

Supplemental Material

Proximate electronic and magnetic phase transitions in CaFe_3O_5

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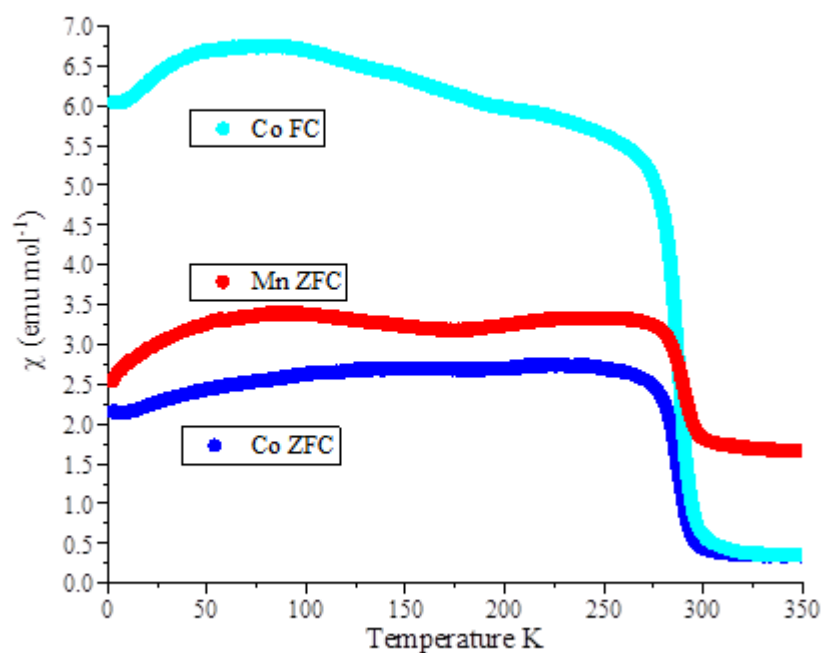
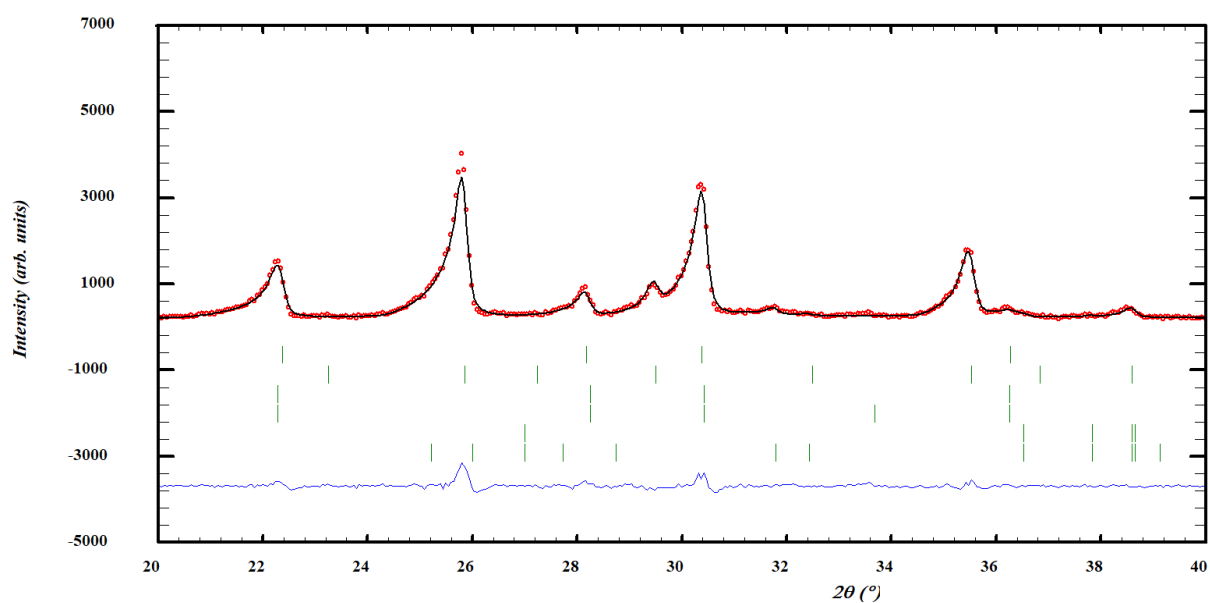
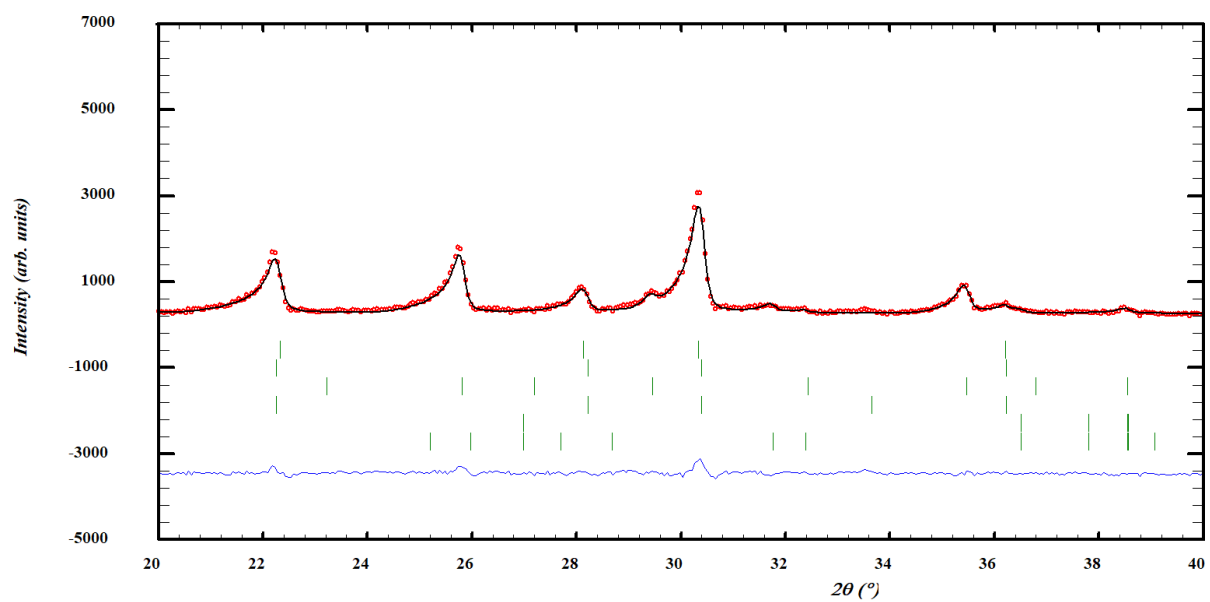


