Tripodal molecules as switches, rotors and single photon sources

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In single molecule electronics, a molecular function is realized by a functional group of the molecule. Often, the interaction with the conductive substrate, on which the molecules are deposited, are so strong, that the molecules adsorb flat and the orbitals of the functional group hybridize with the conduction electrons of the substrate and quench the function of the group. In order to avoid this quenching, we have developed a tripodal foot group that selectively binds to Au(111) and lifts the functional group away from the substrate. We will show three successful examples for this principle, realizing unquenched functions like a molecular switch, a molecular single photon source or a molecular motor. In all cases, the electronic structure of the functional group was isolated from the conduction electrons such that molecular dipoles, frontier orbitals of optical transitions or rotors are decoupled. In some cases, we also achieved vibrational decoupling of the functional group from the substrate evidenced by long lived vibronic states.