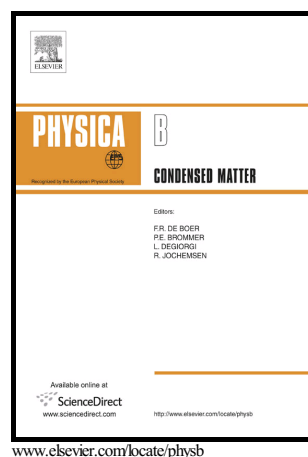


Effect of Sr doping on structural and magnetic behavior of $\text{SmBa}_{1-x}\text{Sr}_x\text{Co}_2\text{O}_{5+\delta}$ ($x = 0$ and 1)

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Effect of Sr doping on structural and magnetic behavior of



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Abstract: Layered double perovskite, $\text{SmBa}_{1-x}\text{Sr}_x\text{Co}_2\text{O}_{5+\delta}$ ($x=0$, $\delta=0.5$ and $x=1$, $\delta=1$) samples were prepared by solid state reaction method. X-ray diffraction studies show that the $\text{SmBaCo}_2\text{O}_{5.5}$ sample crystallizes in the orthorhombic crystal structure with $Pmmm$ space group, whereas $\text{SmSrCo}_2\text{O}_6$ sample crystallizes in the orthorhombic crystal structure with $Pnma$ space group. The temperature dependent magnetization of the $\text{SmBaCo}_2\text{O}_{5.5}$ sample shows a paramagnetic (PM)–ferromagnetic (FM) and a FM-antiferromagnetic (AFM) transitions at $T_C = 267$ K and $T_N = 221$ K, respectively. In contrast, the $\text{SmSrCo}_2\text{O}_6$ sample shows a PM-FM transition at $T_C = 175$ K. According to Goodenough-Kanamori-Anderson rules, the ferromagnetic behavior in $\text{SmSrCo}_2\text{O}_6$ can be understood from the super exchange interaction between the intermediate spin Co^{3+} and low spin Co^{4+} via O^{2-} (IS Co^{3+} - O^{2-} - LS Co^{4+}). The change in magnetic entropy (ΔS_M^{max}) is found to be maximum for the $\text{SmSrCo}_2\text{O}_6$ sample.

Keywords: Layered perovskite, Mixed valence, Cobalt oxide, Crystal Structure, spin state transition, magnetocaloric effect.

1. Introduction

Layered cobalt oxides have been studied extensively due to their interesting structural, magnetic and electronic properties [1-3]. Compared to other layered cobaltites, oxygen

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