International Standard

ISO 11505

Surface chemical analysis — General procedures for quantitative compositional depth profiling by glow discharge optical emission spectrometry

Analyse chimique des surfaces — Modes opératoires généraux pour le profilage en profondeur compositionnel quantitatif par spectrométrie d'émission optique à décharge luminescente

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Contents

Page

Foreword ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Principle **1**

5 Apparatus **2**
5.1 Glow discharge optical emission spectrometer 2
5.1.1 General 2
5.1.2 Selection of spectral lines 2
5.1.3 Selection of glow discharge source type 2

6 Adjusting the glow discharge spectrometer system settings **3**
6.1 General 3
6.2 Setting the discharge parameters of a DC source 4
6.2.1 Constant applied current and voltage 4
6.2.2 Constant applied current and pressure 5
6.2.3 Constant applied voltage and pressure 5
6.3 Setting the discharge parameters of an RF source 6
6.3.1 Constant applied power and pressure 6
6.3.2 Constant applied power and DC bias voltage 6
6.3.3 Constant effective power and RF voltage 7
6.4 Minimum performance requirements 7
6.4.1 General 7
6.4.2 Control of lamp cleanliness and start-up performance 7
6.4.3 Minimum repeatabilitry 9
6.4.4 Detection limit 9

7 Sampling **11**

8 Calibration **11**
8.1 General 11
8.2 Calibration specimens 11
8.2.1 General 11
8.2.2 Low-alloy iron or steel specimens 12
8.2.3 Stainless-steel specimens 12
8.2.4 High-oxygen specimens 12
8.2.5 High-carbon specimens 12
8.2.6 High-nitrogen specimens 12
8.2.7 High-purity copper specimens 12
8.2.8 High-purity zinc specimens 13
8.3 Validation specimens 13
8.4 Determination of the sputtering rate of calibration and validation specimens 13
8.5 Emission intensity measurements of calibration specimens 14
8.6 Calculation of calibration formulae 14
8.7 Validation of the calibration 14
8.7.1 General 14
8.7.2 Checking analytical accuracy using bulk reference materials 15
8.7.3 Checking analytical accuracy using surface layer reference materials 15
8.8 Verification and drift correction 15

9 Analysis of test specimens **16**
9.1 Adjusting discharge parameters 16
9.2 Setting of measuring time and data acquisition rate 16
9.3 Quantifying depth profiles of test specimens 16

10 Expression of results **16**

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10.1 Expression of quantitative depth profile 16
10.2 Determination of total coating mass per unit area 17
10.3 Determination of average mass fractions 18
11 Precision **18**
12 Test report **18**
Annex A (normative) **Calculation of calibration constants and quantitative evaluation of depth profiles** **19**
Annex B (informative) **Suggested spectral lines for determination of given elements** **32**
Bibliography **34**

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Foreword

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 8, *Glow discharge spectroscopy*.

This second edition cancels and replaces the first edition (ISO11505:2012), which has been technically revised.

The main changes are as follows:

— the listed types of array detectors have been updated;

— advances in measurement techniques and apparatus have expanded the applicable sample sizes, and modifications have been made to optimize the optics, vacuum and detection systems;

— the text “setting of the high voltage for the detectors” is replaced with “setting of the parameters for detector sensitivity” throughout the documents;

— the instructions to optimize the crater shape has been changed from mandatory to optional.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Surface chemical analysis — General procedures for quantitative compositional depth profiling by glow discharge optical emission spectrometry

1 Scope

This document specifies a glow discharge optical emission spectrometric (GD-OES) method for the determination of the thickness, mass per unit area and chemical composition of surface layer films.

The applicability of this document is limited to description of general procedures for quantification of the chemical composition and thickness in GD-OES compositional depth profiling. This document is not directly applicable for quantification of individual materials having various thicknesses and elements to be determined.

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 14707, *Surface chemical analysis — Glow discharge optical emission spectrometry (GD-OES) — Introduction to use*

3 Terms and definitions

No terms and definitions are listed in this document.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle

The analytical method described in this document involves the following processes:

a) cathodic sputtering of the surface layer in a direct current or radio frequency glow discharge device;

b) excitation of the analyte atoms and ions in the plasma formed in the glow discharge device;

c) spectrometric measurement of the intensities of characteristic spectral emission lines of the analyte atoms and ions as a function of sputtering time (qualitative depth profile);

d) conversion of the qualitative depth profile in units of intensity versus time to mass fraction versus depth by means of calibration functions (quantification). Calibration of the system is achieved by measurements on calibration specimens of known chemical composition and measured sputtering rate.

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