

Editorial

Magnetochemistry: From Fundamentals to Applications

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Received: 20 January 2016; Accepted: 21 January 2016; Published: 25 January 2016

It is well known that Magnetochemistry is a multidisciplinary area that deals with many different materials and properties. The first issue of the new journal *Magnetochemistry* clearly confirms this fact. Thus, in this first issue we can read five different contributions with very different subjects as the magnetic properties of Pt₁₃ nanoclusters with superatom character, new V₄ and V₆ complexes with β -diketone ligands presenting novel topologies, a theoretical study of the magnetic coupling of transition metal complexes through functionalized chiral and C₆₀-filled bridging carbon nanotubes, the first spin crossover transition in a Mn(II) chain and a study of the effect of the size and electronic configuration on the magnetic coupling in lanthanide-copper complexes.

Thus, in the first article [1], Roduner and Jensen show the synthesis of nearly spherical Pt₁₃ nanoclusters in the pores of NaY and KL zeolites presenting high spin states, blocking temperatures and superdiamagnetic properties strongly dependent on the amount of chemisorbed H₂. These properties are rationalized assuming that the Pt₁₃ nanoparticles behave as analogues of transition metal atoms (superatoms) with high and low spin states and molecular orbitals delocalized in the cluster.

In the second article [2], G. Aromí *et al.* explore the chemistry of vanadyl ions (VO²⁺) with *bis*- β -diketone ligands and pyridine. With this strategy they prepare a novel V^{IV} tetranuclear complex and a mixed valence hexanuclear V^V₄V^{IV}₂ complex, both presenting novel topologies thanks to the conformation flexibility of the *bis*- β -diketone ligands. The magnetic properties of these complexes reveal the presence of S = 2 and S = 1 ground spin states.

In the third article [3], Ruiz and Gómez-Coca show a theoretical DFT study of the magnetic coupling of transition metal complexes connected through chiral and filled carbon nanotubes (CNT) since these nanotubes present highly delocalized π -electrons. This theoretical study shows that Fe(III) paramagnetic centres coordinated to terminal carboxylates groups in functionalized CNT present ferro or antiferromagnetic coupling depending on the presence or absence of chirality in the CNT. This study also shows that the insertion of C₆₀ inside the CNT (peapod structures) results in some cases in dramatic changes in the magnetic coupling.

In the fourth article [4], S. Benmansour *et al.* describe the synthesis and characterization of two novel magnetic coordination polymers with segregated cationic and anionic chains. One of these two compounds represents one of the very few known examples of Mn(II) complex with low spin configuration and the first low spin Mn(II) chain. Since this compound presents a partial spin crossover transition, it is the first Mn(II) chain presenting a SCO transition.

Finally, in the fifth article [5], Ghosh *et al.* describe a series of Ln₂Cu trimers (Ln = Ce, Gd, Tb, Dy and Er) where the size and electronic configuration of the Ln(III) ion play a key role in determining on one side the coordination geometry and, on the other side, the magnitude and sign of the magnetic coupling. This series represents the second reported one where the Ln-Cu magnetic coupling through double oxide bridges has been determined and confirms the hypothesis that the ferromagnetic coupling becomes stronger as the number of unpaired f electrons increases.

From these examples, it is clear that the new journal *Magnetochemistry* is multidisciplinary and may be of interest for a plethora of researchers working in many different areas either from the theoretical or experimental points of view.

References

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