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Control of Relative Tunneling Rates in Single Molecule Bipolar Electron Transport SHIWEI WU, GEORGE NAZIN, XI CHEN, XIAOHUI QIU, WILSON HO, Department of Physics and Astronomy and Department of Chemistry, University of California, Irvine, California 92697-4575, USA — The influence of relative electron tunneling rates on electron transport in a double-barrier single-molecule junction will be presented. The junction is defined by positioning a scanning tunneling microscope (STM) tip above a copper phthalocyanine (CuPc) molecule adsorbed on a thin oxide film grown on the NiAl(110) surface. Unlike the typical single-barrier (vacuum) junction for STM experiments, the finite voltage drops in both barriers, vacuum and oxide film, lead to conduction through the same vibronic states of the molecule at opposite bias polarities – bipolar conduction. However, the differential conductance (dI/dV) spectra taken at opposite bias polarities show a distinct asymmetry. By tuning the tip-molecule separation, we control the ratio of electron tunneling rates through the two tunnel barriers. This results in dramatic changes in the relative intensities of individual conduction channels, associated with different vibronic states of the molecule.

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