PHYSICAL PROPERTIES OF Ti_2MnAl, Ti_2FeAl AND Ti_2FeGa COMPOUNDS

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Heusler compounds can exhibit many interesting physical properties such as high thermopower, magnetocaloric properties or even topological insulator state [1]. One of the very exciting properties which were already seen experimentally in Heusler compound is the spin gapless semiconductor (SGS) state reported for Mn_2CoAl [2]. In that type of material in one spin channel valence and conduction band just touches, and in the second spin channel there exist a band-gap. Such electronic structure is very sensitive to external influences like a magnetic field or pressure since no threshold energy is required to move electrons from occupied states to empty states [3].

Here, we investigate particular Heusler compounds which were previously predicted by ab initio calculations to have an interesting electronic structure and possible spin-gapless semiconductor state. We synthesized polycrystalline samples by arc melting of constituent elements (≥99,9 % purity) in an argon atmosphere, determined crystal structure using X-ray diffraction and performed magnetization measurements. We measured electrical resistivity vs. temperature and magnetic field and observed moderate magnetoresistivity and metallic behaviour.

References

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