MAR06-2005-007144

Abstract for an Invited Paper
for the MAR06 Meeting of
the American Physical Society

Organization of Single Molecule Magnets on Surfaces[1]

ROBERTA SESSOLI, Department of Chemistry, University of Florence, Italy

The field of magnetic molecular clusters showing slow relaxation of the magnetization has attracted a great interest for the spectacular quantum effects in the dynamics of the magnetization that range from resonant quantum tunneling to topological interferences. Recently these systems, known as Single Molecule Magnets (SMMs), have also been proposed as model systems for the investigation of flame propagation in flammable substances. A renewed interest in SMMs also comes from the possibility to exploit their rich and complex magnetic behavior in nano-spintronics. However, at the crystalline state these molecular materials are substantially insulating. They can however exhibit significant transport properties if the conduction occurs through one molecule connected to two metal electrodes, or through a tunneling mechanism when the SMM is grafted on a conducting surface, as occurs in scanning tunnel microscopy experiments. Molecular compounds can be organized on surfaces thanks to the self assembly technique that exploits the strong affinity of some groups for the surface, e.g. thiols for gold surfaces. However the deposition of large molecules mainly comprising relatively weak coordinative bonds is far from trivial. Several different approaches have started to be investigated. We will briefly review here the strategies developed in a collaboration between the Universities of Florence and Modena. Well isolated molecules on Au(111) surfaces have been obtained with sub-monolayer coverage and different spacers. Organization on a large scale of micrometric structures has been obtained thanks to micro-contact printing. The magnetic properties of the grafted molecules have been investigated through magneto-optical techniques and the results show a significant change in the magnetization dynamics whose origin is still object of investigations.

[1]Matteo Mannini of the University of Florence and Andrea Cornia of the University of Modena & Reggio Emilia (Italy) are gratefully acknowledged.