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High-purity germanium gamma spectrometers

高纯锗 γ 谱仪

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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 be subject to patents: The publisher of this document assumes no responsibility for identifying patents: This document is proposed and coordinated by the National Technical Committee on Standardization of Nuclear Instrumentation (SCA/TC30): This document was drafted by: Tongfang Nuctech Technology Co., Ltd., Tsinghua University, China Institute of Metrology, China Atomic Energy Research Institute Institute: The main drafters of this document: Li Yulan, Li Yuanjing, Zhao Kun, He Li, Fu Yidong, Zhang Zhi, Gong Hui, Wu Yao, Huang Xunwang, Wei Hongyan, Zhang Tong, Zhang Hong, Liang Juncheng, Hao Xiaoyong, Wei Kexin, Yu Haijun, Pan Hongwei, Li Xiuxia, Hu Chunxuan, Que Ziang: High purity germanium gamma spectrometer

1 Scope

China's national standard for high-purity germanium gamma spectrometers. The HPGe detector is the reference instrument of gamma spectrometry: a single crystal of germanium purified to about one impurity atom in a trillion, operated as a reverse-biased diode, in which a gamma ray creates a charge proportional to its energy. Its resolution is an order of magnitude better than a scintillator's, which is what allows individual radionuclides to be identified unambiguously in a mixed sample rather than merely detected - the difference between knowing that something is radioactive and knowing exactly which isotopes and how much. That capability is what environmental monitoring, nuclear safeguards, food surveillance after a release, and nuclear forensics all depend on. The cost is operational: germanium's small band gap means the detector must be held at liquid nitrogen temperature whenever it is biased, and warming it up under bias destroys it.

This document stipulates the classification and technical requirements of high-purity

germanium gamma spectrometers (hereinafter referred to as "spectrometers"), describes the test methods, and also provides inspection regulations: Regulations, markings, accompanying documents, transportation and storage are stipulated: This document applies to the production, sales, management and production of high-purity germanium gamma spectrometers with coaxial semiconductor detectors (hereinafter referred to as "coaxial type"): Testing etc: Reference for other types of high-purity germanium gamma spectrometers used in special or customized scenarios:

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document:

GB/T 191 Packaging, storage and transportation pictorial mark GB/T 2423:

56 Environmental testing Part 2: Test methods Test Fh: Broadband random vibration and guidelines

GB/T 2900:66-2004 Electrical terminology semiconductor devices and integrated circuits

GB/T 2900:97-2016 Electrical Terminology Nuclear Instruments Physical Phenomenon, Basic Concepts, Instruments, Systems, Equipment and Detectors GB/T 3785:

3 Terms and definitions

GB/T 2900:66-2004, GB/T 2900:97-2016, GB/T 4960:6-2008 and JJF1850-2020 and The following terms and definitions apply to this document: 3:1 impurity Atoms of other elements in single element semiconductors; atoms of other elements in compound semiconductors or crystal structures related to compound semiconductors