

Coordination chemistry and nitronyl nitroxide free radical A metal-radical approach to bistability

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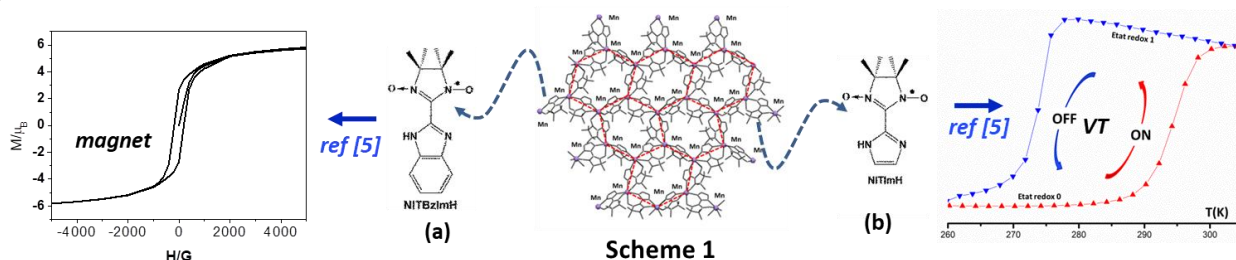
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Coordination chemistry of nitronyl nitroxide free radicals is a very rich playing field of structures and properties. It has played a major role in the development and in the comprehension of molecule-based magnetic materials and still remains a singular source of very diverse and original bistable magnetic systems^[1-5].



Thus, 2D coordination polymers with an auto-control of the metal-radical spin carrier alternation can be obtained [1]. When metal ion is Mn²⁺ ($S = 5/2$) and the radical bears a benzimidazole substituent for example (NITBzImH, $S = 1/2$), they can form ferrimagnets with Curie temperatures (T_c) as high as 55K^[4] (Scheme 1a) ranking in the top of molecular magnets. On the other hand, compounds with an imidazole substituent (NITImH, Scheme 1b) show thermo-induced valence tautomerism where upon cooling an electron transfer takes place in which the Mn²⁺ are oxidized to Mn³⁺ while the radicals are reduced. Upon reheating the electron transfer is reversed but with a hysteresis in temperature leading to bistability^[5] Valence tautomerism opens the way for switchable molecular materials, but its relationship to chemical and structural factors still has to be understood. During this seminar we describe recent development in this field involving collaborative work with the group of Evgeny Tretyakov.

References

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