

Estimation of Magnetic Ordering Temperatures, T_c , for $\text{CaSrFe}_{2-x}\text{Mn}_x\text{O}_{5.0}$, $x = 0.5, 0.67, 1.0$ and $\text{Sr}_2\text{Fe}_{1.9}\text{M}_{0.1}\text{O}_{5.0}$, $M = \text{Cr, Co and Mn}$.

Farshid Ramezanipour¹ and John E. Greedan¹

¹ Department of Chemistry, McMaster University, Hamilton, ON, Canada L8S 4M1

As part of a study of the effects of both A and B site substitutions on the structure and magnetic properties of brownmillerite oxides, the series $\text{CaSrFe}_{2-x}\text{Mn}_x\text{O}_{5.0}$ and $\text{Sr}_2\text{Fe}_{1.9}\text{M}_{0.1}\text{O}_{5.0}$ with $M = \text{Cr, Mn and Co}$ were synthesized in argon and investigated using magnetic susceptibility and neutron diffraction methods among others.[1] Of great interest was the determination of the magnetic ordering temperatures, T_c . These materials order in a G-type antiferromagnetic structure but it proved to be very difficult to assign T_c from the susceptibility data and neutron diffraction was the only reliable method. These results supplemented earlier data obtained on C2 prior to the extended shutdown and data obtained at ORNL during the shutdown period. The method used is illustrated in Figure 1 for the CaSrFeMnO_5 phase. As there were only a few data points within the "critical" regime, T_c was estimated by comparison of the data

with plots generated using the function $I^{1/2} = I_{\text{sat}}^{1/2} ((T_c - T)/T_c)^{0.35}$ for various T_c values. A list of the values obtained in this manner is given in Table 1.

Table 1. T_c values for the series $\text{CaSrFe}_{2-x}\text{Mn}_x\text{O}_{5.5}$ and $\text{Sr}_2\text{Fe}_{1.9}\text{M}_{0.1}\text{O}_{5.0}$.

x	T_c (K)	M	T_c (K)
0.5	435(5)	Cr	649(3)
0.67	405(2)	Mn	636(2)
1.0	398(2)	Co	668(3)

Reference

- [1] Farshid Ramezanipour, John E. Greedan, Lachlan M.D. Cranswick, V. Ovidiu Garlea, Ronald L Donaberger, Joan Siewenie. Accepted, Jan. 12, 2012, J. Am. Chem. Soc.

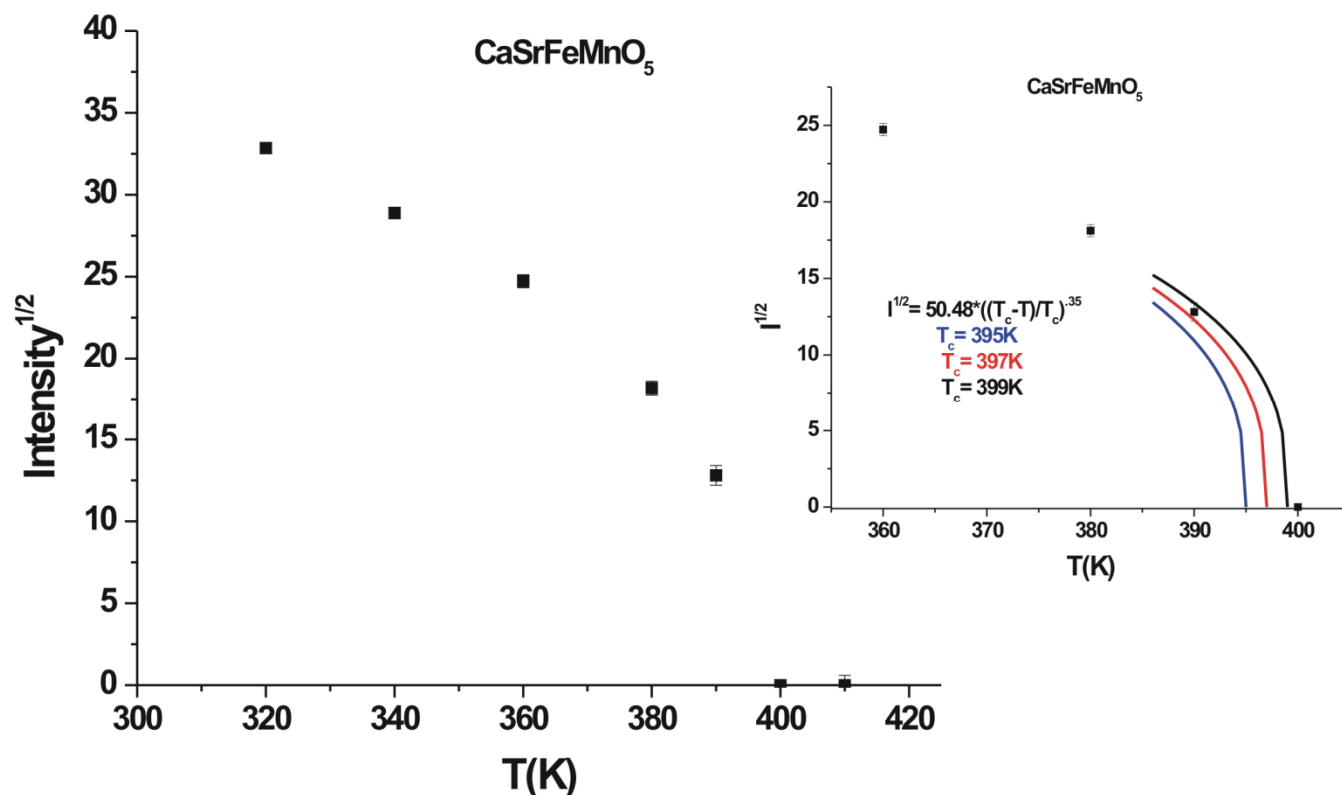


Fig. 1 Estimation of T_c for $\text{CaSrFeMnO}_{5.0}$ using the approach described above.