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Study of magnetocaloric materials in the system $Mn_{2-x}M_xSb$ (M=Fe, Co)

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Magnetocaloric refrigeration is an emerging technology in today's cooling devices and it has a potential to save about 20-30 % of energy compared to conventional vapor compression technology. Nowadays, the most important issue is to find cheap and abundant materials exhibiting a sizable magnetocaloric effect. We report on preparation and characterization of compounds of general composition Mn2-xMxSb system with M = (Fe, Co). The substitution on the Mn site has an effect on magnetic properties and magnetic transitions. We synthesized samples of different stoichiometry by inductive melting of the elements in a cold crucible and performed studies using x-ray powder diffraction method and macroscopic magnetization measurements. Based on these data we could then calculate the entropy change. In the Fe-containing samples, in particular in Mn1.8Fe0.2Sb, we observe a small MCE associated to a paramagentic-ferrimagnetic phase transition. The Co-doped samples reveal a more sizable MCE accompanying a ferri-to-antiferromagnetic phase transition. Currently we study the response of the lattice parameter to the magnetic transitions with low temperature powder diffraction (300-15 K).

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