MS23-P07 | Modulated structure in $Ni_2MnGa_{0.95}In_{0.05}$ shape-memory alloy

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Magnetic shape memory alloys related to Ni_2MnGa are intensively studied because of their promising properties and possible applications as micro-pumps or actuators. Their physical properties, structure and transition temperature are strongly dependent on composition and various doping.

To study abovementioned compositional dependence, $Ni_2MnGa_{0.95}In_{0.05}$ single crystal was grown by Bridgman method. It was examined with x-ray diffraction (XRD) at low temperatures and with the magnetisation measurement. High-temperature cubic phase (austenite) undergoes transition to premartensite at 215 K and the transition to tetragonal martensite occures around 100 K. In the low-temperature martensite, the twin variants (100) and (001) were clearly distinguishable in the XRD. The satelite diffractions were observed as well.

The presence of the satelite diffraction spots is connected to the modulation of atomic positions in the structure. The positions of the satelites imply the 10M type of the modulation with the corresponding modulation vector **q**=(0.4, 0.4, 0.4).

The satelite maxima are visible also above the temperature of martensitic transformation and even above the temperature of premartensitic transformation. This implies that the modulation in the sample occures stepwise already before the transformation. Theoretical simulations of the satelite intensity show that the intensity increase should correspond to the increase of the modulation amplitude.

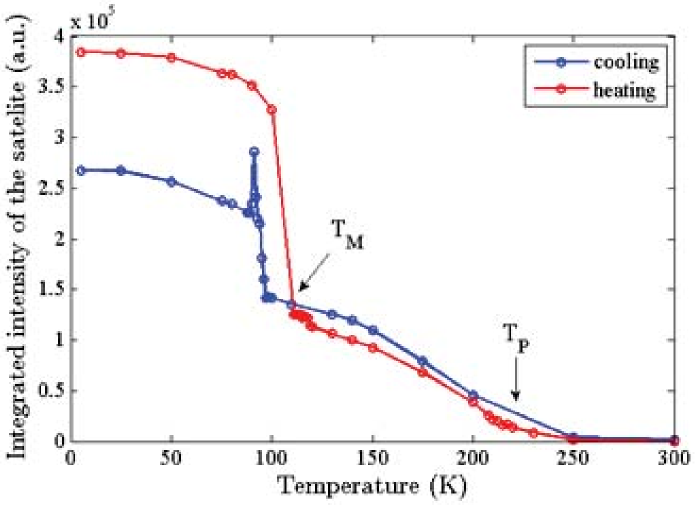

Figure 1: Temperature dependence of the integrated intensity of satelite diffraction maxima 4.4 0.4 0. T_M shows the temperature of martensitic transformation, T_P shows the temperature of premartensitic transformation.