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

**GB/T 47080-2026**

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**Test method for the dislocation density of polished single  
crystal diamond wafers**

金刚石单晶抛光片位错密度的测试方法

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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 involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was prepared by the National Technical Committee on Standardization of Semiconductor Equipment and Materials (SAC/TC203) and the National Semiconductor Equipment and Materials Standards Committee. It was jointly proposed and is under the jurisdiction of the Materials Subcommittee of the Chemical Technology Committee (SAC/TC203/SC2). This document was drafted by: Institute of Semiconductors, Chinese Academy of Sciences; Dezhou University; Chengdu Zhongke Mige Testing Technology Co., Ltd.; and China National Petroleum Corporation. Group Engineering Materials Research Institute Co., Ltd., Henan Carbon Core Material Technology Co., Ltd., Jilin University, Anhui Guangzhi Technology Co., Ltd., Shandong University, Jiaxing World Diamond Tools Co., Ltd., Peking University Dongguan Optoelectronic Research Institute, Zhejiang Pioneer Microelectronics Technology Co., Ltd., Beijing Tess Semiconductor Equipment Co., Ltd., Ningbo Crystal Diamond Technology Co., Ltd., Henan Huifeng Diamond Co., Ltd., Harbin Institute of Technology Zhengzhou Research Institute Research Institute, Nanjing Tongli Crystal Materials Research Institute Co., Ltd., Hubei C

6 Technology Co., Ltd., Nanjing Ruwei New Materials Technology Co., Ltd., Chengdu Shijiu Exhibition Technology Co., Ltd., and Jiaruifu Diamonds (Henan) Co., Ltd. The main drafters of this document are. Huo Xiaodi, Cao Fanqiu, Zheng Hongjun, Wang Xiwei, Yan Fangliang, Wang Shaolong, Qu Pengfei, Wang Zhen, Jin Peng, and Li Hongdong. Zhu Jiaqi, Ou Linfang, Chen Jifeng, Wang Qi, Yu Jinfeng, Jiang Jile, Zhang Juantao, Zhang Jun'an, Wang Zhiqiang, Li Yicun, Li Dongzhen, Lü Jilei, Xu Liangwei Huang Liang, Feng Canjun, and Zhao Jiwen. Test method for dislocation density of polished diamond single crystal wafers

## 1 Scope

GB/T 47080-2026 is the Chinese national standard covering counting dislocations in a diamond wafer - the defects that limit what an electronic or quantum device grown on it can do, revealed by etching or X-ray topography and counted per unit area. First edition, and it belongs with GB/T 47902-2026 on the wafers themselves. It was issued on 28 January 2026 and has been in force since 1 August 2026, as a first edition. The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document describes a method for measuring the dislocation density of a cubic diamond single-crystal polished wafer using dry etching combined with microscopic counting. This document applies to polished cubic diamond single crystal wafers with {100}, {110}, or {111} facets where the dislocation density ranges from  $5 \times 10^3$  dislocations/cm<sup>2</sup>. The test was conducted at a rate of  $5 \times 10^7$  cells/cm<sup>2</sup>.

## 2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 678 Chemical Reagents - Ethanol (Anhydrous Ethanol)

GB/T 686 Chemical Reagent Acetone

GB/T 1555 Method for determining crystal orientation of semiconductor single crystals

GB/T 3634.2 Hydrogen - Part

## 3 Terms and Definitions

The terms and definitions defined in GB/T 14264 apply to this document.

4.Principles When diamond single crystals are etched using a specific plasma, the etching rate is faster at the dislocation line outcrops on the single crystal surface, thus forming a unique... Etching pits of a specific shape. These pits, observed under a microscope and statistically analyzed according to certain rules, represent the number of pits per unit field of view. The number of etched pits is the dislocation density.

## 5 Interference Factors

5.1 During the etching process, the plasma composition, sample surface temperature, and etching time will affect the etching effect and thus the test results.

5.2 Scratches on the sample surface and excessive surface roughness can affect the etching effect and thus the test results.

5.3 Manually counting the number of etching pits will introduce errors.

## 6 Reagents

6.1 Deionized water or distilled water. Grade III water, conforming to the requirements of GB/T 6682.