University of Minnesota
Driven to Discover℠

Department of Chemistry

Dow Lecture Seminar

9:45 a.m. Thursday, April 21 • 331 Smith Hall

Associate Professor

Charles Sykes

Department of Chemistry
Tufts University

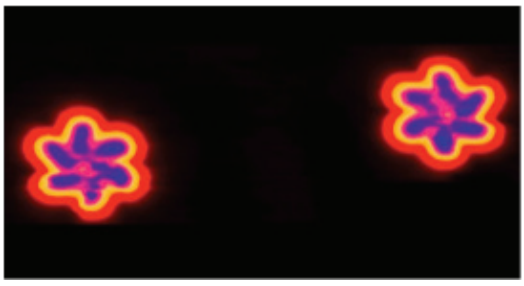
Turning a Single Molecule into an Electric Motor

Research interests:
development of a nanoscale model system and its use in exploring the fundamental limits of thermally and electrically driven molecular rotation.

Website: http://chem.tufts.edu/faculty/sykes/index.html

Abstract

In stark contrast to nature, current manmade devices, with the exception of liquid crystals, make no use of nanoscale molecular motion. Studying the rotation of molecules bound to surfaces offers the advantage that a single layer can be assembled, monitored and manipulated using the tools of surface science. Thioether molecules constitute a simple, robust system with which to study molecular rotation as a function of temperature, electron energy, applied fields, and proximity of neighboring molecules. We demonstrate the effect of molecular architecture on their rotational barrier and report a method whereby rotation can be induced electrically. On the path towards constructing a single-molecule electric motor we have investigated chiral molecular rotors. These systems offer a unique opportunity to study both symmetry breaking and 1:1 chiral interactions in a well defined environment at the single molecule level.



Low-temperature Scanning Tunneling Microscope image of two butyl methyl sulfide molecular rotors on Cu(111). Surface coordination via one of the two S atom lone pairs leads to chirality of the adsorbed complex. Image size: 8nm x 4nm.

Host: Associate Professor Christy Haynes
Refreshments will be served prior to the seminar.