ESTIMATION OF CARRIER DENSITY IN Te-DOPED BISMUTH MICROWIRES

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In this report a new approach to characterizing the carrier density *n* in Te-doped Bi micro-wires is described. Carrier density is a fundamental parameter for determining the electrical transport properties of micro- and nanowires to optimize their performance for different applications, such as thermoelectrics. Measurements of the Hall effect, which is basically a 2D phenomenon, may be inapplicable for microwires and the Shubnicov–de Haas (SdH) oscillations for highly doped microwires. To determine the carrier density *n* of different Te-doped Bi microwires, we used measurements of Seebeck coefficient α(*n*) at 300 K at relative resistance $R_{300}/R_{4.2}(n)$. Glass-insulated Bi-Te microwires were prepared by liquid-phase casting by the Ulitovsky method [1]. The samples had a strictly cylindrical shape, the (1011) orientation along the wire axis, a diameter of >0.2 μm, and a length of a few tens of meters.

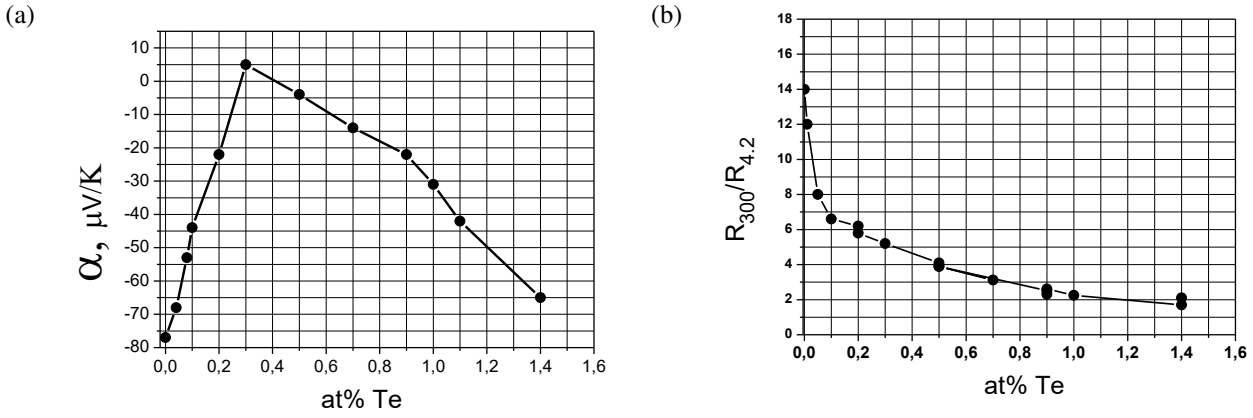

Figure 1. (a) Concentration dependences of coefficient Seebeck α(n) at 300 K and (b) - $R_{300}/R_{4.2}$ (n) of Bi-Te wires.

The From (SdH) oscillations(to 0,4 at %Te) it was estimated Te concentration (in sm^{-3}) at 4.2K. At concentration- 0.3 at %Te there is a sign change thermopover which is a reference point and corresponds Lifshits's to topological transition [2].- to occurrence T- zone of conductivity at alloying. The results offer practical to optimize these parameters during preparation micro-wires for different applications.

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