

# Co(II) Spin Crossover with a Fully-Reversible Chemical Switch of the Spin State at Room Temperature

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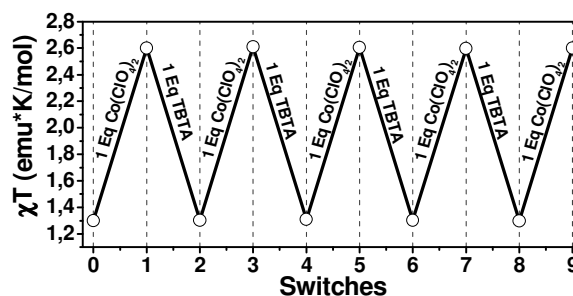
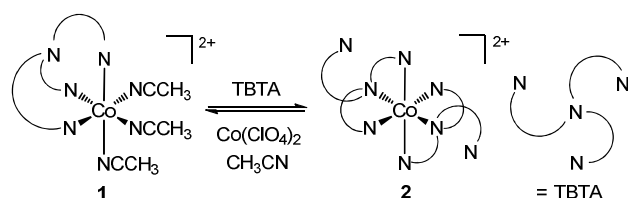
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In spin crossover (SCO) compounds, the spin ground state changes with temperature, from high-spin (HS) to low-spin (LS), leading to a characteristic variation of the magnetic behaviour around a transition temperature  $T_0$ .<sup>[1]</sup> Switching the magnetic properties of SCO compounds by light or pressure is well understood,<sup>[2]</sup> but reversible chemical switching remains elusive. This is because two opposing prerequisites are needed to obtain SCO complexes that can reversibly respond to a chemical stimulus: on the one hand the rigidity of the structure is needed to obtain a high  $T_0$ , while on the other hand flexibility is required to realise chemical switching.

By reacting one or two equivalents of the click ligand tris[(1-benzyl-1H-1,2,3-triazol-4-yl)methyl]amine (TBTA) with  $\text{Co}(\text{ClO}_4)_2$  in  $\text{CH}_3\text{CN}$  we could obtain the complexes  $[\text{Co}(\text{TBTA})(\text{CH}_3\text{CN})_3](\text{ClO}_4)_2$  (**1**) and  $[\text{Co}(\text{TBTA})_2](\text{ClO}_4)_2$  (**2**). Compound **1** is in the HS state over the total temperature range which could be established by SQUID measurements. However, complex **2** shows a distinct spin crossover around room temperature which we attribute to an intramolecular stacking motif.<sup>[3]</sup>

The different coordination of the TBTA ligand in **1** and **2**, confirmed by x-ray crystallography, shows the flexibility of this system and allowed us to reversibly interconvert the complexes at room temperature in an acetonitrile solution, hence changing reversibly the overall magnetic moment.<sup>[3]</sup>

Encouraged by these promising results we found out that we can easily control the spin state of these systems by adjusting the substitution pattern of the click ligand and the right choice of anion.



[1] J. R. Gispert, *Coordination Chemistry*, Wiley-VCH, Weinheim, 2008.

[2] P. Gütllich, Y. Garcia, H. A. Goodwin, *Chem. Soc. Rev.* 2000, 29, 419.

[3] D. Schweinfurth, F. Weisser, D. Bubrin, L. Bogani, B. Sarkar, manuscript in preparation.