Investigation of Structural, Magnetic and Exchange Bias Properties of Co doped Heusler Alloy

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**Abstract**. Here, we have investigated the structural, magnetic, and exchange bias properties of a Mn rich Mn50Ni42-xCoxSn8 (x=6) full Heusler alloy. In recent years, Ni-Mn-Z (Z= Ga, Sn and In) Heusler alloys have attracted a lot of attention of research community, due to their multifunctional properties, such as shape memory effect, giant magnetocaloric effect (MCE), large magnetoresistance (MR) and exchange bias (EB) etc [1-4]. Most of these properties have been found to be associated with their first order magneto-structural transition (i.e. called martensitic transition) from high temperature austenite to low temperature martensite phase [4-6]. Heusler alloys may be considered as potential candidates for various applications such as shape memory devices, magnetic tunnel junctions, sensors, storage and spintronic devices etc. Polycrystalline sample of the present alloy has been prepared by arc melting method, and it is found to show the martensitic transition at around 333 K (i.e. TM). The low temperature magnetic state of the alloy has been investigated by means of DC magnetization and frequency dependent AC susceptibility measurements, which show that there is a coexistence of frustrated magnetic phases in the martensite phase. These measurements confirm the presence of spin glass (SG) phase at low temperatures. A large exchange bias field of 990 Oe is observed after field cooling (FC) the alloy at 10 kOe field. This is attributed to the large exchange anisotropy present at SG/FM interfaces. The temperature and cooling field effect on the exchange bias properties has also been studied in the present case. The *H*EB is found to decrease with the increase in temperature and FC strength, which can be attributed to the decrease in exchange anisotropy between the SG/FM phases.

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