

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Ordered Mesoporous Carbon/Iron Oxide Nanoparticle Composites for Supercapacitor Applications**<sup>1</sup> YING LIN, XINYU WANG, JAMES WATKINS, Department of Polymer Science and Engineering, University of Massachusetts Amherst — Novel mesoporous carbon/iron oxide composites were prepared through a simple carbonization procedure of blends of block copolymer precursors containing the source of carbon, i.e., polyacrylonitrile-block-poly(*t*-butyl acrylate) (PtBA-*b*-PAN) with iron oxide nanoparticles. The addition of functionalized nanoparticles that selectively hydrogen bond with PAN segments was shown to induce order in otherwise disordered system. The ordered mesostructure of the composites was confirmed by both small x-ray scattering and transmission electron microscopy. The preparation of nanocomposites with pore structure was enabled by the high fidelity preservation of the phase-separated nanostructure between two polymer blocks driven by nanoparticle additive upon carbonization at 700°C. The electrochemical performance of the composite films was compared to that of the neat carbon and the mesoporous carbon without iron oxide nanoparticles. The mesoporous structure together with the high iron contents in such materials make them particularly promising for use in supercapacitor applications.

<sup>1</sup>This work was supported by the NSF Center for Hierarchical Manufacturing at the University of Massachusetts (CMMI-0531171).

Ying Lin  
Department of Polymer Science and Engineering,  
University of Massachusetts Amherst

Date submitted: 26 Nov 2012

Electronic form version 1.4