Quantum Computing with Molecules

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Metal complexes will be proposed to acting as active quantum units for Quantum Computing (QC). We report on the implementation of metal complexes into nanometre-sized (single-)molecular spintronic devices by a combination of bottom-up self-assembly and top-down lithography techniques. The controlled generation of magnetic molecular nanostructures on conducting surfaces/electrodes will be shown and persistence of their magnetic properties under confinement in Supramolecular Quantum Devices (SMQD) will be proven. The quantum behaviour (e.g.. superposition, entanglement) of the metal complexes will be addressed at the single molecule level[1-13] to finally implement a quantum algorithm on a $TbPc_2$ Qudit performing quantum computing operations.[10]

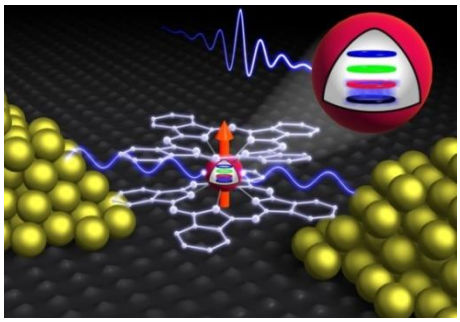

Figure 1 Artistic representation of a Molecular Spin Transistor based on a $TbPc_2$ complex acting as a molecular Spin Qu*d*it.[8]

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„*Synthetic Engineering of the Hilbert Space of Molecular Qudits: Isotopoloque Chemistry.*"
W. Wernsdorfer, M. Ruben. *Adv. Mat.* **2019**, *31*, 1806687.