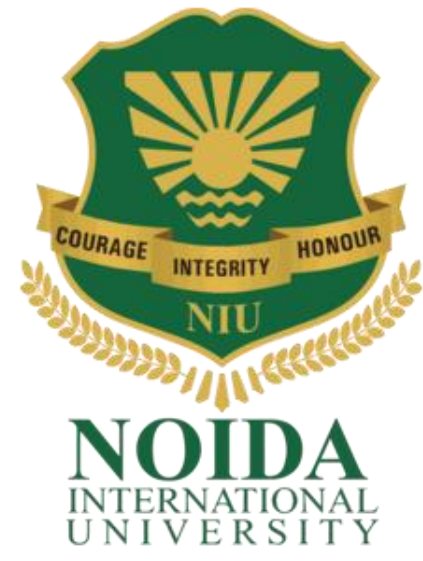


Magnetic and Magnetocaloric Properties of $\text{Gd}_{0.5}\text{Ho}_{0.5}\text{CrO}_3$ Perovskite Compound



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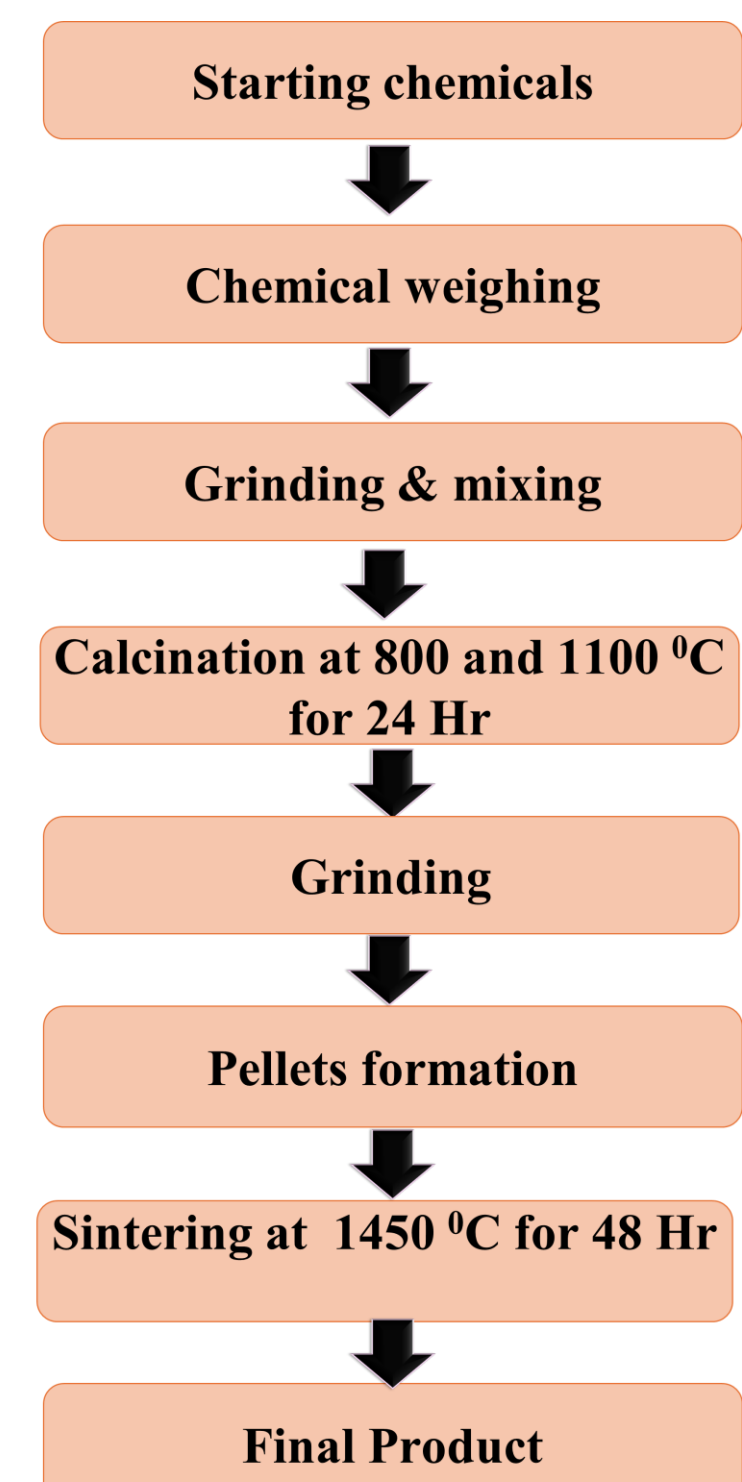
Introduction

Traditional vapor-compression refrigeration Systems face significant limitations in energy efficiency and environmental sustainability. These conventional systems rely on harmful refrigerants and consume substantial electrical power. Magnetic refrigeration, based on the magnetocaloric effect (MCE), emerges as a revolutionary alternative technology. This solid-state cooling approach promises higher efficiency, zero ozone depletion potential, and silent operation without moving parts.

