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Octadecanethiol Island Formation on Single Crystal Zinc Oxide Surfaces ANDREA YOCOM, Colorado School of Mines — Organic photovoltaic devices, comprised of zinc oxide (ZnO) nanorod electron acceptor arrays intercalated with organic polymers, could lead to low-cost renewable energy generation. Surface modifications of ZnO with octadecanethiol (ODT) monolayers can help to improve charge transfer in such devices. In the present work, single crystals of ZnO provided well-defined oxygen-terminated and zinc-terminated surfaces on which to learn fundamentally about the attachment and growth of ODT. Both bare zinc oxide and ODT-functionalized surfaces were characterized with atomic force microscopy, Fourier transform infrared spectroscopy, x-ray photoemission spectroscopy, and contact angle analysis. ODT seemed to form islands of multilayers on zinc-terminated surfaces, while it formed islands of monolayers on oxygen-terminated surfaces. While ODT was expected to preferentially bond along defects and terraces on oxygen-terminated surfaces, this was not observed. ODT was also expected to more effectively bond to the zinc-terminated surface, which was observed. Finally, surface preparation treatments designed to leave atomically-flat oxygen terminated surfaces were developed. This work was made possible by the National Science Foundation Division of Materials Research and the Renewable Energy Materials Research Science and Engineering Center at the Colorado School of Mines.

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