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Nanotechnologies - Test method for semiconductor nanopowders using UV-Vis diffuse reflectance spectroscopy

纳米技术 半导体纳米粉体材料紫外-可见漫反射光谱的测试方法

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard was proposed by the Chinese Academy of Sciences. This standard is under the jurisdiction of the National Nanotechnology Standardization Technical Committee (SAC/TC279). This standard was drafted. National Nanoscience Center, Beijing Weikang Environmental Protection Technology Co., Ltd., Guangzhou Special Pressure Equipment Testing and Research Institute, Beijing Physical and Chemical Analysis and Testing Center, Beijing University of Science and Technology, Beijing Powder Technology Association. The main drafters of this standard. Park Lingxi, Wu Zhijiao, Cao Wenbin, Yang Lin, Gao Xia, Chang Huaiqiu, Liu Wenxiu, Yin Zongjie, Plateau.

Compared with traditional semiconductor materials, semiconductor nano-powder materials exhibit special optical and electrical properties and have excellent photoelectric conversion. Chemical properties are widely used in new energy preparation, environmental protection, chemical, pharmaceutical, aerospace and military fields. UV-visible diffuse reflectance spectroscopy is an important characterization method for studying the optical properties of semiconductor nano-powder materials. It can be used for band gap and color difference.

Analysis, surface adsorption, reaction between powders, and other important properties. UV-visible diffuse in semiconductor nanopowder materials In the reflection spectrum, the position of the characteristic diffuse reflection peak is directly related to its band gap. Bandgap is a very important physical property of semiconductor nanopowder materials. Directly affect the optical properties of the material and the field of application and scope. Combined with UV-visible diffuse reflectance spectroscopy and Kubelka~ The Munk) equation calculates the band gap of a semiconductor nanopowder material. In order to meet the needs of China's research and production departments, the tester is required. The law regulates and standardizes. Nanotechnology semiconductor nano powder material UV-visible diffuse reflectance spectroscopy test method

1 Scope

China's national test method for characterising semiconductor nanopowders by ultraviolet-visible diffuse reflectance spectroscopy. It specifies the method principle, the instruments including the spectrophotometer and integrating sphere, the samples, the procedure and the treatment of results. The measurement determines the band gap, which for a semiconductor is the single number that determines what it does: what wavelengths it absorbs, what it emits, and what chemistry it can drive. Ordinary transmission spectroscopy cannot be used on a powder because the sample scatters rather than transmits, and that is what the integrating sphere is for - it collects the light diffusely reflected in every direction so that the absorption can be recovered from it. The technique is central to photocatalysis, where the whole point of engineering a material such as titanium dioxide at the nanoscale is to shift its band gap into the visible so that sunlight rather than ultraviolet will drive the reaction.

This standard specifies the UV-visible diffuse reflectance spectroscopy test method for semiconductor nano-powder materials. This standard is applicable to the test of diffuse reflectance spectra of opaque semiconductor nano-powder materials.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article. Pieces. For undated references, the latest edition (including all amendments) applies to this document.

JJF1232 reflectivity meter calibration specification JJG178 UV, visible, near-infrared spectrophotometer verification procedures

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Semiconductor semiconductor A solid material having a resistivity between the

conductor and the insulator and ranging from 10 to 3 Omega·cm to 1010 Omega·cm. Current is taken by the belt The directional transmission of positively charged holes and negatively charged electrons is achieved. [GB/T 14264-2009, definition 3.218]

3.2 Nano powder nanopowder A collection of discrete nanoparticles.

Note. Rewritten from GB/T 19619-2004, definition 3.2.1.1.

3.3 Diffuse reflection The dispersion process caused by reflection when there is no regular reflection on the macroscopic scale. [JJF1032-2005, definition 4.5]

3.4 Reflectivity The thickness of the material layer is such that the reflectance does not change as the thickness increases, and is dimensionless. [JJF1032-2005, definition 4.42]

3.5 Integrating sphere integratingsphere A hollow sphere used as a component of a radiometer, photometer, or spectrophotometer, whose inner surface is covered with almost no spectrum in the spectral region of use. Selective diffuse reflective material. [JJF1032-2005, definition 3.52]