Advance characterization of nanostructures using nc-AFM/STM measurements

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Increasing number of precise simultaneous force/tunneling current measurements has been reported last years (see e.g. [1]). The possibility of combining the powerful tools provided by scanning tunneling (STM) and atomic force microscopy (AFM) in a single instrument brings the unique opportunity to correlate tip-surface short-range chemical forces with simultaneously measured tunneling currents at the atomic scale. Among others, this opens new possibilities to characterize not only charge transfer through an established chemical bond between atoms [2] but simultaneously its strength as function of bias and tip-sample distance. In particular, it opens a new way to establish direct relation between fundamental physical entities, such as the tunneling current and the chemical force [3].

In this talk, we will discuss basic principles and obstacles of the simultaneous detection of the atomic forces and the tunneling current from theoretical and experimental point of view. We will discus (i) chemical composition of complex 1D nanostructures [4]; (ii) discrimination of simple molecules on semiconductor surfaces [5]; (iii) relation between the tunneling current and the chemical force [2,3] and (iv) AFM/STM measurements on a single molecule deposited on semiconductor surface.

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