

Microstructural and Magnetic Properties of Ni₅₀Mn₃₉Sn₁₁ and Ni₅₀Mn₃₆Sn₁₄ Heusler Alloys

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Abstract : We report the microstructural and magnetic properties of Ni₅₀Mn₃₉Sn₁₁ and Ni₅₀Mn₃₆Sn₁₄ ribbon Heusler alloys. Experimental results were obtained by differential scanning calorimetry, X-ray diffraction and vibrating sample magnetometry techniques. The Ni-Mn-Sn system undergoes a martensitic structural transformation in a wide temperature range. For example, for Ni₅₀Mn₃₉Sn₁₁ the start and finish temperatures of the martensitic and austenite phase transformation for ribbon alloy were $M_s = 336\text{K}$, $M_f = 328\text{K}$, $A_s = 335\text{K}$ and $A_f = 343\text{K}$ whereas no structural transformation is observed for Ni₅₀Mn₃₆Sn₁₄ alloys. Magnetic measurements show the typical ferromagnetic behavior with Curie temperature 207K at low applied field of 50 Oe. The complex behavior exhibited by these Heusler alloys should be ascribed to the strong coupling between magnetism and structure, being their magnetic behavior determined by the distance between Mn atoms.

Keywords : as-cast ribbon, Heusler alloys, magnetic properties, structural transformation

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