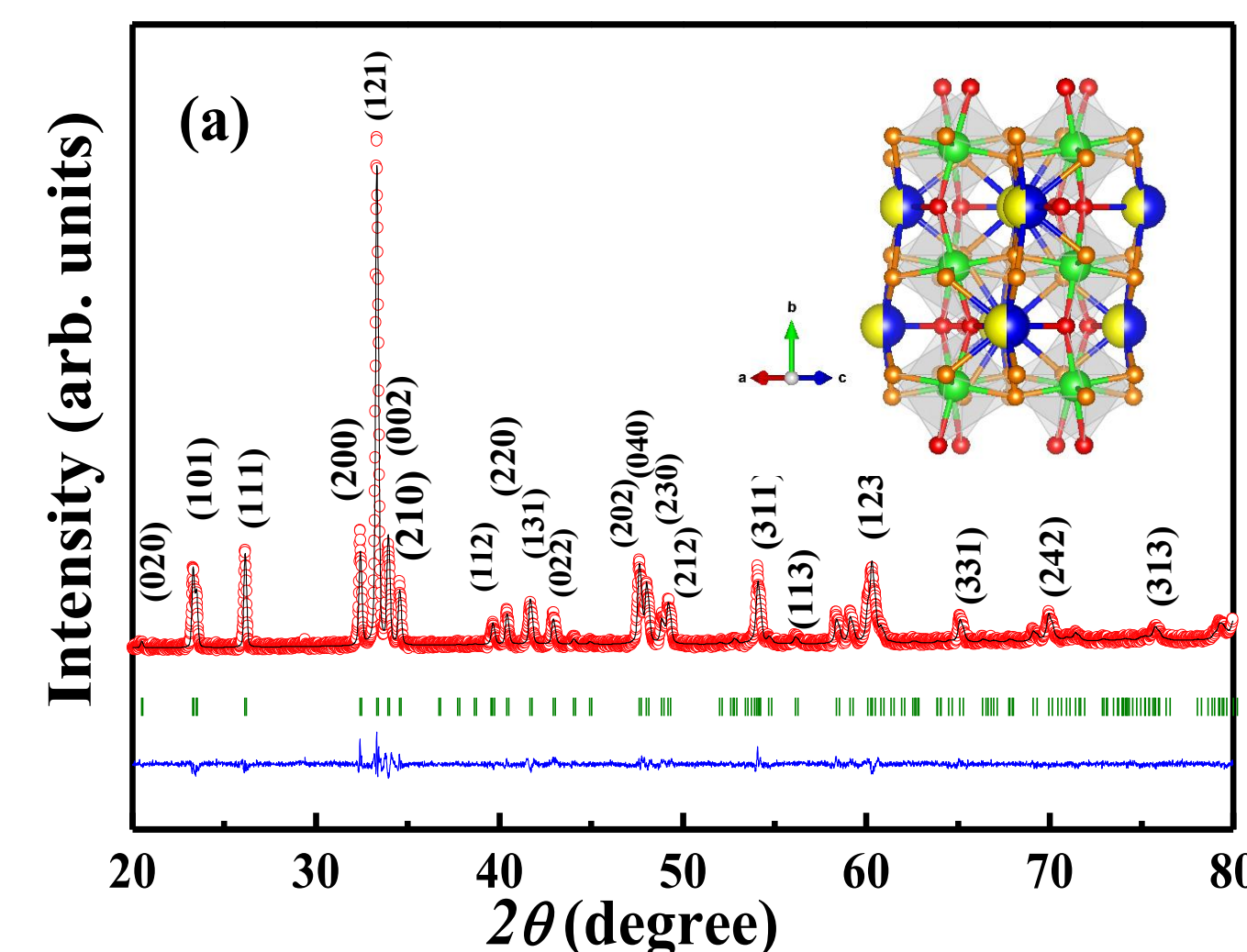
Objectives

- ❖ Synthesize the $\text{Gd}_{0.5}\text{Ho}_{0.5}\text{CrO}_3$ (GHCO) perovskite compound
- ❖ To study structural, magnetic and magnetocaloric properties of GHCO compound

