

Influence of the dimensions of the sample on the measurements of Hall and Seebeck coefficient

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Measurements of Hall and Seebeck coefficient are essential for research of thermoelectric materials. The aim of this work was to investigate the influence of the dimensions of the sample on the measurements of these two coefficients. Two single crystals of well-known thermoelectric material Bi_2Se_3 were prepared. Samples of desired dimensions for our measurements were prepared with use of the electro-erosive cutter. We studied the influence of dimensions (shorting of the samples) and the influence of the shape (oblique cut) of the sample on the measurements. The statistical deviation between our measurements is about 10

We obtained interesting results in measurements of Hall coefficient and electrical conductivity in case of shorting of the sample. According to the theory the measurement becomes inaccurate if the ratio between length and width of the sample is smaller than 2 [1, 2, 3]. This is in contradiction with our results. From our measurements it follows that all of the measured values lie within the 10

We also studied the influence of the measuring equipment, the stability of the samples and the attachment of current-introducing contacts (AquaDAG, Ni-paste, Ag-paste). The way of the attachment of the current-introducing contacts has in our temperature range (from the temperature of liquid nitrogen to 200 °C) and our experiment arrangement (alternating current) no influence on the measurement.

- [1] I. ISENBERG, B. R. RUSSELL and R. F. GREENE. Improved Method for Measuring Hall Coefficients. *Review of Scientific Instruments*. 1948, 19(10), 685-688. ISSN 0034-6748.
- [2] FRANK, V. On the geometrical arrangement in Hall effect measurements. *Applied Scientific Research, Section B*. 1954, 3(1), 129-140. ISSN 0365-7140.
- [3] W. F. FLANAGAN, P. A. FLINN and B. L. AVERBACH. Shorting and Field Corrections in Hall Measurements. *Review of Scientific Instruments*. 1954, 25(6), 593-595. ISSN 0034-6748.