Fig. S1. Magnetisation/field data for $\text{CaFe}_{2.99}\text{M}_{0.01}\text{O}_5$ ($M = \text{Co}, \text{Mn}$) samples under zero field cooled (ZFC) and for $M = \text{Co}$ field cooled (FC) conditions. A broad magnetic transition is observed at 300 K but distinct transitions for the CA and CO phases observed by diffraction are not evident.

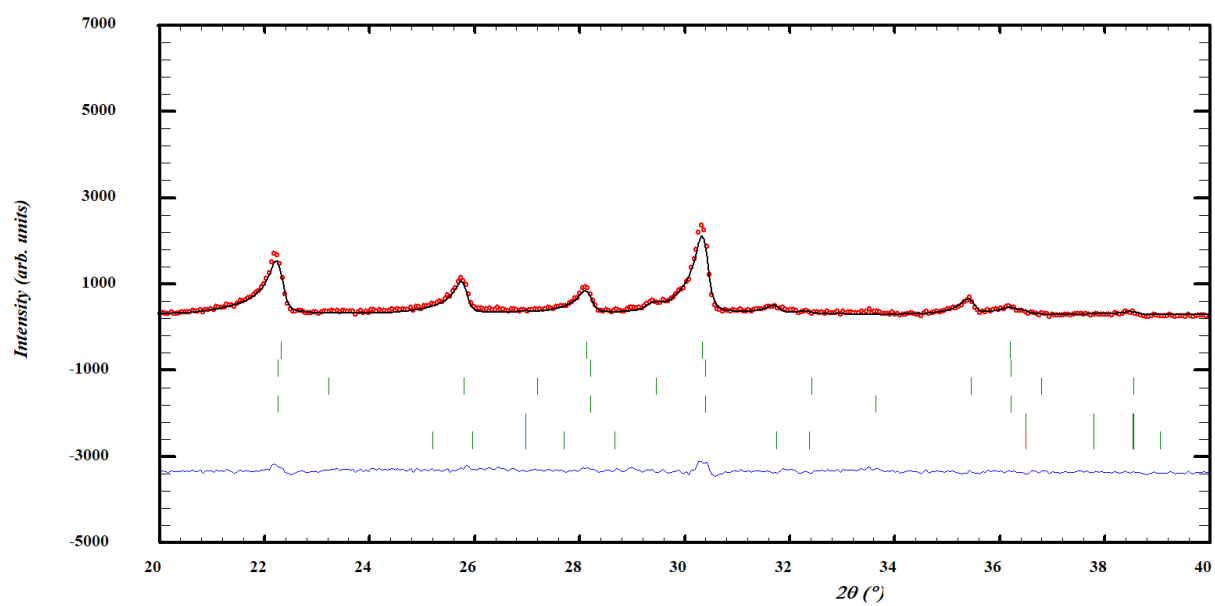
$T = 3 \text{ K}$ (Bragg markers from top to bottom are CO-N, CO-M, CA-N, CA-M, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -M)



