

BS ISO 14606:2015



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Surface chemical analysis — Sputter depth profiling — Optimization using layered systems as reference materials

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National foreword

This British Standard is the UK implementation of ISO 14606:2015. It supersedes BS ISO 14606:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CII/60, Surface chemical analysis.

A list of organizations represented on this committee can be obtained on request to its secretary.

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© The British Standards Institution 2015.
Published by BSI Standards Limited 2015

ISBN 978 0 580 81552 2

ICS 71.040.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2015.

Amendments/corrigenda issued since publication

Date	Text affected
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Surface chemical analysis — Sputter depth profiling — Optimization using layered systems as reference materials

*Analyse chimique des surfaces — Profilage d'épaisseur par
bombardement — Optimisation à l'aide de systèmes mono- ou
multicouches comme matériaux de référence*





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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 4, *Depth profiling*.

This second edition cancels and replaces the first edition (ISO 14606:2000), of which it constitutes a minor revision to update the content of [Table C.1](#)

Introduction

Reference materials are useful in optimizing the depth resolution of sputter profiling methods in materials such as silicon wafers, multilayered devices (for example AlGaAs double-hetero lasers, high electron mobility transistors) and alloy-galvanized steel for corrosion-resistant car bodies.

The specific applications of this International Standard are as follows:

- a) Single-layered and multilayered systems on a substrate as reference materials are useful for the optimization of depth resolution as a function of instrument settings in Auger electron spectroscopy, X-ray photoelectron spectroscopy and secondary ion mass spectrometry.
- b) These systems are useful for illustrating the effects of the evenness of the sputter crater, the inclination of the crater bottom, the sample drift, the drift of sputter conditions (for example ion beam current density) on depth resolution.
- c) These systems are useful for illustrating the effects of sputter-induced surface roughening and sputter-induced atomic mixing on depth resolution.
- d) These systems are useful for the evaluation of instrument performance for instrument suppliers and users.
- e) This International Standard is timely and topical, and can be used for a basis of future development of sputter depth profiling.

A list of ISO Guides related to this International Standard is given in the Bibliography.[\[1\]](#)[\[2\]](#)[\[3\]](#)[\[4\]](#)[\[5\]](#)

Surface chemical analysis — Sputter depth profiling — Optimization using layered systems as reference materials

1 Scope

This International Standard gives guidance on the optimization of sputter-depth profiling parameters using appropriate single-layered and multilayered reference materials in order to achieve optimum depth resolution as a function of instrument settings in Auger electron spectroscopy, X-ray photoelectron spectroscopy and secondary ion mass spectrometry.

This International Standard is not intended to cover the use of special multilayered systems such as delta doped layers.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE The terms used in this International Standard follow basically ASTM E 673–97[6]. The definitions of the terms used are to be modified to conform to those being developed by ISO/TC 201/SC 1, *Terminology*.

2.1

analysis area

two-dimensional region of a sample surface measured in the plane of that surface from which the full signal or a specified percentage of that signal is detected

2.2

angle of incidence

angle between the incident beam and the local or average surface normal

2.3

crater edge effect

signals from the crater edge which often originate from depths shallower than the central region of the crater formed in depth profiling

2.4

depth resolution

depth range over which a signal intensity increases or decreases by a specified amount when profiling an ideally sharp interface between two media

Note 1 to entry: By convention, a measure of the depth resolution is often taken to be the distance over which the signal intensity changes from 16 % to 84 % of the full change between the respective plateau values of the two media.[2]

2.5

gated area

defined area within a larger area from which the signal may be obtained

2.6

image depth profile

three-dimensional representation of the spatial distribution of a particular elemental or molecular species (as indicated by emitted secondary ions or electrons) as a function of depth or material removed by sputtering