A Low Temperature STM Manipulation of a Molecular Rotor

H. KERSELL, U.G.E. PERERA, Y. ZHANG, S.-W. HLA, Ohio University, Athens, OH 45701 — 4Fe3Set molecules consist of ferrocene arms mounted on a ruthenium atomic bearing atop a molecular stand and thus allowing rotation of arms when the molecule is absorbed on a metal surface with its base. Here, we present a study of molecule rotor (4Fe3Set) deposited on Au(111) substrate using Scanning Tunneling Microscope (STM) at 4.6K and 75K, respectively. At 4.6 K, molecules form stable configurations without rotation on the surface due to a lower thermal energy at this temperature. In contrast, the spinning rotors were routinely detected at 75 K substrate temperature. Step-wise rotation of the rotator part of the molecule is realized by inelastic tunneling electron excitation using the STM-tip. Rotation rate was found to vary with tunneling current, and molecule preferred some quantized angles to rotate with.

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H. Kersell
Ohio University, OH 45701, USA