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

**GB/T 20175-2025**

Replacing GB/T 20175-2006

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**Surface chemical analysis - Sputter depth profiling -  
Optimization using layered systems as reference materials**

表面化学分析 溅射深度剖析 用层状膜系为参考物质的优化方法

**(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.

This document replaces GB/T 20175-2006 "Optimization method for layered films as reference materials for sputtering depth profiling of surface chemical analysis".

Compared with GB/T 20175-2006, the main technical changes are as follows.

--- Delete and add some terms and definitions (see Chapter 3, Chapter 2 of the 2006 edition);

--- Added X-ray photoelectron spectroscopy measurement parameters (see 5.3, 4.3 of the 2006 edition);

--- Changed the requirements for optimization parameter setting (see 7.2, 6.2 of the 2006 edition).

This document is equivalent to ISO 14606:2022 "Optimization of layered films as reference materials for sputtering depth profiling for surface chemical analysis".

Law".

## Introduction

In the field of silicon wafers, multilayer film devices (such as AlGaAs double heterojunction lasers, various high electron mobility transistors) and car body anti-corrosion Reference materials are used to optimize the depth resolution of sputter profiling methods in materials such as gold-galvanized steel.

The specific application scope of this document is as follows.

a) When setting up instruments for Auger electron spectroscopy, X-ray photoelectron spectroscopy, and secondary ion mass spectrometry, use single-layer and multilayer film systems on substrates.

For reference materials to optimize depth resolution;

b) Use these films to illustrate the smoothness of the sputtering arc crater, the slope of the arc crater bottom, sample drift, and various sputtering conditions (such as ion the influence of factors such as beam density drift on depth resolution;

c) Use these films to illustrate the effects of sputtering-induced surface roughness and atomic mixing on depth resolution;

d) Use these membranes to evaluate instrument performance for instrument suppliers and

users;

e) This document is timely and may form the basis for further development of sputter depth profiling.

A list of ISO Guides related to this document is given in references [1] to [5].

Surface chemical analysis Sputtering depth profiling Optimization method using layered membranes as reference materials

## 1 Scope

This document provides guidance and requirements for optimizing sputter depth analysis parameters using appropriate single and multilayer reference materials in order to optimize the Russian Instrument settings in intermittent electron spectroscopy, X-ray photoelectron spectroscopy, and secondary ion mass spectrometry to achieve optimal depth resolution.

This document does not cover the use of special multilayer film systems (such as delta-doped layers).

## 2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

ISO 18115-1 Surface chemical analysis - Vocabulary - Part 1: General terms and spectroscopic terms Note. GB/T 22461.1-2023 Surface chemical analysis vocabulary Part 1: General terms and spectroscopic terms (ISO 18115-1:2013, IDT)

## 3 Terms and Definitions

For the purposes of this document, the terms and definitions given in ISO 18115-1 apply.

Image depth profile

A three-dimensional representation of the spatial distribution of a particular element or molecular species (represented by emitted secondary ions or electrons) as a function of depth or as a function of flux.

function of the material removed by sputtering.

plateau region

The region where the signal remains constant or does not change significantly with

sputtering time.

Sputter depth profile Depth profile obtained by measuring a surface while removing material by sputtering.

## **4 Symbols and abbreviations**

$\Delta z$ . depth resolution  $I$ . signal intensity  $z$ . sputtering rate