

XRD Investigation of CrMn 1D Chain with SCMs Behavior

Ching-Lin Yang (楊青林)¹, Yu Wang (王瑜)¹, Hwo-Shuenn Sheu (許火順)²,
and Jey-Jau Lee (李之釗)²

¹Department of Chemistry, National Taiwan University, Taipei, Taiwan

²National Synchrotron Radiation Research Center, Hsinchu, Taiwan

A one-dimensional class, of slow relaxing magnetization named either magnetic nanowires or single-chain magnets^(1,2,3) A new one dimensional (1D) cyano-bridged bimetallic chain is reported here. $[\text{Cr}(\text{CN})_6\text{Mn}(\text{cyclam})\bullet 6\text{H}_2\text{O}](1)$: (cyclam = 1,4,8,11-Tetraazacyclotetradecane) is characterized recently by single crystal x-ray diffraction (Fig. 1), which exhibits a single chain magnet (SCM) behavior. The magnetic behavior of 1 is shown in Fig. 2 in the form of $\chi_m T$ versus T plots. Upon cooling the $\chi_m T$ values decrease gradually and reach a short plateau around 19 K then go up more quickly to the maximum at 5K, followed by subsequent decreases below this temperature. This is clearly antiferromagnetic coupling change to ferromagnetic coupling when temperature is below 18.9K. We want to know if magnetic phase transition happen with structure phase transition. So we used low temperature XRD to monitor this behavior in NSRRC 01C2. We change different temperature to monitor powder-XRD data of 1 from 300K to 6K (Fig.3). Powder pattern at high temperature is the same as simulated single crystal powder pattern. This result tell us compound 1 didn't have any magnetic phase transition below 18.9K or the sample temperature is higher than monitor cold head temperature. Next time we will try to use standard like DyVO_4 which has structure phase transition below 14K to correct the temperature.

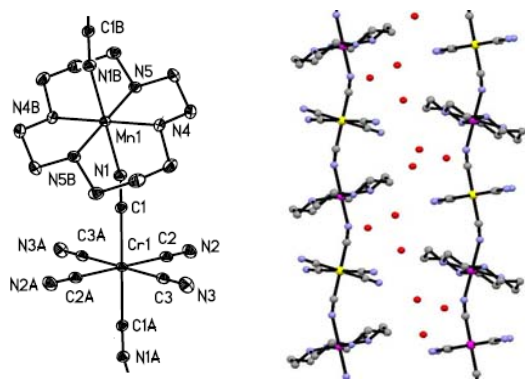


Fig. 1: (Left)ORTEP drawing of CrMn 1D chain.(Right) Zigzag 1D chain.

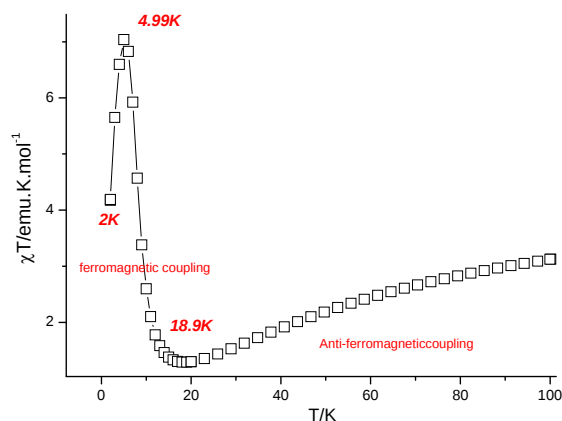


Fig. 2 : $\chi_m T$ versus T plots of CrMn 1D chain.

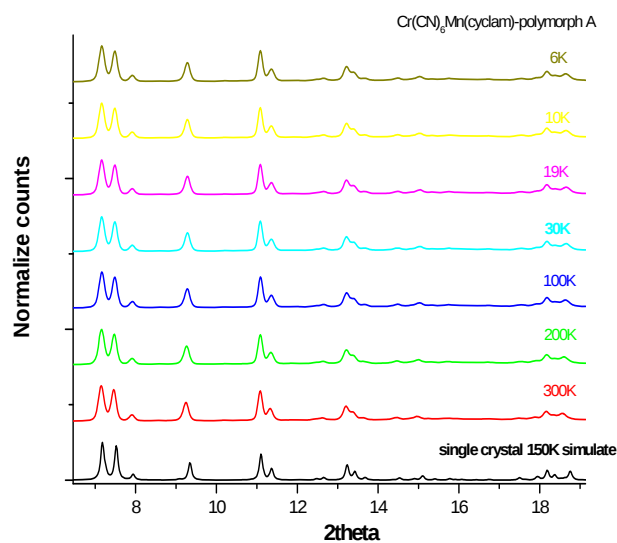


Fig. 3: Powder pattern of CrMn 1D chain at different temperature

References

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