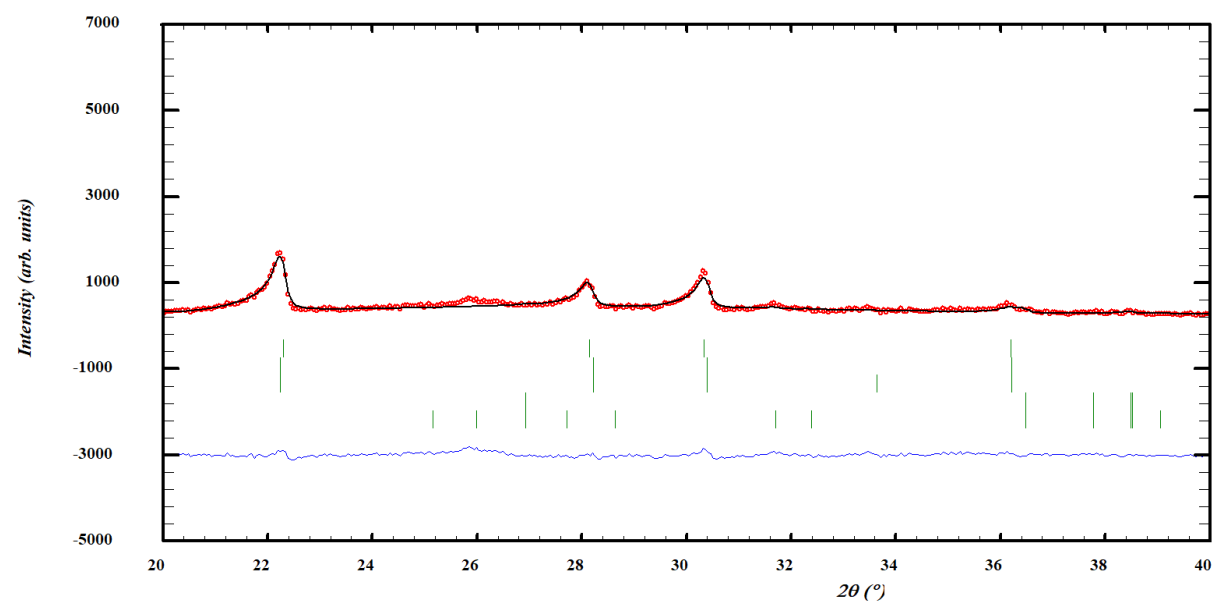
$T = 250 \text{ K}$ (Bragg markers from top to bottom are CO-N, CA-N, CO-M, CA-M, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -M)



