

ICS 71.040.40
CCS G 04



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

GB/T 22572-2008

**Surface chemical analysis -- Secondary-ion mass spectrometry
-- Method for estimating depth resolution parameters with
multiple delta-layer reference materials
(English Translation)**

Issued on: December 11, 2008

Implemented on: October 1, 2009

Issued by: Standardization Administration of China

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Foreword

This standard is identical with ISO 20341:2003 "Surface chemical analysis - Secondary ion mass spectrometry --- multi-layer reference substance assessment deep delta the method of resolution parameters. " for ease of use, the standard ISO 20341:2003 made the following editorial changes.

--- Remove the original preface of international standards;

--- Present international standard to this standard.

Appendix A of this standard is a normative appendix.

This standard by the National Standardization Technical Committee microbeam analysis and focal points.

Introduction

Depth resolution is secondary ion mass spectrometry (SIMS) depth profiling is an important parameter. However, in the SIMS analysis, the impact of the sputtering depth the results of the analysis of many factors, including the ion beam induced mixing and segregation, a charge-driven diffusion, matrix effects, shapes and surface micro-craters Morphology. Only by understanding and minimize the impact of the above factors, to get the best depth resolution.

Get the best depth-resolved analysis usually requires specific conditions, including ultra-low primary ion beam energy, grazing incidence, rotating sample, low Cooling the sample temperature and so on, all of these conditions in the conventional SIMS analysis are difficult to meet. In addition, for each sample, the optimum points Analysis of parameters may be quite different. Further, various instruments of factors, such as the shape of the crater, the identity of the ion beam, crater edge effect elimination, mass the amount of interference, memory effect, residual gas effect, etc., will affect all aspects of the depth

resolution.

Thus, under conventional SIMS analysis conditions, it is difficult to directly assess the depth resolution. This standard describes the decay length of the frontier, the trailing edge of decline Concept of variable length and Gaussian broadening proposed measuring step for each parameter. Multi-delta layer reference materials can be used to assess conventional SIMS Depth resolution parameters under analytical conditions.

GB/T 22572-2008/ISO 20341:2003 Surface chemical analysis - Secondary ion mass spectrometry Reference material layer multi delta Assess the depth resolution parameters method

1 Scope

This standard specifies the SIMS depth profiling, the multi-layer reference substance evaluation delta frontier decay length, the length of the trailing edge of decay and high Adams broadening three steps depth resolution parameters.

Since the physical and chemical state of a sample surface affected by the incident ions and unstable, this standard does not apply to delta layer near surface region.

2 Normative references

The following documents contain provisions which, through reference in this standard and become the standard terms. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard, however, encourage the parties to the agreement are based on research Whether the latest versions of these documents. For undated reference documents, the latest versions apply to this standard.

GB/T 22461 Surface chemical analysis - Vocabulary (GB/T 22461-2008, ISO 18115:2001, IDT)

3 Symbol

AL, AT scale factor.

B, C scale factor.

$I(z)$ with the secondary ion intensity of depth.

Z depth.

Depth z_0 apparent peak.

λ_L frontier decay length.

After λ_T along the length of decay.

sigma Gaussian broadening.

It requires more than 4 delta-layer reference materials According to the definition of 4.1 GB/T 22461 in delta layers, preferably a layer of a single atomic layer delta. However, it is not always possible to produce a layer or verification delta Single atomic layer thickness. If there is no ideal delta layer can, in line with the non-ideal delta layer as specified below may also reference substance.

4.2 SIMS depth profiling of matrix sputtered surface layer should not be changed, so the matrix effect or there will be no significant change in the rate of erosion. wear when over-delta layer table constant matrix elements of the secondary ion intensity BenQ body does not change.

4.3 and delta surface layer should be flat and parallel to each other, in order to avoid any distortion SIMS depth profiling.

4.4 delta-doped layer thickness should be much smaller than a projection range of ions, such small changes in thickness will not affect the shape of the curve analysis.

4.5 spacing delta adjacent layers should be large enough for the valley between the layers of secondary ionic strength value less than 1% of the peak.

4.6 delta layer thickness, interface roughness position and should be used HRTEM, grazing incidence X-ray reflectivity, the ion energy dispersion Radio spectrum or other suitable method to determine.

5 Steps

5.1

In order to adjust and optimize the settings, secondary ion mass spectrometry analysis conditions (such as ion energy, ion species, ion current, secondary ion electrode Sex, a beam scanning area, the analysis region, a beam stability, sample introduction, to detect secondary ions) should follow the manufacturer's instructions GB/T 22572-2008/ISO 20341:2003