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Charge Transport Properties of P3HT-PEO block copolymers that are Electrochemically Oxidized in the Solid-State SHRAYESH PATEL, UC Berkeley, Dept. of Chemical and Biomolecular Engineering, ANNA JAVIER, Lawrence Berkeley National Lab, NITASH BALSARA, UC Berkeley, Dept. of Chemical and Biomolecular Engineering — We report on the relationship between morphology and electronic/ionic charge transport of Poly(3-hexylthiophene)-*b*-Poly(ethylene oxide) (P3HT-*b*-PEO) and lithium bis-(trifluoromethanesulfonyl) imide (LiTFSI) mixtures. Using ac impedance spectroscopy, we show that P3HT-*b*-PEO/LiTFSI mixtures can conduct electronic and ionic charges simultaneously. The electronic resistance of P3HT-*b*-PEO can be controlled through the electrochemical oxidation of P3HT with LiTFSI. We designed an all solid-state electrochemical cell with three terminals to measure the electronic conductivity of P3HT-*b*-PEO under applied potentials. The addition of a third terminal within the P3HT-*b*-PEO layer allows for the *in-situ* measurement of the electronic conductivity as a function of the P3HT electrochemical oxidation level. Our experimental setup is unique in that electrochemical oxidation occurs in the presence of solid-polymer electrolyte. Previous studies on the electrochemical oxidation of polythiophenes have been done in the presence of a liquid electrolyte. The results of the *in-situ* electronic conductivity measurements as a function of electrochemical doping level and block copolymer composition will be presented.

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