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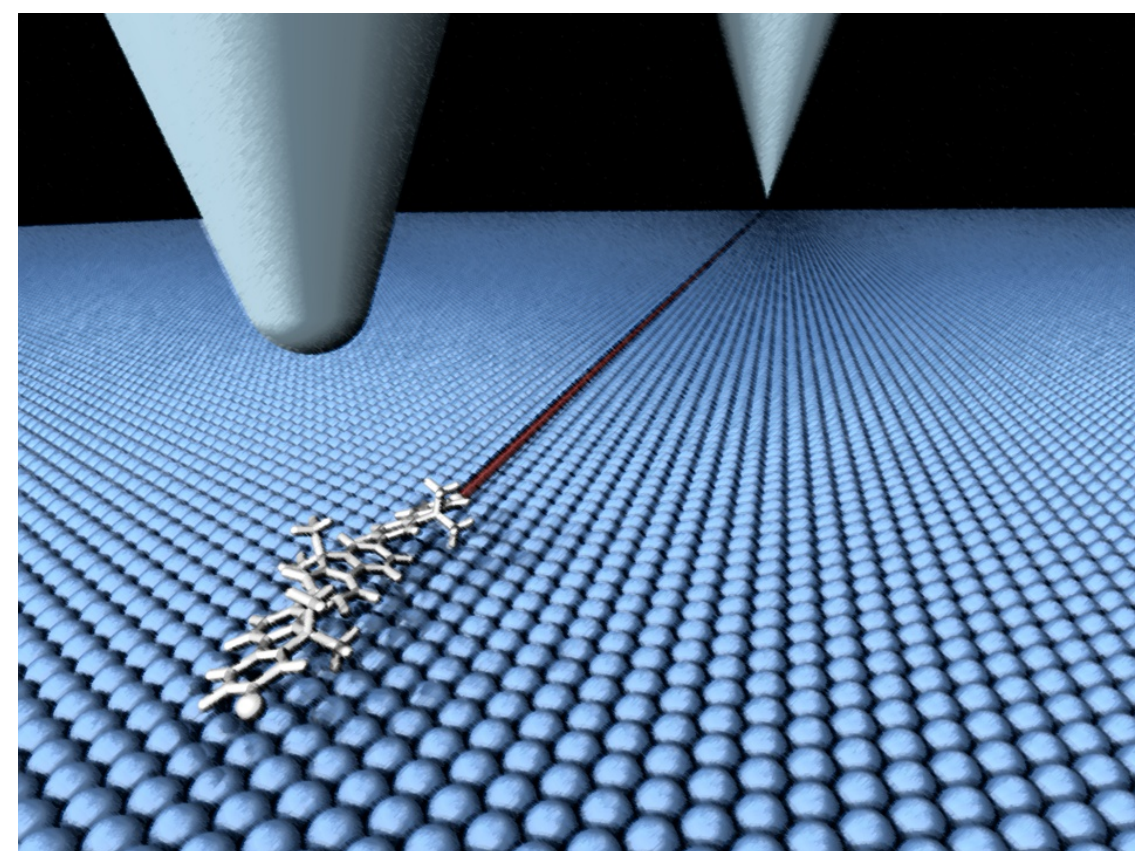
Manipulation of Single Molecules at Surfaces: Speed, Motors and Reactions

physikalisches

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The characterization and controlled manipulation of molecules gives insight into fundamental physical and chemical properties. We study single molecules that exhibit specific mechanical, optical, electronic or chemical functions by scanning tunneling microscopy (STM). This not only allows to control and investigate molecular processes, but also to investigate the role of the local environment at the atomic scale.

In this talk, I will present several examples of our research. Molecular switches, which strongly depend in their switching efficiency on the local atomic-scale surroundings. Molecular motion either by manipulation in a pseudo-blind (and therefore much faster) mode, by using two independent STM tips (see sketch) or by measuring distance-time relationships to determine the real speed of a single molecule. 'Adsorbate motors', which move uni-directionally, although they are based on a simple molecule that does not contain any motor function, but achieves its functionality only in combination with a surface. Chemical reactions induced by controlled collisions of two molecules to study the impact parameters that are required for a successful bond formation.



Scheme of the controlled transfer of a single molecule between two independent STM tips.