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Enhanced Electrical Conductivity due to Morphological Changes in Polyanaline-Titania Core-Shell Nanocomposites NELSON COATES, California Maritime Academy, JIANFENG LIU, University of California, Berkeley, RACHEL SEGALMAN, University of California, Santa Barbara, JEFFREY URBAN, Lawrence Berkeley National Laboratory — Conducting polymer-inorganic nanoparticle composites are a valuable class of advanced materials with a wide range of applications due their extensive physical and chemical tunability. Although effective medium theories are often used to predict the behavior of these materials, the actual physical properties can be distinctly different from their constituents due to a variety of structural or electrical interfacial interactions that may manifest. Here, we present electrical conductivity data for TiO2 nanoparticles coated with polyanaline, along with structural characterization of the conducting polymer as a function of component volume fraction. For these composites, we find that the electrical conductivity cannot be explained by a 2-component effective medium theory, but rather is correlated to a structural change in the polymer. We hypothesize that the organic-inorganic interface induces a structural change in a region of polymer surrounding the nanoparticle which improves the electrical conductivity of the composite. These results emphasize the importance of controlling interfacial interactions in organic-inorganic composites, and demonstrate the potential for using such interactions as a way to tune electrical transport.

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