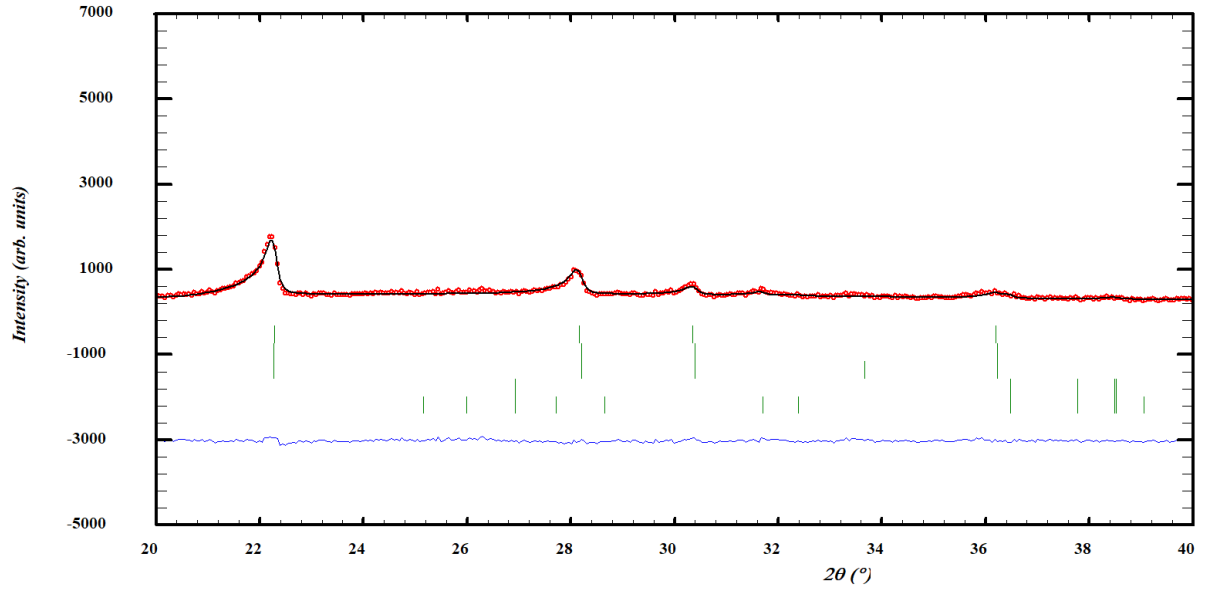
$T = 280$ K (Bragg markers from top to bottom are CO-N, CA-N, CO-M, CA-M, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -M)



$T = 290$ K (Bragg markers from top to bottom are CO-N, CA-N, CA-M, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -M)



$T = 300$ K (Bragg markers from top to bottom are CO-N, CA-N, CA-M, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -M)



$T = 320$ K (Bragg markers from top to bottom are CO-N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -N, $\text{Ca}_2\text{Fe}_2\text{O}_5$ -M)

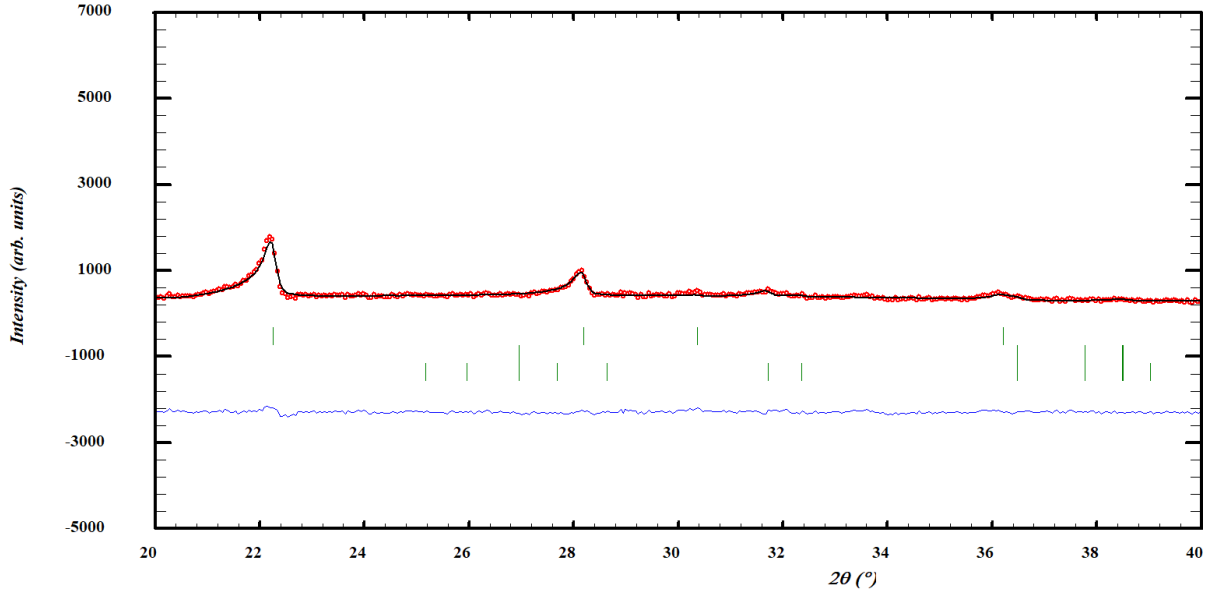


Fig. S2. Low angle region of the PND fits for the $\text{CaFe}_{2.99}\text{Mn}_{0.01}\text{O}_5$ at various temperatures T through the magnetic ordering and phase separation transitions. Bragg markers are described using the notation from Fig. 3. Peaks indicative of phase separation are the $(\frac{1}{2}01)$ CO-M and (021) CA-M reflections at $2\theta = 25.8$ and 30.4° respectively.