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

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**Carbon based films - Determination of optical properties of
amorphous carbon films by spectroscopic ellipsometry**

碳基薄膜 椭偏光谱法测定非晶态碳基薄膜的光学性能

(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 modification adopts ISO 23216:2021 "Optical properties of amorphous carbon-based films by spectroscopic ellipsometry of carbon-based films".

This document has the following structural adjustments compared to ISO 23216:2021.

6.4 and 6.5 correspond to 6.4 in ISO 23216:2021; -6.6 corresponds to 6.5 in ISO 23216:2021.-the following editorial changes were made to this document.

Added the annotations of the types corresponding to each layer of the optical model in Figure 1; -Added title bar (see 5.1 to 5.7). -

1 Scope

This paper describes the use of spectroscopic ellipsometry to determine the optical properties of amorphous carbon-based films (refractive index n and extinction coefficient k) and the use of n - k diagrams A method for classifying different types of amorphous carbon-based films by spectroscopy.

This document applies to non-metallic materials deposited by ion evaporation, sputtering, arc deposition, plasma-assisted chemical vapor deposition, hot wire, etc.

Crystalline carbon-based films.

This document does not apply to amorphous carbon-based films modified by metals or silicon, or amorphous carbon with composition/property gradients through the film thickness.

Base film.

2 Normative references

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document.

Refractive index

The ratio of the speed of electromagnetic radiation in a vacuum to the speed of electromagnetic radiation in a medium.

Extinction coefficient the amount of electromagnetic radiation absorbed by a medium (matter).

4 Sample preparation

Amorphous carbon-based films on any substrate can be used for testing as long as the substrate is optically isotropic and has a usable optical model.

The test substrate is a mirror-finished silicon wafer. The mirror-finished silicon wafer can be

used as a substrate for amorphous carbon films to meet different test requirements. The sample should be for uniform amorphous carbon-based films, the film thickness should be 0.02 μm ~5 μm .

All relevant details of the sample should be provided, such as size, surface roughness, material type, composition, microstructure and processing process.

5.1 Halogen lamp and blue LED lamp

Its spectral range should include 450 nm~950 nm.

5.2 Detector

Used to obtain ellipsometer measurement data, the spectral range should include 450 nm~950 nm.