From high-spin single molecule magnets to low-spin single ion magnets

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Nanomagnets such as single molecule magnets, single chain magnets, and single ion magnets attract an explosive interest in the recent years. Earlier studies on polynuclear complexes, such as Mn_{12} and Fe_8 prototypes, were motivated by the high-spin ground state (S = 10); however these rather symmetric systems displayed only a slight magnetic anisotropy (D < 0). Investigation of the lanthanide (Dy and Tb) complexes brought much higher magnetic anisotropy and consequently much higher barrier to spin reversal that conditioned a prolongation of the relaxation time. A return to the 3d transition metal complexes caused a breakdown in investigation of single ion magnets with plethora examples of them in the family of tri-, tetra-, penta-, hexa-, hepta- and octacoordinated Co(II) complexes with the spin S = 3/2. Only three mononuclear Ni (II) complexes with S = 1 display the slow magnetic relaxation in the AC magnetic fields. There are a few reports on S = 1/2 spin systems spanning the class of single ion magnets: mononuclear complexes of V(IV), Mn(IV), Ni(I) and Cu(II) belong to them. Unlike the traditional single molecule magnets, the Raman, direct, and the quantum tunneling processes dominate the slow magnetic relaxation in low-spin single ion magnets.

Biography

Roman Boča has completed his PhD at the age of 27 years from Slovak University of Technology in Bratislava, Slovakia. He is Professor of chemistry since 1993, presently at the University of SS Cyril and Methodius in Trnava, Slovakia. He has over 300 publications that have been cited over 3000 times, and his publication H-index is 33. His main scientific focus was quantum chemistry of coordination compounds and presently the theoretical and experimental molecular magnetism. He is author of *A Handbook of Magnetochemical Formulae*, Elsevier, Amsterdam 2012, *Theoretical Foundations of Molecular Magnetism*, Elsevier, Amsterdam, 1999.

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