

Nederlandse norm

# NEN-ISO 20411

(en)

Surface chemical analysis - Secondary ion mass spectrometry - Correction method for saturated intensity in single ion counting dynamic secondary ion mass spectrometry (ISO 20411:2018, IDT)

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Als Nederlandse norm is aanvaard:

- ISO 20411:2018, IDT

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Preview

**Surface chemical analysis —  
Secondary ion mass spectrometry  
— Correction method for saturated  
intensity in single ion counting  
dynamic secondary ion mass  
spectrometry**

*Analyse chimique des surfaces — Spectrométrie de masse des ions  
secondaires — Méthode de correction de l'intensité de saturation en  
SIMS dynamique à comptage d'ions individuel*



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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Symbols and abbreviated terms</b> .....	<b>2</b>
<b>5 Outline of method</b> .....	<b>3</b>
<b>6 Procedure for evaluating intensity linearity</b> .....	<b>5</b>
6.1 Obtaining reference sample.....	5
6.2 Setting the sample.....	5
6.3 Operating the instrument.....	5
6.3.1 Setting the ion beam and the mass analyser.....	5
6.3.2 Setting the charge compensation.....	5
6.3.3 Setting the ion detector.....	5
6.4 Acquiring the data.....	5
6.5 Assessing the linearity without and with intensity correction.....	6
6.5.1 Interpolating the minor isotope intensity.....	6
6.5.2 Correcting the ratio of the isotope abundance to the instrument transmittance.....	7
6.5.3 Assessing the linearity of intensity.....	8
6.5.4 Correcting the saturated intensity.....	8
6.5.5 Assessing the uncertainty of the data.....	11
<b>7 Reporting the results</b> .....	<b>12</b>
<b>8 Correcting saturated intensity to the measurement results of the analysis samples</b> .....	<b>12</b>
<b>Annex A (informative) Effect of the dead time correction with various instruments for VAMAS study</b> .....	<b>13</b>
<b>Bibliography</b> .....	<b>15</b>

PREVIEW

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 6, *Secondary ion mass spectrometry*.

## Introduction

For the quantitative analysis of materials using secondary ion mass spectrometry (SIMS), the abundance of a species should be a linear function of its measured signal intensity. However, this relationship can become nonlinear as the count rates rise because of saturation of the detector, which uses a pulse counting system. This causes underestimation of an abundance of high-count-rate species. The nonlinearity of the counting system can be corrected using the relevant method, so that the corrected count rate gives a wider linear range.

This document explains how to assess the linearity in the high-count-rate region. The document also provides a correction method for the saturated intensity in a certain situation. It uses a test based on depth profile analysis of two isotopes in a reference material which has a gradual concentration change between low and high concentration regimes. The correction method is based on the approximate intermediate extended dead time model.

This document should be used when characterizing a new spectrometer so that it may be operated in an appropriate intensity range or when applying a new analysis condition. It should then be repeated after any substantive modification to the detection circuits, such as the multiplier voltage or the threshold, after replacement of their multiplier, or at approximately 6-monthly intervals.

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# Surface chemical analysis — Secondary ion mass spectrometry — Correction method for saturated intensity in single ion counting dynamic secondary ion mass spectrometry

## 1 Scope

This document specifies a method for determining the maximum count rate for an acceptable limit of divergence from linearity of the intensity scale in pulse counting magnetic sector-type secondary ion mass spectrometers or quadrupole secondary ion mass spectrometers. It uses a test based on depth profile analysis of two isotopes in a reference material which has a gradual concentration change between low and high concentration regimes. It also includes a correction method for saturated intensity caused by the dead time of the detector. The correction can increase the intensity range for 95 % linearity so that a higher maximum count rate can be employed for those spectrometers for which the relevant correction equations have been shown to be valid.

This document does not apply to time of flight mass spectrometers.

This document is only applicable to elements with minor isotopes. It is not applicable if the element is monoisotopic or contains isotopes with equal abundances.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18115-1, *Surface chemical analysis — Vocabulary — Part 1: General terms and terms used in spectroscopy*

ISO 18115-2, *Surface chemical analysis — Vocabulary — Part 2: Terms used in scanning-probe microscopy*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18115-1 and ISO 18115-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### major isotope

isotope whose abundance is more than others of the same element

### 3.2

#### minor isotope

isotope whose abundance is less than a *major isotope* (3.1)

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