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

*Analyse chimique des surfaces — Spectrométrie d'émission optique à décharge luminescente — Introduction à son emploi*

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# 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 14707:2015), of which it constitutes a minor revision.

The main changes compared to the previous edition are as follows:

— Editorial mistakes have been corrected.

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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# Introduction

Glow discharge optical emission spectrometry (GD-OES) is used to determine the elemental composition of solid samples. GD-OES can be used for either bulk or depth profile analysis. In bulk analysis, changes in elemental composition with depth into the specimen are assumed to be negligible. In contrast, the main goal of depth profile analysis is usually to gain information concerning such changes of composition. Layer thicknesses amenable to GD-OES depth profiling range from a few nanometres to approximately one hundred micrometres. An average of the concentration within the crater will be obtained and therefore the lateral resolution of GD-OES corresponds to the inner diameter of the anode.

As is true for any instrumental analysis method, the quality of a GD-OES analysis depends markedly on the correct optimization and operation of the instrumentation. This document provides guidelines of practice that are to be followed to ensure that GD-OES analyses are of the highest possible quality.

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

## 1 Scope

This document provides guidelines that are applicable to bulk and depth profiling GD-OES analyses. The guidelines discussed herein are limited to the analysis of rigid solids, and do not cover the analysis of powders, gases or solutions. Combined with specific standard methods which are available now and, in the future, these guidelines are intended to enable the regulation of instruments and the control of measuring conditions.

Although several types of glow discharge optical emission sources have been developed over the years, the Grimm type with a hollow anode accounts for a very large majority of glow discharge optical emission devices currently in use both for dc and rf sources. However, the cathode contact is often located at the back of the sample, in e.g. the Marcus type source, rather than at the front as in the original Grimm design. The guidelines contained herein are equally applicable to both and other source designs and the Grimm type source is used only as an example.

## 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 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

ISO 5725-3, *Accuracy (trueness and precision) of measurement methods and results — Part 3: Intermediate measures of the precision of a standard measurement method(trueness and precision) of measurement methods and results — Part 3: Intermediate measures of the precision of a standard measurement method*

ISO 5725-4, *Accuracy (trueness and precision) of measurement methods and results — Part 4: Basic methods for the determination of the trueness of a standard measurement method*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3497, ISO 5725-1, ISO 5725-2, ISO 5725-3 and ISO 5725-4 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/

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