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Surface Modification of Zinc Oxide Nanorods DARICK BAKER, Colorado School of Mines, CHRISTIAN WEIGAND, Norwegian University of Science and Technology, JAMIE ADAMSON, Colorado School of Mines, CARY ALLEN, University of Arizona, MATT BERGREN, Colorado School of Mines, DANA OLSON, NREL, CECILE LADAM, SINTEF, DAVID GINLEY, NREL, REUBEN COLLINS, THOMAS FURTAK, Colorado School of Mines — Zinc oxide (ZnO) nanorod arrays have a number of advantages over both planar ZnO/P3HT and ZnO/P3HT:PCBM blend solar cell devices. In this study, molecular surface modifications of the ZnO have been explored as a strategy for improving both charge transfer and polymer morphology at the ZnO surface. Surface molecular layers were formed on planar ZnO and ZnO nanorod arrays using octadecyltriethoxysilane, phenyltriethoxysilane, octadecanethiol, and thiophenol. FTIR, SEM, UV-Vis, XPS and contact angle data were used to characterize the resulting layers. The effects of these surface treatments on solar cells are reported. Molecular layers with different attachments to the ZnO but the same terminal group showed different behavior, confirming that both the terminal and attachment group play important roles in interface structure, energetics, and charge transfer. This research is aimed at improving organic solar cell performance, yet is applicable to a broad range of hybrid organic/inorganic systems. Support from NSF Awards DMR-0606054 and DMR-0820518 is gratefully acknowledged.

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