ICS 77.120.99
CCS H 65

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 23595.3-2025

Replacing GB/T 23595.3-2009

Test methods of rare earth phosphors for LED - Part 3: Determination of chromaticity coordinates

LED用稀土荧光粉试验方法 第3部分：色品坐标的测定

Issued on: January 24, 2025 **Implemented on: August 1, 2025**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

Table of Contents

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.

This document is part 3 of GB/T 23595 Test methods for rare earth phosphors for LEDs. GB/T 23595 has been published for the following part.

- Part 1: Determination of spectrum;

- Part 2: Determination of relative brightness;

- Part 3: Determination of chromaticity coordinates;

- Part 4: Determination of high temperature and high humidity performance;

- Part 5: Determination of pH value;

- Part 6: Determination of electrical conductivity;

- Part 7: Determination of thermal quenching properties;

- Part 8: Determination of high voltage accelerated aging performance.

This document replaces GB/T 23595.3-2009 "Test methods for rare earth yellow phosphors for white light LED lamps Part 3: Chromaticity coordinates Compared with GB/T 23595.3-2009, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

a) Changed the scope of application from "440nm~480nm" to "350nm~480nm" (see

Chapter 1, 2009 Edition, chapter);

b) Added terms and definitions (see Chapter 3);

c) The principle has been changed (see Chapter 4, Chapter 2 of the 2009 edition);

d) The equipment has been changed (see Chapter 5, Chapter 3 of the 2009 edition);

e) The sample pan size has been changed (see 5.2, 3.3 of the 2009 edition);

f) Added sample requirements (see Chapter 6);

g) The test steps have been changed (see Chapter 8, Chapter 5 of the 2009 edition);

h) The precision has been changed (see Chapter 10, Chapter 7 of the 2009 edition).

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document was proposed and coordinated by the National Rare Earth Standardization Technical Committee (SAC/TC229).

This document was drafted by: Jiangmen Keheng Industrial Co., Ltd., Youyan Rare Earth New Materials Co., Ltd., Jiangsu Borui Optoelectronics Co., Ltd.

Co., Ltd., Youyan Rare Earth High-Tech Co., Ltd., and Baotou Rare Earth Research Institute.

The main drafters of this document are: Huang Ruitian, Li Yunfeng, Huang Yongyi, Liu Ronghui, Liang Chao, Zhang Shenjie, Xie Shihui, Wang Heng, Wang Jing, Zan Yongxi, Qiao Xin.

This document was first published in 2009 and this is the first revision.

Introduction

With the continuous development of semiconductor lighting and display technology, higher requirements are placed on the performance of phosphors.

The use of blue LED yellow phosphor has developed into the use of ultraviolet-blue LED blue-green/yellow/yellow-green/red phosphors, as well as blue LED green/red phosphors, including garnet structure aluminate yellow/yellow-green phosphors, nitride red phosphors, silicate LED rare earth phosphor products of mainstream systems such as salt green/yellow phosphor, nitrogen oxide blue-green phosphor, etc. are becoming more and more diverse.

The comprehensive performance requirements of products are getting higher and higher, especially the new requirements for product reliability.

With the upgrading of local phosphor products and technologies, it is necessary to establish a unified evaluation method that conforms to the existing technology.

GB/T 23595 "Test methods for rare earth phosphors for LEDs" consists of 8 parts.

- Part 1: Determination of spectrum;

- Part 2: Determination of relative brightness;

- Part 3: Determination of chromaticity coordinates;

- Part 4: Determination of high temperature and high humidity performance;

- Part 5: Determination of pH value;

- Part 6: Determination of electrical conductivity;

- Part 7: Determination of thermal quenching properties;

- Part 8: Determination of high voltage accelerated aging performance.

In recent years, with the development of semiconductor lighting technology, the number of phosphor systems has gradually increased, and its application areas have continued to expand, including ordinary color rendering, high Market segments such as color rendering, full spectrum, high-power lighting and general color gamut display require higher precision in the excitation and emission spectra of phosphors.

In terms of spectrum testing instruments, the detection speed, measurement range, stability and measurement accuracy of phosphor samples have been significantly improved. The current national standard stipulates The test range, test accuracy and error cannot meet the actual application requirements. This document focuses on the expansion of the scope of application, test method The increase of light sources in the principle of the method and the upgrade of equipment accuracy have made the measurement steps and parameter requirements of the spectrum clearer.

The test method improves the accuracy and applicability of product testing, which is helpful for domestic and foreign LED rare earth phosphor manufacturers and related industries Production guidance and usage specifications.

Test methods for rare earth phosphors for LED Part 3: Determination of chromaticity coordinates

1 Scope

This document describes the method for determining the color coordinates of rare earth phosphors for LEDs excited by ultraviolet to blue light with wavelengths from 350nm to 480nm.

This document is applicable to the determination of the color coordinates of rare earth phosphors used in LEDs excited by ultraviolet to blue light with a wavelength of 350nm~480nm.

2 Normative references

GB/T 5838.1

GB/T 8170

3 Terms and definitions

The terms and definitions defined in GB/T 5838.1 and the following apply to this document.

3.1

A set of parameters used to characterize the color of the light emitted by the phosphor after being excited is calculated according to the CIE-1931 standard chromaticity observer rules.

4 Principle

Quasi-monochromatic light of a specific wavelength is used as the excitation light source to excite the fluorescence produced by the phosphor and convert the light signal into an electrical signal through a spectrometer.

The relative emission spectrum power distribution of the entire visible light band is measured at a certain wavelength interval, the influence of the excitation light is eliminated, and then according to CIE-1931 Standard observer rules for colorimetry are used to calculate chromaticity coordinates.

5 Instruments and Equipment

5.1 Spectroradiometer. Use a quasi-monochromatic excitation source with a wavelength of 350nm~480nm, the half-peak bandwidth of the excitation spectrum is not greater than 10nm, and the wavelength is The accuracy is ±0.3nm, and the repeatability is ±0.1nm. The spectral range is 380nm~780nm, the relative brightness accuracy is ±1%, and the chromaticity is The standard accuracy is ±0 0020, the chromaticity coordinate repeatability is ±0 0003, and the relative spectral response of the photodetector meets the national first-level illumination standard. Detector requirements.

5.2 Sample pan. Made of stainless steel, inner diameter 26.0 mm ± 0.5 mm, depth 4.0 mm ± 0.1 mm.

6 Samples

Set the oven temperature to 60°C and bake in the oven for 12 hours. The sample should be a dry powder without lumps.