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THE INFLUENCE OF BORON ADDITION ON STRUCTURAL, MAGNETIC AND THERMOELECTRIC PROPERTIES OF $\text{Ni}_2\text{Mn}_{1.52}\text{Sb}_{0.48}\text{B}_x$

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ABSTRACT

Heusler alloys known as X_2YZ (full-Heusler) and XYZ (half-Heusler), where X and Y denote the transition metals and Z is *s-p* such as Al, Ga, Sb, Sn, In, ect., have been extensively studied since they possess many important properties [1-3] like shape memory effect, magnetocaloric effect (MCE), magnetoresistance and thermoelectric effect. In this work, structure, magnetic and thermoelectric properties of the full-Heusler $\text{Ni}_2\text{Mn}_{1.52}\text{Sb}_{0.48}$ alloy were investigated in terms of Boron (B) addition. We have found that the structural transition temperature i.e. the ferromagnetic-to-antiferromagnetic martensitic transition (T_M) decreases, while the paramagnetic-ferromagnetic austenitic transition (T_C) tends to increase with increasing B concentration. Temperature dependent X-ray diffraction patterns from 200 - 500 K clearly shows an evolution of the structural transformation from orthorhombic to cubic structure. It was interestingly found in the high-temperature (300 - 1000 K) thermoelectric properties, that the sample with $x = 1$ switches from *n*-type conducting behavior at temperatures below 570 K to *p*-type conducting one in higher temperature region. However, with higher B concentration e.g. $x = 2$, the sample shows *n*-type conducting behavior over the whole measured temperature range, again confirming the effect of boron addition.

References:

1. Lluís Mañosa et al., Nature Materials **9**, 478 (2010).
2. L. Chen et al., Appl. Phys. Lett. **101**, 012401 (2012)
3. X. Yan et al., Nano Letters, **11**, 556 (2011).