles, providing an effective means of tailoring the properties and ultimate performance of the composites.

[1]The work was funded by DOE

Ya Liu
University of Pittsburgh

Date submitted: 07 Nov 2012 Electronic form version 1.4