MOLECULAR DEVICES FOR SINGLE MOLECULE STM EXPERIMENTS

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Scanning probe microscopy in ultra-high vacuum nowadays allows very precise experiments at the single molecule level [1]. We have designed and synthesized series of molecules finely tuned for studying molecule-substrate interactions, molecular mechanics, contact conductance or molecular switching.

In this talk, I will introduce molecular moulds able to perform and stabilize nanoelectrodes, molecular devices designed to trap and move metallic atoms [2], to perform switching and conformational changes [3] or to demonstrate a rack-and-pinion mechanism (Figure below) [4]. Current work on molecular orbital imaging will also be presented [5].

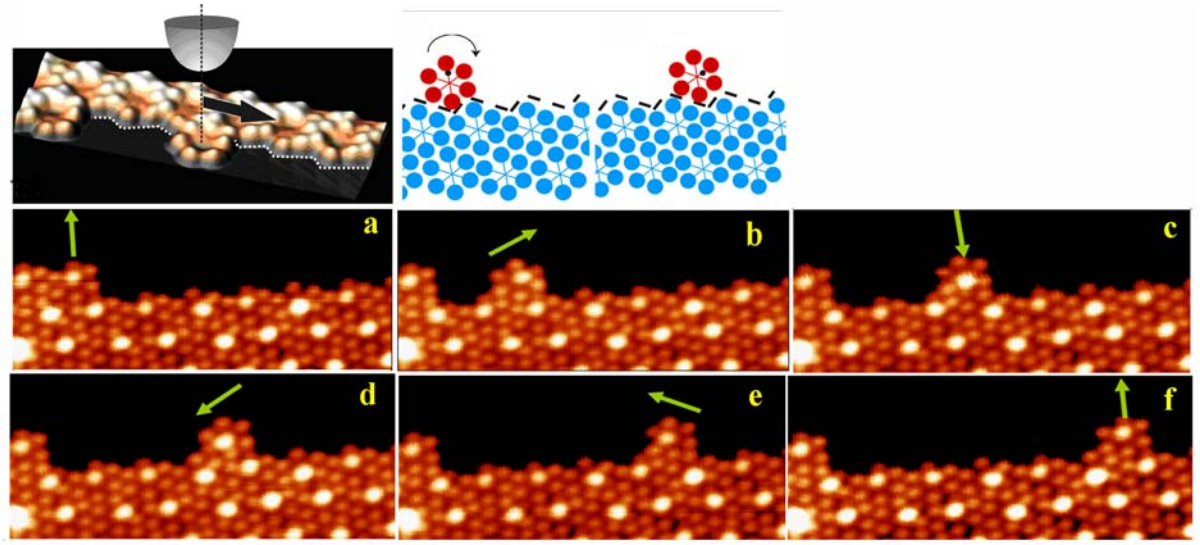

Figure: A fully controlled rotation of a single molecule in a rack-and-pinion system. The arrow shows the orientation of a quasi six-fold symmetry molecule with respect to the 2D crystal step-edge.

References:

1 F. Moresco and A. Gourdon, *Proc. Natl. Acad. Sci. USA* 8809 (2005) 102.

2 L. Gross, K.-H. Rieder, F. Moresco, S. Stojkovic, A. Gourdon and C. Joachim, *Nature Materials* 892 (2005) 4.

3 L. Grill, K.-H. Rieder, and F. Moresco, S. Stojkovic, A. Gourdon, and C. Joachim *Nanoletters* 12(6), (2006) 2685.

4 F. Chiaravalloti, L. Gross, K.-H. Rieder, S. M. Stojkovic, A. Gourdon, C. Joachim, and F. Moresco *Nature Materials* 6 (2007) 30.

5 C. J. Villagomez Ojeda, T. Zambelli, S. Gauthier, A. Gourdon, C. Barthes, S. Stojkovic, C. Joachim. *Chem. Phys. Letters* 450 (2007) 107.

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