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

GB/T 45325-2025

**Determination of length of heat affected zone for precious metal
bonding wire - Scanning electron microscope method**

贵金属键合丝热影响区长度测定扫描电镜法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by China Nonferrous Metals Industry Association. This document is under the jurisdiction of the National Technical Committee on Standardization of Nonferrous Metals (SAC/TC243). This document was drafted by: Guiyan Testing Technology (Yunnan) Co., Ltd., Beijing Dabo Nonferrous Metal Solder Co., Ltd., Guiyan Semiconductor Materials (Yunnan) Co., Ltd., Yantai Yinuo Electronic Materials Co., Ltd., Guohe General (Qingdao) Testing and Evaluation Co., Ltd., Chenzhou City Manufacturer Product Quality Supervision and Inspection Institute, Yunnan Precious Metals Laboratory Co., Ltd., Nonferrous Metals Technology and Economic Research Institute Co., Ltd., Beijing Nonferrous Metals Metal and Rare Earth Application Research Institute Co., Ltd., Zhejiang Jiabo Technology Co., Ltd. The main drafters of this document are: Wang Yiqing, Mao Duan, Zhao Wanchun, Chen Wen, Chen Guohua, Zhou Wenyan, Xiang Lei, Zhu Wuxun, Yan Ru, Lin Liang, Qi Yuefeng, Xue Ziye, Zhang Xiaochen, Zhang Zhuojia, Liu Jie, Bi Qinsong, Yuan Xiaohong, Liang Chen, Jin Yaqui, Zhao Yidong. Determination of heat affected zone length of precious metal bonding wire Scanning electron microscopy

1 Scope

GB/T 45325-2025 gives the SEM method for measuring the heat affected zone of precious metal bonding wire. Bonding wire connects a semiconductor die to its package, and the free air ball formed by the electronic flame-off at the start of every bond leaves behind a recrystallised zone up the wire; the length of that zone governs how the loop behaves, whether the neck cracks under thermal cycling, and it is the parameter by which gold and silver bonding wire is qualified. The standard sets the principle, the specimen preparation including the formation of the ball under the defined conditions and the mounting and etching that reveals the recrystallised grains, the scanning electron microscope and its

imaging conditions, the identification of the boundary of the heat affected zone, the measurement of its length and the number of measurements required, the calculation and statistical treatment, and the report. It takes effect on 1 September 2025.

This document describes the SEM method for determining the heat affected zone length of various types of precious metal bonding wires (hereinafter referred to as "bonding wires"). Method 1 of this document is applicable to the determination of the length of the heat affected zone of bonding wire. Method 2 of this document is applicable to the determination of the heat affected zone length of pure metal, alloy or composite bonding wires with a diameter not exceeding 50 μ m.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 23414-2009 Terminology for microbeam analysis scanning electron microscopy

GB/T 38783-2020 Scanning electron microscopy method for measuring thickness of precious metal composite coatings

3 Terms and definitions

The terms and definitions defined in GB/T 23414-2009 and the following apply to this document.

3.1 free air ball free air ball; FAB During the wire bonding process, the high voltage arc breaks through the air and releases a large amount of heat, causing the end of the bonding wire to melt. The action forms a metal ball at the end of the bonding wire.

3.2 Heat affected zone heat affected zone; HAZ During the wire bonding process, the high temperature melts the end of the bonding wire to form a free air ball (FAB), and the heat conduction causes the bonding wire to The FAB region is the area where recrystallization and grain growth occur.

3.3 Focused ion beam; FIB The ion source is accelerated by an ion gun and focused by an electromagnetic lens to form an ion beam. [Source: GB/T 38783-2020, 3.1, modified]

3.4 Dual beam electron microscope A dual-beam (electron beam/ion beam) system that combines a focused ion beam with a scanning electron microscope. [Source: GB/T 38783-2020, 3.2, modified]

3.5 Gas injection system gas injection system; GIS In a dual-beam electron microscope, a

system that injects various gas compounds to assist deposition or enhance etching.

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