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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 43611-2023

Gallium-based liquid metal thermal interface materials

镓基液态金属热界面材料

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Foreword

This document complies with the provisions of GB/T 1:1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting: Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents: This document is proposed by the China Nonferrous Metals Industry Association: This document is under the jurisdiction of the National Nonferrous Metals Standardization Technical Committee (SAC/TC243): This document was drafted by: Yunnan Zhongxuan Liquid Metal Technology Co., Ltd.; Yunnan Kewei Liquid Metal Valley R&D Co., Ltd.; Science in China Institute of Physics and Chemistry Technology, Yunnan Institute of Product Quality Supervision and Inspection, Yunnan Academy of Science and Technology, Lenovo (Beijing) Co., Ltd.; Kunming Institute of Technology University of Technology, Beijing Mengzhimo Technology Co., Ltd.; Yunnan Frontier Liquid Metal Research Institute Co., Ltd: The main drafters of this document: Cai Changli, Chen Daotong, Deng Zhongshan, Su Haitao, Yang Yingbao, Zhang Xuezhong, Liu Jing, Zhou Ying, Hu Jin, Wang Jian, Du Wangli, Yang Zejun, Xin Zhifeng, Zhou Junrong, Chen Baiwei, Yu Yang, Bai Fan, Xu Xueqi, Zhu Jiajun, Wang Yuhao: Gallium-based liquid metal thermal interface materials

1 Scope

China's national standard for gallium-based liquid metal thermal interface materials. The thermal interface is the layer between a heat-generating component and its heatsink, and it exists because two nominally flat surfaces touch only at a few asperities - the rest is air, which conducts almost nothing. Conventional interface materials are greases and pads filled with ceramic particles, and their conductivity is a few watts per metre-kelvin. A gallium alloy is a metal, and conducts at twenty to eighty - an order of magnitude better, which is why enthusiasts and increasingly manufacturers use it on high-power processors. The constraints are severe and the standard has to state them: it attacks aluminium catastrophically, so it can only be used on nickel-plated or copper surfaces; it is electrically conductive, so a drop that escapes shorts the board; and it can slowly pump out of a joint that cycles.

This document specifies the classification, technical requirements, test methods, inspection rules, marking, packaging, transportation, Storage and accompanying documents and order form contents: This document applies to liquid or paste thermal interface materials with gallium or gallium-based liquid metal as the main effective thermal conductive component:

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document:

GB/T 8170 Numerical rounding rules and expression and determination of limit values

GB/T 8928 Determination of density of solid and semi-solid petroleum asphalt

GB/T 22588-2008 Flash method for measuring thermal diffusivity or thermal conductivity

GB/T 31229-2014 Test method for determination of volatilization rate by thermogravimetric method

GB/T 39859-2021 Gallium-based liquid metal GB/T 41079:

1 Methods for determination of physical properties of liquid metals Part 1: Determination of density GB/T 43604:

1 Chemical analysis methods for gallium-based liquid metals Part 1: Determination of lead, cadmium, mercury, arsenic content inductive coupling, etc: Ion mass spectrometry YS/T 1258 Thermal analysis method for melting and crystallization temperature testing of non-ferrous metal materials

3 Terms and definitions

The following terms and definitions as defined in GB/T 22588-2008 and GB/T 39859-2021 apply to this document: 3:1 galium-basedliquidmetal An alloy with gallium as the base metal and a melting temperature $T_m < 30^{\circ}\text{C}$: [Source: GB/T 39859-2021,3:1] 3:2 A material used to fill the gap between the contact interface between the heating device and the heat dissipation device and enhance the interface heat transfer performance: 3:3 thermalconductivity The heat transferred through unit area of material in the direction of heat flow under unit temperature gradient per unit time:

Note: The unit is watt per meter $[\text{W}/(\text{m}\cdot\text{K})]$: [Source: GB/T 22588-2008, 3:1, with modifications]