Single molecule manipulation by light and electrons

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The development of molecular switches on the single molecule level is a major challenge on the path towards incorporating molecules as building units into nanoelectronic circuits. Azobenzene derivatives are a prototype class of molecules that are well known to switch in the gas phase under illumination based on a *cis-trans* isomerization. With a scanning tunneling microscope (STM) it is also possible to induce this chemical reaction on individual molecules by electrons tunneling inelastically from the STM tip into a molecule. We explored several azobenzene derivatives, p-hydroxy-azobenzene, amino-nitro-azobenzene, and anilino-nitro-azobenzene on a variety of surfaces, Cu(111), Ag(111), Au(111), and NaCl/Ag(111), in order to investigate the importance of the side groups and of the interaction strength with the surface. From these studies we deduce general rules for the feasibility isomerization either of these molecules in contact to a surface.