Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Additive-Driven Self-Assembly of Well Ordered Mesoporous Carbon/Iron Oxide Nanoparticle Composites for Supercapacitors[1] YING LIN, XINYU WANG, GANG QIAN, JAMES WATKINS, University of Massachusetts Amherst, DEPARTMENT OF POLYMER SCIENCE AND ENGINEERING, UNIVERSITY OF MASSACHUSETTS AMHERST TEAM — Supercapacitors have attracted significant attention as energy storage devices for applications to meet the requirements of fast charge and discharge, high power density, and long cycle life. Recent research efforts demonstrate that the metal oxide- mesoporous carbon nanocomposite materials are indeed a class of promising electrode materials for high performance supercapacitors. However several major drawbacks for metal oxide-carbon nanocomposite materials remain, such as relatively low loadings of the metal oxide, aggregation of nanoparticles, and the lack of an ordered mesoporous structure. Here we demonstrate that well ordered mesoporous carbon/iron oxide composites can be prepared through simple carbonization of blends of block copolymers serving as the source of carbon and a porogen, e.g., poly(t-butyl acrylate)-block-polyacrylonitrile (PtBA-b-PAN), and iron oxide nanoparticles (NPs). Strong interactions between phenol-functionalized iron oxide NPs and polyacrylonitrile result in a preferential dispersion of the nanoparticles within the PAN domains and leads to ordered nanostructured mesoporous carbon framework containing upto 30 wt

[1]This work was supported by the NSF Center for Hierarchical Manufacturing at the University of Massachusetts (CMMI-1025020).

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Date submitted: 14 Nov 2013 Electronic form version 1.4