The influence of local atomic configuration on magnetic properties of $Ni_{50}Mn_{50-x}Z_x$ (Z = In, Sn, Sb) Heusler alloys

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The concentration dependence of magnetic properties in the austenite phase of $Ni_{50}Mn_{50-x}Z_x$ (Z = In, Sn, Sb) Heusler alloys vary strongly with the Z component [1]. In the case of Z = In alloy the magnetic moment shows a linear dependency with decrease of concentration (x), conversely to Z = Sb case, but shows a concave curve with a minimum of about $x = 20$ in Z = Sn alloy. While the concentration dependence of the magnetic moment of Z = In(Sb) alloys is related to only (anti)ferromagnetic coupling between Mn and Mn_Z moments, the nonlinear curve observed for Z = Sn alloy is related to a change of a ratio of ferro- and antiferromagnetic coupled Mn and Mn_{Sn} moments. We propose a model of local atomic configuration of these alloys and its influence on a total magnetic moment and an exchange-bias effect. In particular, the results of *ab initio* calculations of $Ni_{50}Mn_{50-x}Z_x$ alloys and the results of magnetic measurements of $Ni_{50}Mn_{50-x}Sn_x$ ($x = 16, 20, 25$) alloy thin films are presented.

References:

[1] W. Ito, X. Xu, R.Y. Umetsu, T. Kanomata, K. Ishida, and R. Kainuma, J. Appl. Phys. **109**, 07A926 (2011)