



DATE 27/02/2023

TIME 04:00 PM

VENUE Fermion Hall

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## TITLE

*From magnetic anisotropy to molecular magnets: A journey into the coordination chemistry of pentagonal bipyramidal complexes*

## ABSTRACT

Magnetic anisotropy plays an important role in the behavior of magnetic materials. For instance, the hardness (i.e. coercive field) of bulk magnets is mainly proportional to the magnetic anisotropy, and the energy barrier for magnetization reversal of molecular nanomagnets, such as Single-Molecule Magnets (SMM) and Single-Chain Magnets (SCM), is intimately related to the zero-field splitting characteristics (D) of its individual building units. However, it is still challenging for chemists to control the actual magnetic anisotropy of the complexes, all the more so when they get involved in the construction of heterometallic magnets.

In this context, seven-coordinated 3d ion complexes with pentagonal bipyramidal (PBP) geometry have been found of great relevance. Small or large ZFS D values (up to about +/- 30 cm<sup>-1</sup>) with a positive or negative sign can be rationally obtained simply by selecting the appropriate metal center.<sup>1</sup> After a brief introduction on the origin and control of the magnetic anisotropy in this geometry, we will discuss the interest of such complexes for the construction of heterometallic SMMs and SCMs,<sup>2</sup> and some important aspects to be taken into account when designing such systems.<sup>3</sup> A recent development towards chiral nanomagnets will also be presented.<sup>4</sup>

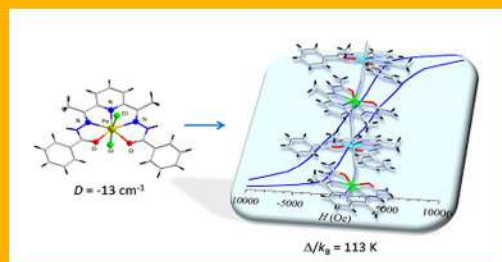


Figure 1. Typical building block of controlled anisotropy and its assemblage with ferromagnetic coupling units to achieve a SCM.

## References

- [1] J.-P. Sutter et al. Chem. Soc. Rev. 2022, 51, 3280.
- [2] K. Bretosh, et al. Inorg. Chem. Front. 2020, 7, 1503 ; C. Pichon, et al. J. Am. Chem. Soc. 2018, 140, 7698.
- [3] C. Pichon et al. Chem. Eur. J., 2021, 27, 15484
- [4] V. Jubault et al. Cryst. Growth&Des. 2023, 23, 1229.

## SPEAKER

**Professor Dr. Jean-Pascal Sutter,**  
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Professor Dr. Jean-Pascal Sutter is a research director at CNRS. He obtained his PhD in Chemistry from the University of Strasbourg (France) in 1992 under the supervision of Dr Michel Pfeffer. After a post-doctoral fellowship at the University of Utrecht (The Netherlands) with Prof. G. van Koten, he started his career at CNRS in 1994 as a research fellow in the team of Prof. Olivier Kahn in Bordeaux. In 2005, he joined the CNRS coordination chemistry laboratory (LCC) in Toulouse where he leads a research team. His research activities focus on molecular materials, in particular magnetic and microporous architectures. He is also known for his various contributions in molecular magnets.