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Rectification in Symmetric Conjugated Molecules with Asymmetric Linkers ARUNABH BATRA, Dept. of Applied Physics and Applied Mathematics, Columbia University, JEFFREY S. MEISNER, Dept. of Chemistry, Columbia University, JONATHAN R. WIDAWSKY, EEK HUISMAN, Dept. of Applied Physics and Applied Mathematics, Columbia University, COLIN NUCKOLLS, Dept. of Chemistry, Columbia University, LATHA VENKATARAMAN, Dept. of Applied Physics and Applied Mathematics, Columbia University — Demonstrating single-molecule rectification is an important step towards the realization of molecule-based electronic devices. Most molecules put forward as potential rectifiers employ asymmetric molecular backbones. In contrast, we show that we can create rectifying junctions by designing asymmetry only into the linker groups used to bond the molecule to metal electrodes. Our molecules consist of a conjugated backbone terminated with methylsulfide on one end and methyl-trimethyltin on the other. These molecules couple to Au electrodes through an Au-SMe donor acceptor bond, which serves as the electronically weak link, and a Au-C covalent bond, which is created in-situ after the $SnMe_3$ cleaves off [1]. We create thousands of molecular junctions using a modified STM setup in a solution of molecules, measure their current-voltage (IV) characteristics and create averaged IV curves. We find that asymmetrically terminated molecules show non-linear IV curves with significant rectification, while molecules terminated symmetrically with either SMe or $SnMe_3$ do not show substantial rectification. We also find that the rectification direction is dependent on molecular orientation in the junction. [1] Chen, W., et al., J. Am. Chem. Soc., 2011. 133(43): p. 17160-17163

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