Pressure-induced Electron Transfer in Cobalt-iron Prussian Blue Complex Studied by RIXS

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Resonant Inelastic X-ray Scattering (RIXS) recently has become one of the most advanced techniques that probe electronic excitations in solids, combining both advantages of a high resolution and bulk sensitivity. In our measurement, we attempted to study the charge transfer in $K_{0.2}Co_{1.4}[Fe(CN)_6]\bullet XH_2O$[1] as a function of pressure by RIXS. The photoinduced magnetization at low temperature in Co-Fe Prussian blue analogues was explained by the presence of diamagnetic Co(III)-Fe(II) low spin pairs, this step can be pushed by low temperature or high pressure[2]. Then the photoinduced electron transfer from Fe(II) to Co(III) can be happened. We had performed a preliminary Resonant inelastic x-ray scattering (RIXS) studies on the $K_{0.2}Co_{1.4}[Fe(CN)_6]\bullet XH_2O$ at 0.33GPa under Diamond Anvil Cell(DAC) to study and confirmed the charge transfer behavior successfully during this time. From the comparison of the title compound at 0.33GPa pressure and ambient pressure, we can see the Co(III) ratio increase very clearly, that mean the charge transfer Fe(III)-Co(II)→Fe(II)-Co(III) happened. This confirms the outstanding resolving power of RIXS and fruitful quantitative determinate the ligand field strength and also the Co(II)/[Co(II)+Co(III)] ratio can be determinated from this kind of measurement. In here, we will present the measurement results on Iron K-edge and Cobalt K-edge partial fluorescence yield mode (PFY) by RIXS experiment to get the ligand field strength and charge transfer information related with pressure.

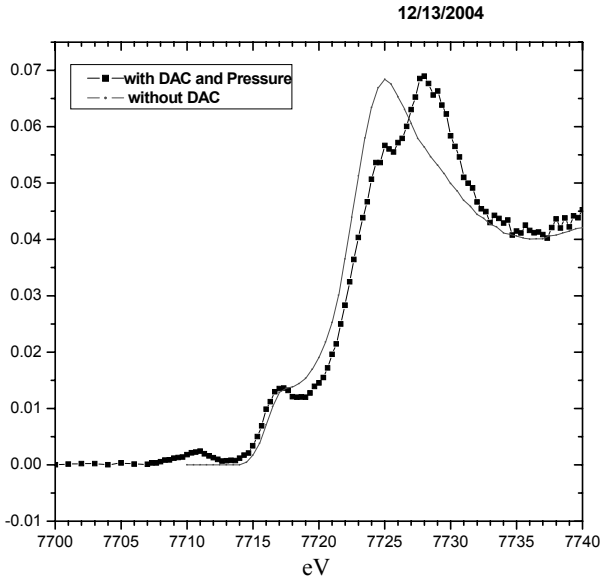

Figure 1. Cobalt K-edge X-ray absorption spectra with 0.33GPa and without pressure by partial fluorescence yield mode (PFY)

[1] Verdaguer M., *Science*, **272**, 698 [2] Ksenofontov V., Levchenko G., Reiman S., Gutlich P., *Phys. Rev. B*, 2003, **68**, 24415.

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