

First-row transition-metal-based molecular sensors and molecular switches

Paulo N. Martinho

CQB, Faculdade de Ciências, Universidade de Lisboa, Portugal

Email: pnmartinho@ciencias.ulisboa.pt

The versatility of ethylenediamine-inspired Schiff-base transition metal complexes has been shown in their extensive applications in molecular sensors (e.g. electrochromic, recognition) and molecular switches (e.g. redox, magnetic). Taking this into account, one can design an ethylenediamine-inspired versatile molecule with sensing or switching properties that will be used to fabricate materials with one or both properties combined. For example, while metal salen-type electropolymers of transition metal ions such as Co(II) and Ni(II) have produced exciting results in the activation of small molecules, particularly electrocatalytic reduction of oxygen, Fe(III)-salen derived complexes have shown to be able to switch between spin states, thus displaying the spin crossover phenomenon. Engineering of multifunctional materials with one function or more in the same molecule offers the opportunity to construct complex systems and to fabricate materials towards application to real life objects. Here I will show our contribution to the fields of molecular sensors and molecular switches where colorimetric sensors with molecular recognition using homo- and hetero-binuclear Cu(II) and Ni(II) complexes and Fe(III) magnetic switches will be discussed.

Biography:

Dr Martinho is an invited assistant professor at the department of chemistry and biochemistry from the faculty of sciences, University of Lisbon and an invited scientist at the Chemistry and Biochemistry Research Centre (CQB) from the faculty of sciences, University of Lisbon. He graduated both in chemistry and teaching at the University of Lisbon and he got his PhD from the University College Dublin in Ireland on cooperatively operating hierarchically organised materials for spintronics with Professor Grace Morgan and Professor Martin Albrecht. After finishing his PhD, he continued on his research career as a postdoctoral fellow at Karlsruhe Institute of Technology working in the group of Professor Mario Ruben at the Institute of Nanotechnology on spin crossover assembly and device fabrication. In 2012, he joined the group of Inorganic and theoretical chemistry coordinated by Professor Maria José Calhorda at CQB for his second postdoctoral position. At CQB, Dr Martinho started his own research line on multifunctional hybrid systems and in 2015 he started his Invited Assistant Professor position at the Department of Chemistry and Biochemistry from the Faculty of Sciences, University of Lisbon.

