

STM investigation of single molecule surface processes
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Electrons tunneling inelastically from the tip of a scanning tunneling microscope through a molecule into a metal surface may induce chemical reactions. The method is based on high-resolution imaging at low-temperature (5K) that allows us to identify different groups within the molecule. Chemical reactions are induced by injecting selectively electrons into specific parts of the molecule. The success of the manipulation is visualized in the recorded tunneling current during the manipulation and in STM images taken afterwards. In this talk I will present reactions for a several molecules of different complexity, specifically water, substituted benzene molecules (chloronitrobenzene), and photochrome molecules (azobenzene). The molecular reactions include formation and destruction of external and internal bonds and isomerization. The energies needed for the reactions are remarkably low and involve excitations of molecular vibrations.