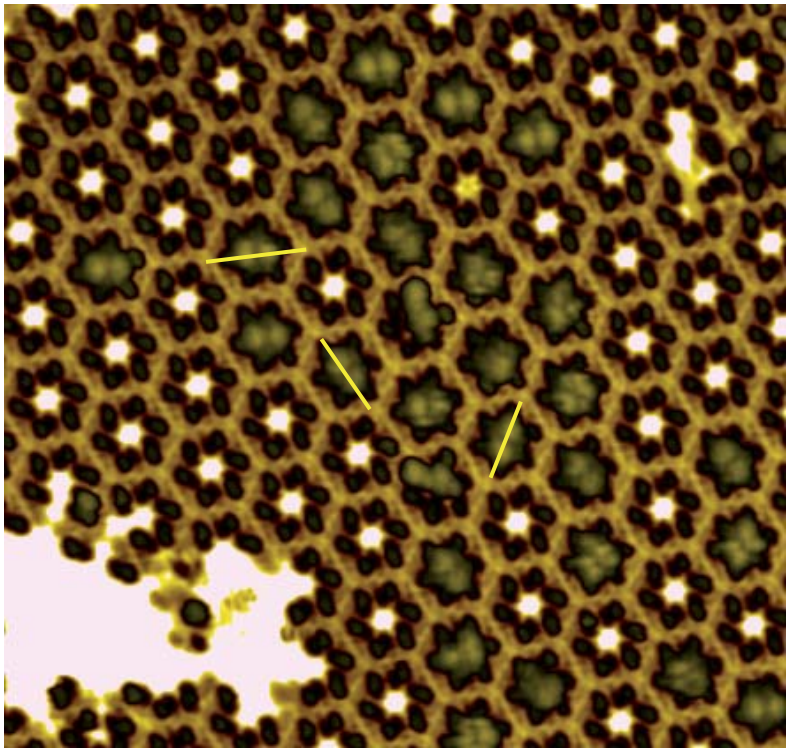
NANONIS APPLICATION NOTE

Supramolecular Rotary Device

For years a lot of efforts have been put on designing organic molecules whose properties can be exploited for building up artificial molecular devices. Together with our partners from the University of Basel and the ETH Zurich we created a specially functionalized molecule that on a Cu(111) surface does not only form a nanoporous network, but also have the right size to be nested on top of the pores.

The whole system is thus the result of a very delicate balance and requires stable STM conditions at low temperatures with low current setpoints (down to 5pA) and minimum of noise. Furthermore, the molecules nested on top of the pores can perform a hindered rotation and snap into three different, distinguishable positions. The rotation can be either induced thermally or by the STM tip. The switching of the molecules direction is stable and reproducible.

The stability and the reliability of our combined setup of the Nanonis control system with the Omicron LT-STM proved to be essential for making this experiment. We plan further refinements of the design of the molecule in order to get assemblies with increased activation energies for technological applications.



STM image of supramolecular assembly of porphyrin derivates on a clean Cu(111) surface at T=77 K.

N. Wintjes et al., A Supramolecular Multiposition Rotary Device, Angewandte Chemie International Edition: 22, 4089 (2007).
See also http://www.nzz.ch/2007/06/06/ft/articleF8BXR.html

Authors:

N. Wintjes, A. Kiebele, M. Stöhr, and H. Spillmann,

University of Basel, Switzerland

T. Jung,

PSI Villigen, Switzerland

D. Bonifazi, F. Cheng, and F. Diederich,

ETH, Zurich, Switzerland

Nanonis Modules in Use:

- Base Package
- Omicron Adaptation Kit

System:

- Omicron LT-STM

NANONIS
The SPM Application Experts

Nanonis GmbH, Zürich, Switzerland
www.nanonis.com