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Nanomaterials-Measuring method for DC magnetic susceptibility (magnetic moment)

纳米材料直流磁化率（磁矩）测量方法

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Table of Contents

Foreword

The guidance of technical documents proposed by the Chinese Academy of Sciences. The guidance of technical documents by the National Standardization Technical Committee Nano Nanomaterials Technical Committee (SAC/TC279 / SC1) centralized. The guiding technical document drafting unit. Chinese Academy of Sciences Institute of Physics National Key Laboratory of superconductivity. The main drafters of this technical document. Zhang Yingzi, Wen Haihu. Methods of measuring DC magnetic susceptibility (magnetic moment) of nanomaterials

1 Scope

This guiding technical document specifies the terms and definitions, the preparation and

measurement of samples, the measuring instruments, the measuring procedure and the test report for measuring the direct-current magnetic susceptibility (magnetic moment) of nanomaterials. This guiding technical document applies to the measurement of the direct-current magnetic susceptibility (magnetic moment) of nanomaterials by the superconducting quantum interference device magnetometer and the vibrating sample magnetometer, both built on the law of electromagnetic induction. Materials in the sub-micrometre size range may also follow this standard.

This Guidance Document specifies the terms and definitions used to measure DC susceptibility (magnetic moment) of nanomaterials, sample preparation and measurement, measuring instruments Devices, measurement procedures and test reports. This Guidance Document is applicable to the measurement of superconducting quantum interference magnetometers and vibrating sample magnetometers made by the law of electromagnetic induction DC magnetic susceptibility (magnetic moment) of nanomaterials. Submicron scale range of materials can also refer to the implementation of this standard.

2 Normative references

The following documents contain provisions which, through reference in this Guidance Document, become the provisions of this Guidance Note document. All dated Reference documents, all subsequent amendments (not including errata content), or revisions do not apply to this guidance document, however, drums Recipients of the agreement based on this guidance document are encouraged to study whether the latest versions of these documents are applicable. All undated references The latest version of this document applies to this guidance document.

GB/T 19619 nanomaterials terminology

3 Terms and definitions

GB/T 19619 established and the following definitions of terms apply to the guidance of technical documents.

3.1 Magnetic moment magneticmoment Under the action of the magnetic field can change and in turn affect the magnetic field of the medium, called the magnetic medium. For any magnetic material, it is generated by current The smallest unit of magnetic moment is atom. The atom generates a magnetic moment by the spin of the electron and the movement around the nucleus. The direction of magnetic moment can be right Hand rules to determine. Its expression see formula (1). mj = A ji (1) In the formula. mj

--- magnetic moment vector, the unit is ampere square meter (A · m2); j

--- enclosed by the current i enclosed area vector, in square meters (m2); i

--- closed path current, in amperes (A). According to the magnetic moment in the external

magnetic field when the different performance, usually can be simply divided into the following three categories of objects.

a) diamagnetic material. When the external magnetic field, the object itself generated magnetization direction and the applied field opposite;

b) Paramagnetic substance. When the magnetic field is applied, the magnetization direction of the object itself is the same as that of the applied field.

c) Ferromagnetic material. When the applied magnetic field, the object itself produces a strong magnetization and the direction of the applied field. Ferromagnetic Material is divided into soft magnetic and hard magnetism.

3.2 Magnetization The total magnetic moment per unit volume of magnetizable material, its expression see formula (2). M = Sigma mj/V (2) In the formula. M--

--- magnetization vector, in amperes per meter (A/m); V

--- volume of magnetized material, in cubic meters (m3).