

Study of multicaloric properties of 1% Cr and Ni-doped $\text{CaBaCo}_4\text{O}_7$

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Abstract. The *Swedenborgite* cobaltate $\text{CaBaCo}_4\text{O}_7$ (CBCO) has drawn significant attention due to its unique structure characterized by alternate stacking of triangular and kagomé layers of CoO_4 tetrahedra along the c -axis [1]. The material shows robust magnetoelectric coupling and large electric polarization [2]. Herein we report the multicaloric properties of 1% Cr^{3+} and Ni^{2+} doped compounds $\text{CaBaCo}_{3.96}\text{Cr}_{0.04}\text{O}_7$ (CBCCO) and $\text{CaBaCo}_{3.96}\text{Ni}_{0.04}\text{O}_7$ (CBCNO), respectively. The study of the magnetocaloric effect (MCE) shows considerable reduction of magnetic entropy ($-\Delta S_M$) in CBCNO, compared to the parent compound CBCO [3], although the reduction is minimal in CBCCO. Further, the peaks of $-\Delta S_M$ at 40 K and 82 K for CBCNO reminds us of the switching behaviour of MD%, well below T_C , and the weak magnetic ordering at $T_S = 82$ K [4]. The electrocaloric effect (ECE) shows that the change in electric entropy $-\Delta S_E$ is considerably larger (\sim twice) in CBCNO compared to CBCCO and CBCO [3].

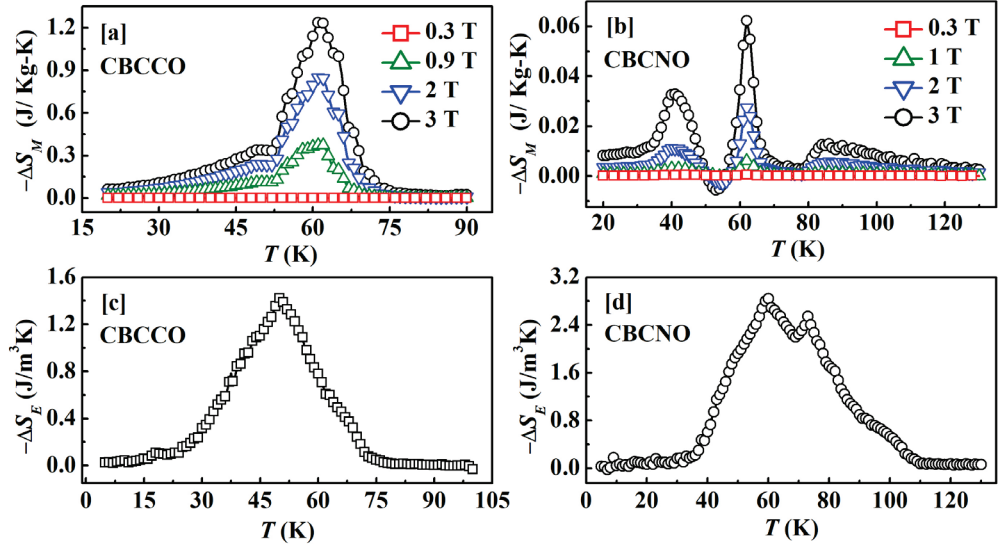


Figure 1: Thermal variation of (a), (b) magnetic entropy ΔS_M and (c), (d) electric entropy ΔS_E of CBCCO and CBCNO, respectively.

References:

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