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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Surface chemical analysis - Depth profiling - Method for sputter rate determination in X-ray photoelectron spectroscopy, Auger electron spectroscopy and secondary-ion mass spectrometry sputter depth profiling using single and multi-layer thin films

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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 of Standardization Documents"

drafted:

This document is identical to ISO 17109:2015 "Determination of X-ray Photoelectricity of Monolayer and Multilayer Thin Films for Depth Profiling of Surface Chemical Analysis

Methods for Depth Profiling of Sputtering Rates in Electron Spectroscopy, Auger Electron Spectroscopy and Secondary Ion Mass Spectrometry:

Please note that some content of this document may be patented: The issuing agency of this document assumes no responsibility for identifying patents:

Introduction

The sputtering rate for surface chemical analysis is usually the ratio of the sputtering depth measured by the profilometer to the sputtering time, however this method can only

The average sputtering rate of the multi-layer film was measured, but the sputtering rate of the multi-layer film composed of materials with different sputtering rates could not be measured: and sputtering rate

The rate is also affected by various material preparation parameters, making it difficult to tabulate and use for sputter depth calibration: To improve accuracy

Degree, it is important to measure the sputtering rate under the specific experimental conditions of each laboratory: The sputtering rate should be higher than the sputtering ion range

It is determined by surrounding a thicker monolayer so that surface transient effects can be ignored: Or use a multilayer film, which can exclude surface transients

impact and minimize interface transients: This document utilizes Auger Electron Spectroscopy (AES), X-ray Photoelectron Spectroscopy (XPS) and secondary ions

Mass spectrometry (SIMS) was used for depth profiling of monolayer and multilayer films, and sputtering depth was calibrated by measuring sputtering rate: Measured sputtering rate

rate can be used to predict sputtering rates for a variety of other materials to allow depth estimation in conventional samples from tabular values of sputter yield and bulk density

scale or sputtering time:

Monolayer and Depth Profiling for Surface Chemical Analysis

Determination of X-ray Photoelectron Spectroscopy, Auger

Depth Profiling in Electron Spectroscopy and Secondary Ion Mass Spectrometry

method of sputtering rate

1 Scope

This document specifies a method for calibrating the sputtering depth of a material by measuring the sputtering rate, that is, under certain sputtering conditions

There are sputtering rates of reference materials for monolayer or multilayer films, used as depth calibration for films of the same material: When using Auger Electron Spectroscopy (AES),

When X-ray photoelectron spectroscopy (XPS) and secondary ion mass spectrometry (SIMS) are used for in-depth analysis, this method is suitable for thicknesses between 20nm and:200nm:

The layers in between have an accuracy of 5% to 10%: The sputtering rate is determined by the film thickness between the reference material-related interfaces and the sputtering time:

Certainly: Using the known sputtering rate combined with the sputtering time, the film thickness of the tested sample can be obtained: Measured ion sputtering rates are available

It is useful for predicting the ion sputtering rate of various other materials, so that the depth of these materials can be estimated from the table values of sputtering yield and atomic density:

Degree scale and sputtering time:

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, dated citations

documents, only the version corresponding to that date applies to this document; for

undated references, the latest edition (including all amendments) applies to

this document:

ISO 14606 Surface chemical analysis-Optimized method of layered films for sputtering depth profiling as reference materials (Surfacechemical

analysis-Sputterdepthprofiling-Optimizationusinglayeredsystemsasreferencematerials)

Note: GB/T 20175-2006 Surface chemical analysis-Optimized method for layered films used for sputtering depth profiling as reference materials (ISO 14606:2000,

IDT)

3 Terms and Definitions

The following terms and definitions apply to this document:

3:1

On the platform upperplateau

The intensity exceeds 95% of the maximum intensity of the layer's characteristic signal and covers more than half the layer's thickness:

3:2

Lower platform lowerplateau

The intensity is lower than the sum of the minimum intensity and 5% of the maximum intensity of the characteristic signal of the layer and covers an area more than half of the thickness of the layer:

4 Requirements for monolayer and multilayer film reference substances

4:1 The thickness of each layer and the thickness of the single-layer film in the multi-layer film should be much larger than the total range of ion sputtering and the depth information value measured by this method:

Therefore, an upper platform and a lower platform can appear on each layer when performing in-depth analysis: Projection range can be used from http://www:srim:org[7]

The obtained SRIM code is simply calculated: