Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Nanostructured functional hybrid materials via self-assembly of brush block copolymers[1] DONG-PO SONG, YUE GAI, BENJAMIN YAVITT, JAMES WATKINS[2], University of Massachusetts, Amherst — The self-assembly of well-ordered nanoparticle (NP) / block copolymer (BCP) composites enables precise control over the spatial distribution of NP arrays, providing a simple route to the low-cost "bottom-up" fabrication of hybrid materials with enhanced mechanical, optical and electric properties. Here we summarize the fabrication of nanocomposites via the self-assembly of brush BCPs (BBCPs). In comparison to conventional materials based on linear BCPs, the BBCP hybrids exhibit many attractive features, including rapid supramolecular self-assembly (<5 min), macroscopic ordering, large lattice parameters (>100 nm), and high loading of functional additives (>70 wt%). Both the self-assembled structures and the compositions of the nanocomposites can be widely tuned for applications such as photonic crystals or coatings, nonlinear optics, and metamaterials. In addition, BBCPs were employed as templates for the mesoporous hybrid materials that have large mesopores (up to 40 nm) and high loadings of functional NPs (up to 50 wt%). Simple solutionbased processing and rapid self-assembly of brush BCP nanocomposites are promising for roll-to-roll manufacturing of low-cost and flexible devices.

[1]This work was supported by NSF Center for Hierarchical Manufacturing at the University of Massachusetts, Amherst
[2]PI

Yue Gai
University of Massachusetts, Amherst

Date submitted: 11 Nov 2016 Electronic form version 1.4