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Scanning Tunneling Microscopy studies of single conjugated diblock co-oligomers MARIA IAVARONE, GORAN KARAPETROV, WAI K. KWOK, Materials Science Division, Argonne National Laboratory, GUSTAVO MORALES, PING JIANG, YU LUPING, Department of Chemistry, University of Chicago — The electrical properties of single conjugated diblock co- oligomers were studied with a low temperature Scanning Tunneling Microscope (STM) at 4.2 K and 77 K. The molecules consist of an electron rich biphenyl segment and an electron poor bipyrimidine segment with two different protected terminal thiol groups that can be sequentially connected to gold electrodes. They were first self-assembled on a gold substrate Au(111) embedded in an insulating matrix of dodecanethiol and then a gold nanoparticle was connected as the second gold electrode on the top thiol. Thus the diode molecules were connected at both ends to gold electrodes and ready for the electron-transport study. In STM topography we observed a hexagonal closed packed lattice of the matrix molecules and we could locate single gold nanoparticles. Scanning tunneling spectroscopy on the gold nanoparticles and away from them were performed. Symmetric I-V characteristic were observed on the SAM matrix by switching the bias between –2.0 V to +2.0 V at 4.2 K and 77 K. Strongly asymmetric I-V were recorded on the top of gold nanoparticles suggesting that the diblock acts as a molecular rectifier.

Maria Iavarone
Materials Science, Argonne National Laboratory

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