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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 11071-2018

Replacing GB/T 11071-2006

Zone-refined germanium ingot

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Standardization Administration of the PRC

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 11071-2006 "Zone Melting Ingot", compared with GB/T 11071-2006, except for editorial modification The changes are as follows:

--- The scope is further clarified as "this standard is applicable to the reduction of bismuth ingots and ruthenium single crystals as raw materials, which are prepared by the zone melt purification process. The area is melted ingots. ZGe-0 zone melting crucible is mainly used to prepare high purity germanium single crystal for semiconductor and high purity germanium detector; ZGe-

1 The region melting crucible is mainly used for preparing germanium single crystal for infrared optics, germanium single crystal for solar cells, and various germanium-chromium and germanium-silicon alloys. Wait" (see Chapter 1).

--- Increased the resistivity of the zone melting ingot at (23 ± 0.5) °C (see 3.2).

--- "The difference between the maximum and minimum cross-sectional area of the same bismuth ingot is not more than 15% of the average cross-sectional area" is modified to "the same root zone melting zone" The height difference between the ends of the ingot is no more than 4mm" (see 3.3,

--- "Ingot length 100mm ~ 500mm" revised to "length should be no less than 100mm" (see 3.3,.2006 version 3.3).

--- Increased the requirement that the surface of the zone melting ingot should be free of holes (see

3.4 of 3.4,.2006 edition). This standard was proposed by the China Nonferrous Metals Industry Association. This standard is under the jurisdiction of the National Nonferrous Metals Standardization Technical Committee (SAC/TC243). This standard was drafted. Yunnan Linyi Xinyuan Industrial Co., Ltd., Youyan Optoelectronic New Materials Co., Ltd., Zhonghao Technology Co., Ltd. Company, Hengyang Hengrong High Purity Semiconductor Materials Co., Ltd., Guangdong Pioneer Thin Materials Co., Ltd., Xilin Goleng Tongli Industry Co., Ltd. Division, Yunnan Dongchang Metal Processing Co., Ltd. The main drafters

of this standard. Bao Wendong, Pu Shikun, Li Hecheng, Feng Deshen, Hui Feng, Fan Desheng, Zhu Zhiguo, Li Zhengmei, Dong Yukun, Zhu Liu, Yin Shiping, Wang Xiaohua. The previous versions of the standards replaced by this standard are.

---GB/T 11071-1989, GB/T 11071-2006. Zone melting ingot

1 Scope

China's national standard for zone-refined germanium ingot - the last stage of the germanium production chain and the form in which the metal reaches the users who need it pure. Zone refining is the technique that made semiconductor materials possible: a narrow molten zone is passed repeatedly along the length of an ingot, and because most impurities are more soluble in the liquid than in the solid, each pass sweeps them toward one end. After enough passes the middle of the bar is purer than anything achievable by chemical means, and the contaminated end is cut off. It specifies the requirements, the test methods, the inspection rules, the marking, packaging, transport and storage, the quality certificate and the content of the order or contract for zone-refined germanium ingot. Because the purity is now the product, the requirements are expressed in the terms the users actually work in: the resistivity, which for a semiconductor is the practical measure of purity and is what a crystal grower specifies; the carrier concentration and the lifetime; and the limits on the residual impurities that zone refining does not remove, since some elements have segregation coefficients close to unity and simply travel along with the zone. Around them sit the form and dimensions of the ingot and its surface condition. The clause on the content of the order is unusual and worth noting: in a material sold at this price and specified this tightly, what the purchaser must state when ordering - the grade, the resistivity range, the conductivity type, the dimensions - is itself part of the standard, because an order that omits any of them cannot be filled. Issued on 28 December 2018 and in force since 1 July 2019, it replaces GB/T 11071-2006.

This standard specifies the requirements, test methods, inspection rules, marking, packaging, transportation, storage, quality certificate and order form of the zone melting ingot. (or contract) content. This standard is applicable to the zone melting bismuth ingot prepared by the zone melting purification process using the reduced bismuth ingot and the ruthenium single crystal return material as raw materials. ZGe-0 area The smelting ingot is mainly used to prepare high-purity germanium single crystal for semiconductor and high-purity germanium detectors; the ZGe-1 region melting ingot is mainly used for preparing infrared optics. And bismuth single crystals for solar cells and various types of bismuth-chromium, bismuth-silicon alloys, and the like.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article. Pieces. For undated references, the

latest edition (including all amendments) applies to this document.

GB/T 4326 extrinsic semiconductor single crystal Hall mobility and Hall coefficient measurement method YS/T 602 area melting bismuth ingot resistivity test method two-probe method

3 Requirements

3.1 Product Classification The zone melting ingot is divided into two grades according to electrical properties. ZGe-0, ZGe-1. ZGe- Representation zone melting ingot Arabic numerals, indicating product grade

3.2 Electrical performance The electrical properties of the zone melting ingots shall comply with the requirements of Table 1. The resistivity can be selected to be tested at 20 ° C or 23 ° C. And meet the requirements of Table 1. Table

1 Electrical properties Brand Resistivity/(Omega · cm) Detection of single crystal parameters (77K) (20±0.5) °C (23±0.5) °C Carrier concentration Cm-