



Contribution ID: 74

Type: **Poster**

COMPLEX VOLUME CHANGES INDUCED BY HIGH PRESSURE AND EXTERNAL MAGNETIC FIELD IN Ni_2MnSn -BASED HEUSLER ALLOY

Wednesday, 9 September 2020 15:50 (30 minutes)

The Heusler $\text{Ni}_2\text{Mn}_{1-x}\text{Sn}_x$ alloys exhibit structural martensitic transformation from cubic (austenite) into orthorhombic (martensite) phase in a narrow composition range, $0.4 \leq x \leq 0.6$, only. The transformation is accompanied by a significant changes of volume, magnetization and by large anomalies in transport properties. We have studied forced volume magnetostriction, Joulian magnetostriction, thermal expansion and effect of high pressure on magnetization of the $\text{Ni}_{1.92}\text{Mn}_{1.56}\text{Sn}_{0.52}$ alloy in wide range of temperature, magnetic field and pressure. The pronounced decrease of magnetization under pressure, $= -11.8 \cdot 10^{-3} \text{ GPa}^{-1}$, points to an itinerant character of magnetism of the alloy. Using the Maxwell relation, $d\omega/dH = -pdM/dP$, the received value of $d\ln M/dP$ can be perfectly compare with value of forced volume magnetostriction, $d\omega/dH = 3.1110 \cdot 10^{-6} \text{ T}^{-1}$, received by dilatometric measurement at field above 0.3 T. The Joulian magnetostriction at low temperature and low magnetic field (with $\Delta L \parallel < 0$ and $\Delta L \perp > 0$) confirms a competition between strengths of magnetocrystalline anisotropy and elastic energy in martensite of $\text{Ni}_{1.92}\text{Mn}_{1.56}\text{Sn}_{0.52}$ that is characterized by a zig-zag twins structure. The relevant model proposed by O'Handley will be discussed. The observed change of volume during martensitic transformation of the alloy was verified by X-ray diffraction measurements.

Presenter: KAMARÁD J. (Institute of Physics ASCR, Prague)

Session Classification: Poster session