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Replacing GB/T 23595.4-2009

Test methods of rare earth phosphors for LED - Part 4: Determination of high temperature and high humidity property

LED用稀土荧光粉试验方法 第4部分：高温高湿性能的测定

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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.

This document is part 4 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 23595.4-2009 "Test methods for rare earth yellow phosphors for white light LED lamps Part 4: Thermal stability Compared with GB/T 23595.4-2009, 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 1);

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) Added requirements for test environment (see Chapter 7);

f) The test steps have been changed (see Chapter 8, Chapter 4 of the 2009 edition);

g) The precision has been changed (see Chapter 10, Chapter 6 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).

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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, and 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 general color rendering, Market segments such as high color rendering, full spectrum, high-power lighting and ordinary color gamut display require higher precision in the excitation and emission spectra of phosphors.

In terms of spectral testing instruments, the detection speed, measurement range, stability and measurement accuracy of phosphor samples have been significantly improved.

The specified test range, test accuracy and error cannot meet the actual application requirements. This document focuses on the expansion of the scope of application, test The addition of light sources and the upgrade of equipment precision in the method principle further clarified the measurement steps and parameter requirements of the spectrum.

The refined 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 for the industry.

Test methods for rare earth phosphors for LED Part 4: Determination of high temperature and high humidity performance

1 Scope

This document describes the determination of high temperature and high humidity performance of rare earth phosphors for LEDs excited by ultraviolet to blue light with wavelengths from 350nm to 480nm method.

This document is applicable to the determination of high temperature and high humidity performance of rare earth phosphors for LEDs excited by ultraviolet light to blue light with a wavelength of 350nm~480nm.

2 Normative references

GB/T 5838.1

GB/T 8170

GB/T 23595.3

3 Terms and definitions

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

3.1 Phie

The radiant energy of light passing through a specific area per unit time.

3.2

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 rule.

3.3 Dx

In the CIE1931 coordinate system, the distance between one chromaticity coordinate and another chromaticity coordinate.

4 Principle

The phosphors were treated with high temperature and high humidity, and the light (radiation) power and chromaticity coordinates of the original phosphors and the treated phosphors were measured.

The high temperature and high humidity performance of the phosphor is characterized by the variation of light (radiation) power and the drift of chromaticity coordinates.

5 Instruments and Equipment

5.1 Constant temperature and humidity test oven. temperature accuracy is ±1°C, relative humidity accuracy is ±2%. The maximum operating temperature is not less than 85°C, the maximum