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POSSIBLE FOR ALLOYING $Bi_2Te_3 - Bi_2Se_3$ TAKING AND INSPECTION OF THERMOELECTRIC MATERIALS IN QUARTZ CRACKS

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Abstract
The thermoelectric properties of alloys made of semiconductor materials depend not only on the composition of the alloy material, but also on its degree of purity. The study recommended the use of a nomogram to determine the optimal alloying concentration, which depends on the thermoelectric properties of the base. In some batches, the primary raw material provides the basis for the fact that their thermoelectric properties do not correspond to the nomogram range. In such cases, it was not possible to obtain an unalloyed material with the required properties by changing the concentration of the additive.

Keywords: Material, semiconductor, thermoelectric, alloy.

Introduction

The thermoelectric properties of alloys made of semiconductor materials depend not only on the composition of the alloy material, but also on its degree of purity. Therefore, materials from different batches of raw materials often differ in their thermoelectric properties. In practice, it is more convenient to determine the characteristics of the starting material of the base dissolved in the raw material by its thermoelectric properties [3]. Of course, the best solution to this problem is to control and carefully analyze the initial composition of the alloy. However, the method is not always convincingly fast and inexpensive in multi-alloy alloys [3]. In the study, he recommended the use of a nomogram to determine the optimal alloying concentration, which depends on the thermoelectric properties of the base. In some batches, the primary raw material provides the basis for the fact that their thermoelectric properties do not correspond to the nomogram range.

In such cases, it was not possible to obtain an unalloyed material with the required properties by changing the concentration of the additive. The study presents the thermoelectric properties of bases in which the initial component consists of different batches. Practice has shown that the thermoelectric properties of the raw materials of some batches do not allow to obtain an unalloyed base with optimal properties. Therefore, it was agreed to study the possibility of adjusting the properties of the base material Bi_2Te_3 - Bi_2Se_2 from different raw material batches. We used the introduction of high stoichiometric chalcogenites into the shale materials as a method of adjusting the properties of the base. The effect of excessive amounts of chalcogenites on the theoelectric properties of the alloy has been studied in a number of studies. These were mostly high-quality works. Another problem in this work is to determine the amount of excess chalcogenites added to the slag material on the thermoelectric material of the base and to obtain a base with optimal properties:

The experiment was carried out by dissolving the initial components of 20 and 100 grams of Bi_2Te_3 - Bi_2Se_3 in a quartz handle quartz solvent. Content was uploaded in the following order. Selenium is placed at the bottom of the solvent, then tellurium, and bismuth at the top. The following purity starting components were used to prepare the required alloy: Based on the research, n-type solid solution was selected as the basis, consisting of 80% Bi_2Te_3 and 20% Bi_2Se_3. Tellurium, bismuth-selenium were studied as highly stoichiometric chalcogens.

Experiments with the addition of high stoichiometric chalcogenides have shown that excess sulfur in the composition has a more effective effect on changes in the thermoelectric properties of the base than such excess tellurium and selenium. Therefore, initial experiments made it possible to make a concentration range of excess chalcogenides, ranging from 0.10% by weight to 0.60% for chalcogenides and from 0.05% to 030% by weight for selenium. The changes in the thermoelectric properties of the base on which the various excess chalcogenides are introduced have the same appearance.

An increase in the amount of excess chalcogen added to the composition increases the specific electrical conductivity of the content. reduces the thermoEYUK coefficient. An increase in the amount of chalcogen added during melting indicates an increase in M% of the loss due to evaporation. Subsequent increases in excess chalcogen slow down the increase in electrical conductivity and the decrease in thermoelectric coefficient.

The results of the study show that the proposed method of adjusting the basic properties is 0.24% by weight for tellurium, 0.12% by weight for selenium, 0 for sulfur, suitable for alloying the optimal value of the amount of excess chalcogen included in the composition for practical use. 08% by weight. The addition of different amounts of chalcogen to the composition shows that the degree of exposure of chalcogen to thermoelectric properties decreases with increasing number of orders of magnitude instead of chalcogens in the Mendeleev periodic table. Based on the research work, a solid solution of the following order was selected for the study, consisting of 74% mol Sb_2Te_3 and 26% mol Bi_2Te_3. The thermoelectric properties of non-alloyed materials mainly depend on the degree of purity of the starting components. Therefore, in practice, results with reproducible electrophysical properties are not always achievable. The properties of the alloy also change when it is transferred to another raw material. [4]

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