Internal structures in single molecule bipolar conduction in a double barrier tunnel junction

NAOKI OGAWA, RCAST, University of Tokyo, Tokyo 153-8904, Japan, GAREGUIN MIKAEAM, XIUWEN TU, WILSON HO, Department of Physics and Astronomy, University of California, Irvine, CA 92614 —

Electronic properties of molecules decoupled from metal leads are of current interest due to their extended lifetime of excitation and potential applications. Here we use scanning tunneling microscopy and spectroscopy to study charge transport through a single molecule in a double barrier tunnel junction composed of isolated copper phthalocyanine molecules adsorbed on an ultrathin Al₂O₃ film grown on a NiAl(110) surface. The differential conductance spectra show several types of features at positive and negative biases, exhibiting bipolar conduction. STM topographic images about these conductance features reveal that different parts of the same molecular orbital are imaged at different sample biases. In addition spatially resolved conductance microscopy shows rich and highly anisotropic conductance patterns in the single molecule.

Naoki Ogawa
University of California, Irvine

Date submitted: 29 Nov 2004  Electronic form version 1.4