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

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**Surface chemical analysis - Secondary-ion mass spectrometry -
Repeatability and constancy of the relative-intensity scale in
static secondary-ion mass spectrometry**

表面化学分析 二次离子质谱 静态二次离子质谱相对强度标的重复性和一致性
(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 is equivalent to ISO 23830:2008 "Surface chemical analysis secondary ion mass spectrometry static secondary ion mass spectrometry relative intensity standard Repeatability and consistency.

This document adds two chapters. "Normative References" and "Terms and Definitions".

Introduction

Static secondary ion mass spectrometry (SIMS) is widely used in surface analysis of mixed materials and is often used to identify surface substances and mixtures.

Quantitative analysis, such as surface functionalized polymer blends. By measuring the relative intensity of the peaks and comparing them with the corresponding peaks of the reference sample, in these measurements, repeatability is critical in order to determine whether any changes observed are meaningful.

The consistency of relative intensity between the measurement work and the database and the determination of the working status of the instrument are crucial.

The measurement is meaningful and depends on the repeatability and stability of the instrument.

The paper is aimed at two important aspects of the static SIMS instrument itself that affect the uncertainty of intensity measurement. the repeatability of the relative intensity measurement of positive ions and the relative intensity of positive ions drifts with time. For negative ions, it is not possible to control the surface potential of the insulator to obtain sufficiently good repeatability.

Therefore, this document does not include negative ions, but the concepts described may also be applicable to negative ions if the surface potential can be controlled.

Repeatability is important for analyzing trends and differences between similar samples. Poor repeatability will give the impression that samples are significantly different.

Wrong conclusion. Factors that affect instrument measurement repeatability include ion source stability, charge stability, detector settings, instrument position on the sample, and so on.

The sensitivity of the settings, data acquisition parameters and data processing procedures.

This document provides a simple method to confirm the repeatability and consistency of the relative intensity standard of the instrument, to evaluate the working condition of the instrument, and to take Therefore, it is advisable to use this method regularly, preferably after the instrument manufacturer has completed the test.

The sample used in this method is polytetrafluoroethylene (PTFE for short).

For use in static SIMS instruments with charge stabilization.

This method does not cover all possible problems of the instrument, because covering all problems would take a long time to test and require professional knowledge.

This method is intended only to address common basic issues of repeatability and drift of static SIMS relative intensity standards.

Surface chemical analysis secondary ion mass spectrometry Static secondary ion mass spectrometry relative intensity standard Repeatability and consistency

1 Scope

This document describes a method for confirming the repeatability and consistency of static secondary ion mass spectrometry positive ion relative intensity measurements for routine analysis.

This document is applicable to instruments equipped with a charge neutralizing electron gun and is not used to calibrate the intensity response function as it varies with mass. This calibration can be done by the instrument.

This document provides data to confirm the relative strength consistency of the instrument when used, and provides information that may affect the consistency.

A guide to setting some instrument parameters.

2 Normative references

This document has no normative references.

3 Terms and definitions

There are no terms or definitions that require definition in this document.

4 Symbols and abbreviations

The following symbols and abbreviations apply to this document.

A1. Average area of the combined peak of C3F3 and C2F5 A2. Average area of the combined peaks of C7F13 and C8F15 A3. Average area of the combined peaks of C14F27 and C15F29 d. beam spot diameter (μm) e. electron charge (C) F. Pulse repetition rate or frequency (s^{-1}) (only for time-of-flight systems) i. the label of the i-th peak among the 13 mass peaks lij. Peak intensity matrix element of the i-th mass peak and the j-th spectrum li. Average intensity of the peaks in 7 spectra j. The mark of the jth score among 7 scores J. Total ion flux (ions/m^2 , i.e. the number of ions passing through per square meter) n. number of complete scan frames Nij. Normalized peak intensity matrix element of the i-th mass peak in the j-th spectrum p. Number of ion pulses expressed per pixel (only applicable to time-of-flight systems) Pij. Relative intensity matrix element of the i-th mass peak in the j-th spectrum Pj. average relative intensity of the 9 peaks in the jth spectrum q. Time-averaged pulsed ion beam current (A) (only for time-of-flight systems)