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Charge-Carrier Transport Measurements through Single Molecules

By Emanuel Lörtscher

Cuvillier Verlag Okt 2007, 2007. Taschenbuch. Book Condition: Neu. 210x147x14 mm. Neuware - The goal of this thesis was to establish and to characterize single-molecule junctions by means of the mechanically controllable break-junction (MCBJ) technique. Using this method, an electrode pair with atomic-sized tips can be created. These tips are located exactly opposite to each other and their distance can be adjusted with picometer accuracy. This technique was developed by Moreland et al. in 1985 and further improved by Muller et al. in the subsequent years to study quantum phenomena in superconductors. Mechanically controllable break-junctions are distinguished by an excellent stability of the two electrodes against external vibrations. The stability is achieved by a purely mechanical transaction in a three-point bending mechanism with a very low transmission ratio between the pushing-rod travel distance, and the electrode separation resulting there from (ratio of approximately 1×10^{-5}). This lateral stability combined with a sub-atomic spatial electrode positioning accuracy allows single molecules to be contacted. In the framework of this thesis, an ultra-high vacuum system equipped with a MCBJ bending mechanism was designed, fabricated, characterized, and continuously improved. This experimental system can be used to establish a contact with a single molecule...



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