



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

GB/T 41232.6-2024

**Nanomanufacturing - Key control characteristics - Nano-enabled
electrical energy storage - Part 6: Determination of carbon content for
nano-enabled electrode materials - Infrared absorption method**

纳米制造 关键控制特性 纳米储能 第6部分：纳米电极材料中的碳含量测定 红外
吸收法

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting is required.

This document is part 6 of GB/T 41232 "Nanomanufacturing Key Control Characteristics Nano Energy Storage". GB/T 41232 has been issued the following parts were published.

Part 2: Density test of nano cathode materials;

Part 3: Test of contact resistivity and coating resistivity of nanomaterials;

Part 6: Determination of carbon content in nanoelectrode materials - Infrared absorption method.

This document is modified to adopt IEC TS 62607-4-6:2018 "Critical Control Characteristics of Nanomanufacturing Part 4-6.Nano Energy Storage Nanomaterials" Determination of Carbon Content in Electrode Materials by Infrared Absorption Method", the document type was adjusted from IEC technical specifications to my country's national standards.

Compared with IEC TS 62607-4-6:2018, this document has made the following structural adjustments.

Added Chapter 8, Chapter 9 corresponds to Chapter 8 in IEC TS 62607-4-6:2018.-the technical differences between this document and IEC TS 62607-4-6:2018 and their reasons are as follows.

ISO/TS 80004-1:2010 has been replaced by ISO 80004-1 to ensure that the latest version of the document is referenced (see Chapter 2 and 3.1);

Added resolution of analytical balance to clarify the resolution requirements of analytical balance (see Table 1); -Added the content of drying oven to clarify the temperature range of drying oven (see 5.6 and 6.2.1); -Uncertainty analysis has been added to clarify the sources of uncertainty associated with measuring the carbon content of nanoelectrode materials (see

The content of the test report has been increased to clarify the test object, tester and date, test instrument and model [see Chapter 9

The following editorial changes were made to this document.

To coordinate with the existing standards, the name of the standard is changed to "Key Control Characteristics of Nanomanufacturing Nano Energy Storage Part 6: Nano Determination of carbon content in electrode materials-Infrared absorption method";

The abbreviation "IR" has been deleted;-Added the abbreviation "LMFP" (see 3.2); -the parameters of the test instruments are classified (see Table 1). -

Introduction

Compared with general materials, nano energy storage materials have shown superior performance. In order to accelerate the healthy development of the emerging industry of nano energy storage, with the rapid development of the industry, standardizing the performance test methods of nano energy storage materials has become an urgent task for the industry.

The System Nanotechnology Committee (IEC/TC 113) has published 8 standardized documents on the performance testing of nano energy storage materials.

In order to meet the needs of domestic industrial development, it is planned to adopt relevant standards. GB/T 41232 "Key Control Characteristics of Nanomanufacturing Nano Energy Storage" is the standard guiding the testing methods of the physical and chemical properties of nano energy storage materials is planned to consist of 8 parts.

Part 1: Electrochemical performance test of nano cathode materials Two-electrode battery method. The purpose is to establish the use of two-electrode battery method to test Test the relevant regulations on the electrochemical performance of nano positive electrode materials.

Part 2: Density test of nano cathode materials. The purpose is to establish relevant regulations for testing the density of nano cathode materials.

Part 3: Test of contact resistivity and coating resistivity of nanomaterials. The purpose is to establish the test method for measuring the contact resistivity of nano-electrode materials.

Relevant regulations on resistivity and coating resistivity.

Part 4: Thermal performance test of nanomaterials by needle puncture method. The purpose is to establish the use of needle puncture method to test the thermal properties of nano energy storage devices.

relevant provisions on control levels.

Part 5: Electrochemical performance test of nano cathode materials - three-electrode battery method. The purpose is to establish the use of three-electrode battery method Regulations for testing the electrochemical properties of nano cathode materials.

Part 6: Determination of carbon content in nanoelectrode materials by infrared absorption method.

Regulations on the carbon content of nano-electrode materials.

Part 7: Determination of magnetic impurities in nano cathode materials by ICP-OES method. The purpose is to establish the use of inductively coupled plasma Relevant regulations for the determination of magnetic impurities in nano cathode materials by bulk

emission spectrometer (ICP-OES).

Part 8: Determination of water content in nanoelectrode materials by Karl Fischer coulometric titration.

Regulations on the determination of water content in nanoelectrode materials by coulometry.

Nano energy storage technology has been widely used in portable electronic devices, electric vehicles and energy storage systems.

The development of nano energy storage devices has put forward higher requirements on the performance. The main performance of energy storage devices depends on the electrode materials.

The carbon content of nano-electrode materials is an important control indicator, which will affect the performance and quality of electrode materials.

The carbon content is necessary to improve the electronic conductivity between particles. On the one hand, when the carbon content is insufficient, the conductivity If the problem is not effectively improved, the battery will have high internal resistance, low discharge platform or small capacity, which will reduce its rate performance and cycle life.

On the other hand, excessive carbon content will cause the carbon to aggregate and become difficult to disperse, which will affect subsequent processing because excess carbon will reduce the activity of the active substances.

The proportion affects the energy density of the battery.

Since the nano-electrode material has a small particle size and low apparent density, the sample can be easily blown away by the gas in the furnace during the test.

This document provides a special sample preparation method, powder tableting, which not only affects the determination of carbon content, but also may contaminate the test system.

A method for determining the carbon content of nanoelectrode materials used in electrical energy storage devices to evaluate the optimal formulation of nanoelectrode composite materials this method allows the comparison of results from different research teams.

This method is only suitable for comparing the carbon content in nano-electrode materials in the research stage, and is not suitable for evaluating electrode materials in end products.

This method is applicable to materials that can only display functions or properties through nanotechnology, and they can be intentionally added to active materials to show Improve the performance of electrical energy storage devices.

Nanomanufacturing Key Control Characteristics Nano Energy Storage Part 6: Carbon content in nanoelectrode materials Infrared absorption method