## The 905<sup>th</sup> IMS colloquium

## **Molecular Quantum Materials and Devices**



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Date & Time: 2017/6/12 (Mon.) 10:00-Place: IMS Research Building Room 201

Magnetic metal complexes have been proposed as Quantum Bits (Qubits) candidates units for Quantum Computing (QC) and Quantum Information Processing (QIP). Herein, 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 and electrodes will be shown, self-assembled on sp2-carbon nano-structures (SW-CNTs, graphene, etc.), or inside nanogap gold junctions. The quantum properties of the metal complexes inside of the obtained supramolecular Quantum Devices (SMQD) are addressed at the single molecule level in view of their I-V-characteristics by means of UHV- and solution-based scanning probe and electromigration techniques.<sup>1-10</sup>

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- M. Urdampilleta et al. Nature Mater. 2011, 10, 502-506.
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- 4. R. Vincent et al. Nature **2012**, 488, 357-360.
- 5. M. Ganzhorn et al. Nature Nano. **2013**, 8, 165–169.
- 6. M. Ruben et. al. Nature Nano. **2013**, *8*, 377–389.
- 7. S. Wagner et. al. Nature Nano. **2013**, *8*, 575–579.
- 8. S. Thiele, et al. Science **2014**, 344, 1135-1138.
- 9. M. Ganzhorn, et. al. Nature Comms 2016, 11443.
- 10. C. Godfrin, F. Balestro, S. Klyatskaya, M. Ruben, W.Wernsdorfer, submit. **2017**



**Figure 1** Artistic representation of a Molecular Spin Transistor based on a TbPc<sub>2</sub> Single Molecule Magnet (SMM) acting as a Single Molecule Qubit.<sup>8</sup>

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