

MAR06-2005-040097

Abstract for an Invited Paper
for the MAR06 Meeting of
the American Physical Society

Probing molecular electronics with mechanical break junctions

HEIKO WEBER, University of Erlangen

We will report on experiments with single molecule junctions, performed with the mechanically controlled break-junction technique. A review is given on the capabilities of the technique and the results obtained so far. The importance of the molecular structure, the local environment, the contacts, and of the electronic polarizability will be elucidated. As a particular example, we will present an experiment with a molecule that was designed to form a single-molecule diode when contacted from two sides. The concept is closely related to Aviram-Ratner's Gedankenexperiment. Indeed, the IVs show a pronounced asymmetry, whereas a blind experiment with symmetric molecules resulted in symmetric IVs. A closer analysis of the data, involving theoretical models, suggests that the bias-dependent charge reconfiguration of the electronic structure is responsible for the diode-like characteristics.