

ICS 77.040.01

CCS H 21



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

GB/T 30537-2014

**Superconductivity -- Measurements for bulk high temperature
superconductors -- Trapped flux density of large grain oxide
superconductors**

超导电性 块状高温超导体的测量 大晶粒氧化物超导体的俘获磁通密度

(English Translation)

Issued on: May 6, 2014

Implemented on: November 1, 2014

Issued by: Standardization Administration of China

Table of Contents

Introduction

Introduction

1 Scope

2 Normative references

3 Terms and definitions

4 Principle

5 Requires

6 Experimental device

7 Measuring step

The precision and accuracy of test methods 8

9 Test Report

Appendix A (informative) text 3 to 6 Additional information

Measurement Appendix B (informative) high temperature superconductor maglev
massive force

Annex C (informative) Test Report (Example)

Reference

1 Block superconductors trapped magnetic flux density of principle

2 A schematic diagram of experimental setup

Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules.

This standard uses the translation method is equivalent to using IEC 61788-9:2005
"Superconductivity - Part 9. Measurement of large bulk high temperature superconductors
Oxide superconductor grains trapped magnetic flux density. " Correspondence between the
consistency of the standards of international documents and normative references of the
following documents.

--- GB/T 13811-2003 Electrotechnical terminology superconductivity (eqv IEC 60050
(815).2000) this standard by the National Standardization Technical Committee of
superconducting (SAC/TC265) will be presented and interpreted.

This standard was drafted. Beijing Nonferrous Metal Research Institute, Shanghai
University, Chinese Academy of Sciences Institute of Physics.

Introduction

Large grain bulk high temperature superconductors (BHTSC) of such magnetic bearings, flywheel energy storage system, no friction load transport, magnetic levitation and prisoners Eligible flux density magnets and other engineering applications with great potential. Internationally, a large grain superconductors have entered the market.

Industrial applications, bulk superconductor has two important material properties. One of these is magnetic levitation force, which determines the bulk superconductor can withstand the weight of the suspension; the other is trapped magnetic flux density, which determines the maximum magnetic field capable of capturing the bulk superconductor. Bulk superconductors Users in the design of equipment must understand these characteristic parameter values. However, these measurements strongly dependent on the test method. With the domestic block Research, production and the development of applications, expanding the size of the market and international trade shaped superconductor, an urgent need to establish International standards of performance tests on bulk superconductor national standards. In 2007, the Standardization Administration of China approved the release "Bulk oxide superconductor magnetic levitation force measurements," the national standard (GB/T 21115-2007), the international standard IEC 61788-9 will "SUPERCONDUCTIVITY-Measurementsforbulkhightemperaturesuperconductors-Trapped fluxdensityoflargegrainoxidesuperconductors "(" high-temperature superconductivity bulk superconductors measurement of large grain oxide Superconductor trapped magnetic flux density ") into national standards, so that bulk superconductor has two important characteristics of measuring national standards.

Test methods used in IEC 61788-9 is off (Versailles program advanced materials and standards) VAMAS based organizations of High-temperature superconductors in bulk standardization and the establishment of the preparatory work.

High-temperature superconductor bulk superconductivity measurements Trapped magnetic flux density of large grain oxide superconductors

1 Scope

This standard specifies a high-temperature superconductor massive capture magnetic field (magnetic flux density trapping) measurement method.

This standard applies to having a regular shape, such as a wafer, cylindrical, rectangular, hexagonal prism block and n large grain oxide superconductors in bulk Evaluation trapping the magnetic flux density within the temperature range of 4.2K ~ 90K. Based on the purpose of standardization, reports only capture the flux liquid nitrogen temperature density.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document.

IEC 60050 (815).2000 Electrotechnical terminology superconductivity
(Internationalelectrotechnicalvocabulary-Part 815. Superconductivity)

3 Terms and Definitions

IEC 60050 (815).2000 definition of terms and definitions as well as the following terms and definitions apply to this document.

Trapped magnetic flux density trappedfluxdensity in determining clearances and temperature conditions, massive high-temperature superconductors trapped magnetic flux density (T).

The maximum capture magnetic flux density maximumtrappedfluxdensity Capture peak flux density.

NOTE: Most measurements only for the z component of the magnetic flux density, geometry or demagnetization of the sample (see A.2) its great influence. Therefore, the total magnetic flux density that is all components of the magnetic field vector and can be considered to represent the material properties of trapping magnetic flux density (see A.1).

$$\Delta \times B = \mu_0 J_c$$

Principle 4

Flux pinning superconductor having the ability to capture the magnetic field may be, as shown in FIG. In the high-temperature superconductor massive internal rotation, the magnetic flux density ($\Delta \times B$) and critical current density (J_c) is proportional to the formula (1).

$\Delta \times B = \mu_0 J_c$ (1) in the one-dimensional case, the formula (1) can be simplified in a Cartesian coordinate system as follows.

$$dB_z/dx = \mu_0 J_{cy} \quad (2)$$

Or simplified in cylindrical coordinates are.

$$dB_z/dr = \mu_0 J_{c\theta} \quad (3)$$