Development of Spin-Crossover Complexes with a Protonic Dipolar Anion: Toward Switchable Spin-Crossover Protonics

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The development of multifunctional spin-crossover (SCO) compounds is one of the most attractive fields of inorganic coordination chemistry. The synergy between SCO phenomena and electronic properties such as conductivity, magnetism, permittivity, and optics can provide an opportunity to control or switch such an electronic property by external stimuli. Recently we have developed SCO molecular conductors [1,2], in which conductivity modulation can be achieved by using a sort of chemical pressure effect, namely, a remarkable structural change in an SCO molecule accompanying a spin conversion. In the further efforts along this strategy, we have focused on dielectric property of a SCO solid, because dielectric property of a solid is very sensitive to structural modification. In order to develop novel SCO compounds coupled with protonics, we have tried to prepare Fe complexes with protonic dipolar anions. In this conference, we will report preparation, crystal structures, and physical properties of the first Fe(III) SCO complex with a protonic dipolar anion, [Fe(qsal)₂(HSO₄)]·CH₃OH 1 (Fig. 1), which shows a complete spin transition at around 160 K with a thermal hysteresis loop of 5 K (Fig. 2). The SCO mechanism will be presented.

Fig. 1 [Fe(qsal)₂(HSO₄)]·CH₃OH 1