

From Molecular Magnetism to Molecular Spintronics

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Spin-based electronics is one of the emerging branches in today's nanotechnology and the most active area within nanomagnetism. So far spintronics has been based on conventional materials like inorganic metals and semiconductors. Still, molecular electronics emerged several decades ago as a promising possibility to complement or even to replace conventional inorganic electronics when it goes nano. On the other hand, molecular magnetism has provided in recent years many examples of new magnetic molecules and multifunctional materials with tunable magnetic properties or combination of properties. In this context, molecular spintronics has recently appeared as a new field at the intersection of these two molecular fields. Its final aim is that of using molecule-based materials, or even single-molecules, as components of new spintronic systems and devices [1].

In this talk I will show with different examples taken from my own research the main advances in this new area. The first example will deal with the use of single-molecule magnets as qubits in quantum computing [2]. The second example will concern the electrical addressing of the spin in molecular nanoobjects [3]. The third example will focus on the chemical design of nanostructured layered materials exhibiting multifunctional properties, in particular magnetism and electric conductivity [4]. Finally, I will show the possibility of designing multifunctional molecular devices combining luminescence and spin-valve properties (i.e., Spin-OLEDs).

References:

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