The development of stimuli-responsive metal complex

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The development of switchable metal complexes, such as spin crossover, valence tautomerism, and metal-to metal electron transfers, is an attractive theme in the field of materials science. Numerous metal complexes showing various switching behavior in their electronic, magnetic, optical properties has been reported. Of these, we have recently demonstrated novel tetraoxolene-bridged Fe-based 2-D honeycomb layered systems exhibiting electron transfers between metal ions and bridging ligands. [1-3] The electron transfer behavior in this system is influenced through temperature variation, solvation/desolvation treatment, chemical doping of ligands and pressure application. Especially, the desolvated sample showed stepwise thermally driven electron transfers. As the examples of another switchable metal complexes, our group have comprehensively investigated on the synthesis, structural features and physical properties of a series of Co(II) or Fe(III)-based spin crossover complexes.[4] Among such materials with flexible spin-state switching, multi-step spin-transition systems could be a good candidate for molecular-based high order data storage. However, such multi-stable systems are still relatively rare because of less development of suitable molecular designs.

Systems incorporating multiple switchable building units is expected to show more than two stable phases when stimulated by external perturbation. To development of new materials for observation of multi-step spin state conversion, the co-crystallization of cationic and anionic stimuli-responsive building blocks as the simple molecular design, has been utilized in this study. We report on the synthesis, structural and magnetic properties data for new metal complexes based on this strategy.

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