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Incorporation of Functionalized Metal Oxides into Poly(Ethylene Oxide) Based Solid Polymer Electrolytes for Lithium-Ion Batteries ERIC ANDERSON, YUYING TANG, University of Massachusetts Amherst Department of Polymer Science and Engineering, CRAIG VERSEK, MARK TUOMINEN, University of Massachusetts Amherst Department of Physics, SAMUEL GIDO, JAMES WATKINS, University of Massachusetts Amherst Department of Polymer Science and Engineering — A detailed study on the influence of size and shape as well as surface properties of metal oxides incorporated into poly(ethylene oxide) based solid polymer electrolytes for lithium-ion batteries is explored. The morphology of the solid polymer electrolyte is determined using small angle x-ray scattering and transmission electron microscopy. The surface properties of the metal oxide are modified through silane chemistry. Surfaces are modified to be hydrophobic, hydrophilic, high dielectric constants, as well as single-ion conductors. The electrochemical properties of the solid polymer electrolyte systems are investigated by electrochemical impedance spectroscopy and cyclic voltammetry. These functionalized metal oxide particles not only reduce crystallinity of poly(ethylene oxide) based solid polymer electrolytes, but also increase the conductivity.

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