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Scanning Tunneling Microscope Observation of Current Rectification by Self-Assembled Monolayers of Conjugated Organic Molecules SHASHI KARNA, US Army Research Laboratory, GOVIND MALLICK, US Army Research Laboratory, ANUBHAV SRIVASTAVA, US Army Research Laboratory, SARAH LASTELLA, US Army Research Laboratory, QINGDONG ZHENG, State University of New York at Buffalo, PARAS PRASAD, State University of New York at Buffalo, US ARMY RESEARCH LAB TEAM, SUNY BUFFALO TEAM — The current (I) voltage (V) characteristics of $HS-C_6H_4-CH=N-C_6H_4-N=CH-C_6H_4-SH_5$ 4,4'-[1,4-phenylenebis(methylidynenitrilo)]bisbenzenethiol (PMNBT), molecules adsorbed on Au (111)/Mica substrate has been determined by scanning tunneling microscope (STM) measurements. The self-assembled monolayers (SAMs) of PMNBT molecules exhibit rectification of the tunneling current. In contrast, SAMs of σ bonded dodecanemonothiolate molecules do not exhibit rectification. The observed rectification in the case of PMNBT SAMs is attributed to a combination of (i) charge transfer from Au to molecule at Au-S interface and (ii) a highly delocalized π -electron charge in the donor level (highest occupied molecular orbital) of the molecule.

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