SOME EXOTIC LOW-D MAGNETIC INORGANIC SYSTEMS, FRUSTRATION *VS.* MAGNETIC ORDERING

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Résumé: In this "tutorial-lecture", I will use some compounds investigated in our laboratory to set the analogy that exists between low-dimensional molecular systems and "pure" inorganic ones. In our approach, magnetic transition metals are surrounded by counter-cations (alkali, alkali-earth) and oxo-anions (PO_4^{3-}, HPO_3^{-}, SeO_3^{2-} , TeO_3^{2-}…) which play the role of molecular bridging spacers. It creates original tridimensional edifices in which low-D magnetic units emerge as building units. The possibility to tune M-X-M magnetic exchanges using mixed anionic ligands (X = O^{2-} and F^{-} for instance) opens extra potentialities for sizeable behaviors.

In the selected examples, both magnetic frustration and the lattice dimensionality are key ingredients that may harbor exotic phenomena and unconventional states of matter, such as quantum spin liquids (QSLs),[1] spin ice,[2] superconductivity,[3,4] and topological states.[5] In most 1 or 2 spatial dimensions, the *Mermin-Wagner* theorem states that long-range ordering does not occur at finite temperatures, otherwise that assisted by magneto-crystalline anisotropy. However, in most of the real inorganic such magnetic ordering occurs at low-temperature. However, in some inorganic materials, it exists original intermediate topologies where strongly inner-coupled low-D topologies (chains, layers) are weakly coupled together via frustrated alien-magnetic M' ions, with very ambiguous roles towards the 3D-ordering. I will present such compounds studied at the lab, in which the M' "idle spin" like situation hesitates between a spin-liquid state or very specific magnetic orders. Such examples will be the opportunity to initiate a brief magnetic structure analysis using neutron diffraction data.

In the case of low-D ferromagnetic units, I will also show some possible drastic influence of the magnetocrystalline anisotropy and magnetic domains towards giant coercivity and magnet hardness, a specificity of extended coupled inorganic systems. [7]

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