

Study of the crystalline and magnetic structure of half-Heusler compounds $\text{MnNi}_{0.9}\text{M}_{0.1}\text{Sb}$ ($\text{M} = \text{Ti, V, Cr, Fe, Co, Zn}$) at high pressures and low temperatures

Wednesday 26 October 2022 14:00 (15 minutes)

Half-Heusler magnetic intermetallic compounds of transition metals exhibit interesting physical properties such as magnetoresistance, ferromagnetic and antiferromagnetic magnetic states, and superconductivity. It is observed the shape memory effect and superelasticity with opportunity to control these phenomena by means magnetic field. It makes these compounds promising materials to apply for creation permanent magnets, elements of electronic devices and cooling technology.

In our work we present the results of investigation the crystal and magnetic structure of half-Heusler intermetallic compounds MnNiSb and $\text{MnNi}_{0.9}\text{M}_{0.1}\text{Sb}$ ($\text{M} = \text{Ti, V, Cr, Fe, Co, Zn}$) by means of neutron diffraction in the temperature range 10–300 K and by X-ray diffraction in the pressure range 0–30 GPa at room temperature.

It has been found that the initial cubic structure $F\bar{4}3m$ and ferromagnetic phase remain in the investigated temperature range. New reflections correspond to the antiferromagnetic phase have not been found. Partial substitution of another transition element for nickel leads to a decrease in the magnetic moment of the Mn ions. Under high pressure, the cubic structure $F\bar{4}3m$ remains stable for all compounds under study.

This work have been supported by the Russian Foundation for Basic Research, project no. 20-52-04003 Bel_mol_a (Belarusian Foundation for Basic Research, project no. T21RM-029) and Grant Competition for JINR Young Scientists and Specialists 2022 № 22-402-07

Authors: RUTKAUSKAS, Anton (Joint Institute for Nuclear Research); Mr RIMSKY, Gregory (SSPA «Scientific-Practical Materials Research Centre of NAS of Belarus»); ZEL, Ivan (FLNP JINR); BELOZEROVA, Nadezhda (FLNP); Dr KICHANOV, Sergey; D.P.KOZLENKO (Frank Laboratory of Neutron Physics, JINR, 141980, Dubna, Moscow Region, Russia)

Presenter: RUTKAUSKAS, Anton (Joint Institute for Nuclear Research)

Session Classification: Condensed Matter Physics

Track Classification: Condensed Matter Physics