TECHNICAL REPORT

ISO/TR 15969

Second edition
2021-03

Surface chemical analysis — Depth profiling — Measurement of sputtered depth

Analyse chimique des surfaces — Profilage d'épaisseur — Mesurage de l'épaisseur bombardée

Reference number
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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 4, *Depth profiling*.

This second edition cancels and replaces the first edition (ISO/TR 15969:2001), which has been technically revised.

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

— in the Scope, the applicable range of depth has been specified more clearly;

— Clause 3 has been revised according to the latest edition of the ISO 18115 series;

— in 4.2.2, the information on reference materials has been updated;

— Table A.1 bas been updated.

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.

Introduction

This document is intended to be used as follows:

a) for the determination of the depth scale in sputter depth profiling where signal intensity is obtained as a function of sputtering time (or ion dose density). The sputtered depth per sputtering time is the sputtering rate (typically reported in nm/s);

b) to enhance the comparability of depth profiling data obtained with different instruments and to increase the reliability and use of depth profiling in industrial applications;

c) to serve as the basis for the development of International Standards on the measurement of sputtered depth.

Surface chemical analysis — Depth profiling — Measurement of sputtered depth

1 Scope

This document provides guidelines for measuring the sputtered depth in sputtered depth profiling.

The methods of sputtered depth measurement described in this document are applicable to techniques of surface chemical analysis when used in combination with ion bombardment for the removal of a part of a solid sample to a typical sputtered depth of up to several micrometres. The depth typically determined by this approach is between 1 nm to 500 µm.

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*

ISO 22493, *Microbeam analysis — Scanning electron microscopy — Vocabulary*

ISO 15932, *Microbeam analysis — Analytical electron microscopy — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18115-1, ISO 18115-2, ISO 22493 and ISO 15932 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
sputtered depth
distance z (in m) (perpendicular to the surface) between the original surface and the analysed sample surface after removal of a measurable amount of matter as a result of sputter profiling, which is given by Formula (1):

$$z = \frac{m}{A \cdot \rho} \tag{1}$$

where

m is the removed sample mass (kg);

A is the sputtered area (m^2);

ρ is the density of the sample (kg/m^3)