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Effects of Surface Treatment and Anneal Temperature on Poly(3-hexylthiophene) Infiltration in Zinc Oxide Nanorod Arrays TAYLOR WOOD, Brigham Young University, DARICK BAKER, Colorado School of Mines, DANA OLSON, National Renewable Energy Laboratory, REUBEN COLLINS, THOMAS FURTAK, Colorado School of Mines — The performance of a hybrid inorganic/organic photovoltaic cell is crucially dependent on the contact between the inorganic electron acceptor and the organic electron donor. In this study, we seek to optimize the infiltration and local polymer ordering of poly(3-hexylthiophene) (P3HT) into ZnO nanorod arrays through thermal annealing and chemical surface treatment. ZnO nanorods were grown on glass substrates and subsequently spin-coated with P3HT. Some of the nanorod arrays were chemically treated with ocadecyltriethoxysilane (OTES), phenyltriethoxysilane (PTES), and octadecanethiol (ODT) to form organic molecular layers on the rod surfaces. Samples were then thermally annealed at 150 and 220 $^{\circ}$C and characterized using UV-Vis spectrophotometry and electron microscopy. Our results revealed that while high-temperature annealing increases the amount of P3HT infiltration, it also destroys local polymer ordering and thus charge carrier mobility. Results from chemically-treated samples were largely inconclusive and merit further research. This material is based upon work supported by the National Science Foundation through Grant Nos. DMR-0820518 and DMR-0907409.

Taylor Wood
Brigham Young University

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