Controlled Bistability in a Molecular Flexible Crystalline material as Robust Chemosensor at Room Temperature

José Sánchez Costa[1],[4] Santiago Rodriguez Jimenez[1], Gavin A. Craig[1] Olivier Roubeau[2], Christine Beavers[3] Simon J. Teat[3], Azzedine Bousseksou,[4] Guillem Aromí[1]

[1]Departament de Química Inorgànica, Universitat de Barcelona, Diagonal 647, 08028 Barcelona, Spain.
[2]Instituto de Ciencia de Materiales de Aragón (ICMA), CSIC and Universidad de Zaragoza, Plaza San Francisco s/n, 50009, Zaragoza, Spain.
[3]Advanced Light Source, Berkeley Laboratory, 1 Cyclotron Road, Berkeley, CA 94720, USA
[4]Laboratoire de la Chimie de Coordination
205, route de Narbonne, 31077 Toulouse Cedex 4, France

josesanchezcosta@gmail.com

Nanoporous materials have exceptional characteristics that confer them important potential technological applications such as molecular sieves, sensors, magnetism and catalysis[1]. Those materials have recently experienced a renewed interest since the discovery of a new class of flexible porous materials, which contrast with the well-explored rigid porous materials. These flexible porous materials defined as soft porous crystals[2] may respond to external stimuli such as light, a magnetic field or even the interaction with some molecules, keeping their crystallinity and porosity intact. The properties of soft porous crystals are dominated by their structure, therefore structural transformations have a profound effect.

Moreover, spin-crossover (SCO) properties have been introduced in such porous materials with the aim of reaching room temperature applications[3]. SCO involves a change in the electronic configurations of molecules by applying an external perturbation such as temperature, pressure, or light irradiation. Furthermore, SCO is a molecular phenomenon which is accompanied by dramatic and readily detectable changes of macroscopic properties (color, crystal size and magnetism). In some cases, the central cavity of these ligands, based on the well-known “bpp” moiety, is suited for accessing Fe(II) complexes exhibiting SCO, while the external groups can play other chemical or structural roles.[4]

This work concerned the sensor activity for a new type of switchable material that can act as a soft porous molecular framework in which the molecular bistability is associated to a solvent absorption-desorption process in a reversible way above room temperature, and the further nanostructuration of such material. The nano-controlled porosity would without any doubt be of great benefit in many practical applications

References

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