

Magnetic properties of half-metallic semi Heusler $\text{Co}_{1-x}\text{Cu}_x\text{MnSb}$ compounds

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Abstract: A study of the half-metallic character of the semi Heusler alloys $\text{Co}_{1-x}\text{Cu}_x\text{MnSb}$ ($0 \leq x \leq 0.9$) is presented. We investigated the saturation magnetization M_S at temperatures from 5 K to room temperature and the temperature dependence of the DC magnetic susceptibility χ above Curie temperature T_C . The magnetic moments at 5 K, for most compositions are very close to the quantized value of $4 \mu_B$ for Mn^{3+} ion, the compound with 90% Co substituted by Cu is still ferromagnetic with $M_S(5 \text{ K}) = 3.78 \mu_B/\text{f.u.}$ These results emphasize the role of Co atoms in maintaining the ferromagnetic order in the material. The Curie temperature is decreased from 476 K to about 300 K as the Cu content increases from 0% to 90%. Above T_C , the χ^{-1} vs T curves follow very well the Curie-Weiss law. The effective moment μ_{eff} and paramagnetic Curie temperature θ are derived. A comparison between the values of M_S at 5 K and μ_{eff} shows a transition from localized to itinerant spin system in these compounds. © 2006 Elsevier B.V. All rights reserved.

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