Molecular Magnetism of Lanthanides Complexes and Networks

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Editorial

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Lanthanides ions allows for the design of remarkable magnetic compounds with unique magnetic properties. One of their assets is that they can give rise easily to multi-functional materials. Such multi-functionality is found in the collection of papers of this Special Issue with contributions that highlight the unprecedented magnetic properties of lanthanide-based molecules together with chirality [1], luminescence [2,3] or electrical conductivity properties [4]. Innovative synthetic routes such as the use of helical [1,5] or protonated ligands [6] together with cutting edge characterization techniques of 4f-SMM are presented [7].

First of all, this Issue features a remarkable review article from Oliver Waldman and co-workers [7] that highlights the power of neutron scattering studies for the understanding of the magnetic behavior of 4f-SMMs. This extended and remarkably accurate work provides a deep and comprehensive perspective on this technique by analyzing, among others, one of the most famous molecules in our field, the $Tb_2(\mu\text{-}N_2^{3-})$ dimer.

Then, a study of Jerôme Long and co-workers [3] details how the analysis of luminescent properties of Dy-SMMs can be useful for understanding their magnetic properties. The authors use the very simple molecule $[Dy(NO_3)_3(H_2O)_4]\cdot 2H_2O$ which, though often used as a precursor in the design of Dy-SMM, has never been deeply characterized.

Miki Hasegawa, Takashi Kajiwara and co-workers [5] present a nice 4f-SMM family based on a helical ligand in which, surprisingly, not only the Dy^{III} but also the Nd^{III} derivative show SMM behavior [5]. Helicity is also the topic of the work of Boris Le Guennic and co-workers [1] in which SMM behavior is observed on a racemic form of a helicene-based molecule with a remarkable magnetic hysteresis opening.

Albert Escuer, Spyros Perlepes and co-workers [6] report a new approach to the widely used triethanolamine ligand that gives rise to a family of Ln^{III} complexes in which the Dy^{III} derivative behave as a SMM.

Pierre Rabu, Emilie Delahaye and co-workers [2] show how synthetic conditions can influence the creation of magnetic hybrid networks in which the Sm^{III} and Pr^{III} adducts depict luminescent properties.

Masahiro Yamashita and co-workers [4] present a very appealing hybrid material in which partially oxidized BEDT-TTF molecules crystallize together with Dy^{III} precursors to form a compound in which both SMM behavior and electrical conductivity can be observed.

I hope that this Special Issue will be pleasant and useful to the readers of *Magnetochemistry* and I wish this new open access journal all the best for its future.

I am thankful to the *Magnetochemistry* Editor, Carlos J. Gomez-Garcia, for his confidence in giving me the opportunity to guest edit this Special Issue. I am also thankful to the MDPI editorial team for their professionalism and reactivity. I also want to acknowledge the work of all referees that accepted to spend their time to judge, comment and finally enhance the quality of the papers. Finally, and most of all, I would like to thank the authors for their valuable contributions to this Issue.

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