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Electronic Transport in Molecular Diode Heterojunctions SHANNON YEE, JIBIN SUN, UC Berkeley, PIERRE DARANCET, Berkeley National Laboratory, T. DON TILLEY, UC Berkeley, JEFFREY NEATON, Berkeley National Laboratory, RACHEL A. SEGALMAN, UC Berkeley — Anode-donor, donor-acceptor, and acceptor-cathode interfaces dominate the performance of organic solar cells. However, within thin-film, bulk-heterojunction, or nanostructured morphologies, interfacial transport affects are not well understood. In order to better understand these interfaces, a simplified system consisting of a single, small, diode molecule covalently bound to electrodes (anode-end group-donor-bridge-acceptor-end group-cathode) is considered. The end groups and bridge moities can be interchanged using chemical synthesis technique to understand how these parameters affect electronic transport. Here, we report our findings on single-molecule diode measurements using a conducting atomic force microscope on four newly synthesized molecules consisting of bithiophene donors and naphthalene diimide acceptors with systematic interchange of two end groups and two bridge moities. We explain the electronic structure of these molecules using absorption and fluorescence spectrometry, cyclic voltammetry, and transition voltage spectrometry in conjunction with newly developed theory.

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