Molecular nanomagnets and multifunctional coordination complexes based on transition and lanthanide metal ions

Evangelos Pilichos [1#], **Konstantinos Pantelis**[1], **Diamantoula Maniaki** [1], **Catherine P. Raptopoulou** [2], **Vlasoula Bekiari** [3], **Albert Escuer** [4] and **Spyros P. Perlepes**[1,5*]

[1]Department of Chemistry, University of Patras, GR-26504 Patras, Greece

[2]Institute of Nanoscience and Nanotechnology, NCSR "Demokritos", 15310 Aghia Paraskevi, Greece

[3]School of Agriculture Sciences, University of Patras, 30200 Messolonghi, Greece

[4]Department of Inorganic and Organic Chemistry, University of Barcelona, 08028 Barcelona, Spain

[5]Institute of Chemical Engineering Sciences, Foundation for Research and Technology-Hellas (FORTH/ICE-HT), Platani, P.O. Box 1414, GR-26504 Patras, Greece

Presenting author: Evangelos Pilichos, email: pilvag@gmail.com
* Corresponding author: Spyros P. Perlepes, email: perlepes@patreas.upatras.gr

ABSTRACT

The field of Molecular Magnetism has undergone impressive changes since the discovery of slow magnetization relaxation in the 3d-metal coordination cluster $[Mn_{12}O_{12}(O_2CMe)_{16}(H_2O)_4]$ in the early 1990s and in double-decker mononuclear complexes containing the anions $[Ln(Pc)_2]^-$ (Ln= Tb, Dy) in the beginning of the 21st century [1,2]. On the other hand, the chemistry and properties of multifunctional molecular metal complexes are "hot topics" in inorganic and material chemistry because of their importance in high-technology applications [3].

In the last 15 years or so, our group has been actively involved in the development of synthetic strategies and the study of the properties of: (a) Single-Molecule Magnets (SMMs) based on 3d- and mixed 3d/4f-metal ions; (b) Single-Ion Magnets (SIMs) based on 3d- and 4f-metal ions; and (c) Mononuclear and polynuclear Ln(III) complexes, as well as Zn(II)/Ln(III) complexes that combine SMM or SIM properties and photoluminescence that is based on the Ln^{III} ion or on the coordinated organic ligand. The choice of the metal ions and organic ligands is of paramount importance for the realization of our goals.

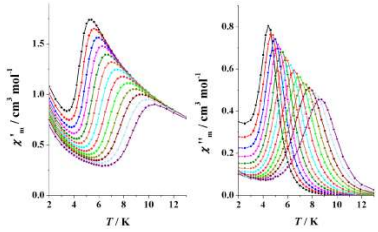

Fig.1 Magnetic data for complex $[Dy(NO_3)_3(5BrsalanH)_2(H_2O)]$ which behaves as a SIM under a static magnetic field of 0.1 T; 5BrsalanH is the organic ligand N-(5-bromosalicylidene)aniline.

REFERENCES

[1] A book chapter from our group: Z.G. Lada, E. Katsoulakou and S.P. Perlepes, in "*Single-Molecule Magnets: Molecular Architectures and Building Blocks for Spintronics*" (edited by M. Holynska), Wiley-VCH, Weinheim, Germany, 2019: pp. 245-313 (Print ISBN: 978-3-527-3421-8).

[2] For an extensive review from our group, see: D. Maniaki, E. Pilichos and S.P. Perlepes, *Frontiers in Chemistry*, **6**, article 461: 27 pp.
[3] See the various articles in "*Multifunctional Molecular Materials*" (edited by L. Quahab), Pan Stanford Publishing, Singapore, 2013.