Studies of Spin Crossover Complexes via Solvo-thermal Syntheses and their Thermal Relaxation of Light Excited Kinetic Phenomena

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The unique spin crossover 1D ladder complex $[Fe_2(bpt)_2(NCS)_2(bpy)_2]\cdot MeOH$ (**1**) have been synthesized successfully by one-step solvo-thermal syntheses or directly transformed from *trans*-$[Fe(abpt)_2(NCS)_2]$ complex by hydrothermal process.

The magnetic measurement reveals that the 1D spin-crossover complex **1** has an abrupt spin transition at 130 K and possesses an unusual magnetic behavior. The π-π interactions of **1** do vary slightly with spin transition. The distances along the (110) and (101) planes are 3.65(1) Å and 3.52(5) Å at 295 K but 3.53(3) Å and 3.45(2) Å at 100 K.

The novel dinuclear Double bridging complex $[Fe_2(\mu\text{-}bpt)_2(NCS)_2(CH_3OH)_2]$(**2**) and $[Fe_2(\mu\text{-}bpt)_2(NCS)_2(py)_2]$ (**3**) have also been synthesized and characterized by x-ray diffraction. The bond lengths of Fe-N are 2.292(3) Å, 2.094(3) Å for complex **2** and 2.110(2) Å, 2.321(2) Å for complex **3** at HS state.

The variable-temperature magnetic susceptibility measurement reveals that **2** and **3** are in high-spin state during 60-400 K. Interestingly, the complex **3** has a spin transition from HS to LS at low temperature under 808 nm radiation and the thermal relaxation behavior of such induced LS state will be disscussed.

Keywords: LIESST, spin crossover, thermal relaxation