Synthesis Method

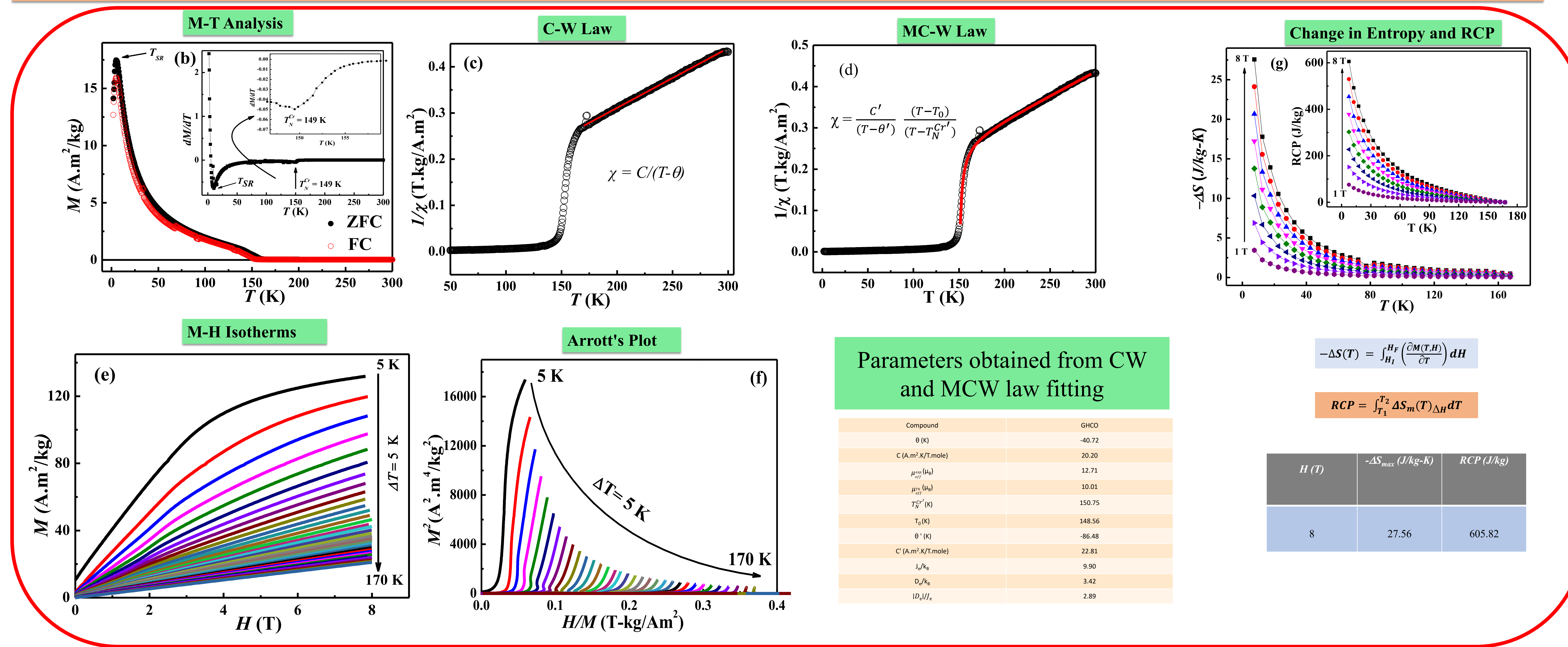


XRD



- ❖ The compounds possess an orthorhombic structure with space-group $Pnma$ (No. 62)

Results



Parameters obtained from CW and MCW law fitting

Compound	GHCO
θ (K)	-40.72
C (A.m².K/T.mole)	20.20
$\mu_{eff}(\mu_B)$	12.71
$\mu_{eff}(\mu_B)$	10.01
T_N (K)	150.75
T_0 (K)	148.56
θ^* (K)	-86.48
C' (A.m².K/T.mole)	22.81
J_J/k_B	9.90
D_J/k_B	3.42
$ D_J/J_J $	2.89

$$-\Delta S(T) = \int_{H_i}^{H_f} \left(\frac{\partial M(T,H)}{\partial T} \right) dH$$

$$RCP = \int_{T_1}^{T_2} \Delta S_m(T)_{\Delta H} dT$$

H (T)	$-\Delta S_{max}$ (J/kg-K)	RCP (J/kg)
8	27.56	605.82

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This work utilized the facilities provided under project No. ECR/2017/002681 sanctioned to Dr. Neeraj Panwar. The authors acknowledge CIF, CURAJ (India) for providing XRD and PPMS facilities.

Conclusions

The bulk powder of the GHCO compound was successfully synthesized via the solid-state reaction method, with phase purity validated by XRD. Magnetic measurements revealed a transition temperature of 149 K. Under an applied field of 8 T, the maximum value of $-\Delta S$ was 27.56 J/kg-K, and the calculated RCP value was 605.82 J/kg. At low temperatures, GHCO exhibits a large magnetocaloric effect (MCE), making it suitable for magnetic refrigeration applications.