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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 4326-2025

Replacing GB/T 4326-2006

Extrinsic semiconductor single crystals - Measurement of Hall mobility and Hall coefficient

非本征半导体单晶霍尔迁移率和霍尔系数测量方法

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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. This document supersedes GB/T 4326-2006 "Methods for Measuring Hall Mobility and Hall Coefficient of Intrinsic Semiconductor Single Crystals" and is consistent with... Compared with GB/T 4326-2006, apart from structural adjustments and editorial changes, the main technical changes are as follows:

a) The scope has been changed (see Chapter 1, Chapter 1 of the.2006 edition);

b) Terms and definitions have been changed (see Chapter 3, Chapter 2 of the.2006 edition);

c) The methodology has been modified (see Chapter 4, Chapter 3 of the.2006 edition);

d) The interfering factors were changed (see Chapter 5, Chapter 8 of the.2006 edition);

e) Increased experimental conditions (see Chapter 6);

f) Added reagents or materials (see Chapter 7);

g) The requirements for geometric dimensional gauges have been changed (see 8.2,

5.2 of the.2006 edition);

h) The requirements for electrode fabrication equipment have been changed (see 8.3,

5.3 of the.2006 edition);

i) The sample has been modified (see Chapter 9, Chapter 4 of the.2006 edition);

j) The experimental procedures were changed (see Chapter 10, Chapter 6 of the.2006 edition);

1 Scope

GB/T 4326-2025 is the Chinese national standard covering the Hall measurement on a doped crystal - the specimen geometry and the contacts, the magnetic field and the current, and the carrier concentration, type and mobility that come out of it, which is how a wafer's doping is actually verified. Issued on 31 October 2025, it has been in force since 1 May 2026, replacing GB/T 4326-2006.

This document describes a method for measuring the Hall mobility and Hall coefficient of intrinsic semiconductor single-crystal materials. This document applies to single crystals of silicon, germanium, gallium arsenide, gallium phosphide, indium phosphide, gallium antimonide, indium antimonide, cadmium sulfide, gallium oxide, silicon carbide, and gallium nitride. The measurement of Hall mobility and Hall coefficient of materials is also applicable to the Hall mobility of other semiconductor single-crystal materials with resistivity less than 10^8 Omega·cm. Measurement of rate and Hall coefficient.

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 14264 Semiconductor Materials Terminology

3 Terms and Definitions

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

4.Method Principles This method utilizes the Hall effect, which states that when a solid conductor is placed in a magnetic field and a current flows through it, the charge carriers within the conductor are subjected to... The phenomenon of the Lorentz force causing the object to deflect to one side, thereby generating a voltage (Hall voltage), is used to determine the Hall mobility and Hall coefficient. In an intrinsic semiconductor with a single type of charge carrier, the relationship between the Hall coefficient and the basic material parameters is given by formula (1). RH= nxe (1) In the formula. RH

--- Hall coefficient, measured in cubic centimeters per coulomb (cm^3/C); gamma

--- Hall factor; n

--- Carrier concentration, in cubic centimeters (cm-3); e

--- electron charge, measured in coulombs (C). The Hall factor (gamma) is a proportionality factor determined by the scattering mechanism, sample temperature, band structure, and magnetic field strength. gamma is usually taken as 1.

5 Interference Factors

5.1 The measuring current should not exceed 1 mA to avoid heating the sample. When current passes through the sample, the change in resistivity over time can be used as a predictor of the measurement. The appropriateness of the measured current is determined by the method of analysis.

5.2 When measuring high-resistivity samples, leakage current on the sample surface will affect the measurement results.