INFLUENCE ELASTIC DEFORMATION AND MAGNETIC FIELD ON MAGNETO- THERMOELECTRIC PROPERTIES Bi, $Bi_{1-x}Sb_x$ SEMIMETAL WIRES

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We repot on the experimental observation of the electron topological transition (ETT) in the semimetal $Bi_{1-x}Sb_x$ wires induced by the electric deformation and magnetic field and its influence on thermoelectric efficiency $ZT=\alpha^2\sigma/\chi$, where α- is thermopower, σ- , χ- electrical and thermal conductivity.

Individual semimetal single- crystal $Bi_{1-x}Sb_x$ micro- and nanowires in glass cover with diameter from 100 nm to 2000 nm were fabricated by the liquid phase casting [1].

It was establish, that the essential influence of elastic deformation on magneto - thermoelectric properties of the micro-wires, connected with qualitative change of the topology of the Fermi surface.

Change of topology of a Fermi surface of, at elastic deformation was estimated with the help Shubnikov de Haas oscillations.

Considerable change thermopower not only quantitative, but also qualitative (change of a sign from negative on the positive) it was observed in the field of temperatures 150 – 10K and amplifies in weak magnetic field (0.4T). That leads to considerable increase of the power factor $\alpha^2\sigma$.

The possibility of application the revealed effect in thermoelectric converters of energy is discussed.

Keywords: *micro-wires, elastic deformation, thermoelectric efficiency.*

References

1. Nikolaeva, A., Gitsu, D., Konopko, L., Graf, M.J. and Huber, T. E. Quantum interference of surface states in bismuth nanowires probed by the Aharonov- Bohm oscillatory behavior of the magnetoresistance. In: *Phys. Rev. B*, 2008, 77, pp. 075332.
2. Lin, Y.-M., Sun, X., and Dresselhaus, M.S. Theoretical investigation of thermoelectric transport properties of cylindrical Bi nanowires. In: *Phys. Rev. B*, 2000, 62, pp. 4610.