

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Probing Structural Changes in Poly(3-hexylthiophene) (P3HT) During Electrochemical Oxidation with In Situ X-ray Scattering¹ JACOB L. THELEN, University of California Berkeley, Lawrence Berkeley National Laboratory, SHRAYESH N. PATEL, University of California Berkeley, ANNA E. JAVIER, Lawrence Berkeley National Laboratory, NITASH P. BALSARA, University of California Berkeley, Lawrence Berkeley National Laboratory — Mixtures of poly(3-hexylthiophene)-b-poly(ethylene oxide) (P3HT-b-PEO) block copolymer and lithium bis(trifluoromethanesulfonyl) imide (LiTFSI) salt can microphase separate into electron (P3HT) and ion (PEO/LiTFSI) conducting domains. P3HT is a semicrystalline polymer with intrinsically semiconducting electronic properties. Electrochemical oxidation (doping) of the P3HT block provides the P3HT-b-PEO/LiTFSI mixtures with electronic conductivity suitable for lithium battery operation[1][2]. Due to the presence of the solid-state electrolyte (PEO/LiTFSI) in intimate contact with the microphase separated P3HT domains, electrochemical oxidation of P3HT can be performed entirely in the solid state; therefore, P3HT-b-PEO/LiTFSI provides a unique opportunity to study the structural changes in P3HT induced by oxidation. We use in situ x-ray scattering techniques to probe structural changes in P3HT during electrochemical oxidation and correlate these changes with previously observed enhancements in electron mobility[2]. [1] Javier, A. E., Patel, S. N., Hallinan, D. T., Srinivasan, V., Balsara, N. P., *Angew. Chem. Int. Ed. Engl.*, 50, 9848-51 (2011). [2] Patel, S. N., Javier, A. E., Balsara, N. P. *ACS Nano*, 7, 6056-6068 (2013).

¹Supported by the Joint Center for Energy Storage Research (JCESR)

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Date submitted: 13 Nov 2013

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