

Surface chemical analysis — Depth profiling — Measurement of sputtering rate: mesh-replica method using a mechanical stylus profilometer

ICS 71.040.40

National foreword

This Published Document is the UK implementation of ISO/TR 22335:2007.
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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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 August 2007

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ISBN 978 0 580 54014 1

Amendments issued since publication

Amd. No.	Date	Comments

TECHNICAL REPORT

ISO/TR 22335

First edition
2007-07-01

Surface chemical analysis — Depth profiling — Measurement of sputtering rate: mesh-replica method using a mechanical stylus profilometer

*Analyse chimique des surfaces — Profilage en profondeur — Mesurage
de la vitesse de pulvérisation: méthode par empreinte de grille au
moyen d'un profilomètre à stylet mécanique*



Reference number
ISO/TR 22335:2007(E)

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Foreword

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ISO/TR 22335 was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 4, *Depth profiling*.

Introduction

This Technical Report has been prepared for the experimental determination of ion-sputtering rates for depth profiling using Auger electron spectroscopy (AES) and X-ray photoelectron spectroscopy (XPS), where ion sputtering is carried out over a region with an area between 0,4 mm² and 3,0 mm². For this Technical Report, a replica pattern is first formed on a specimen surface by ion sputtering through a grid mesh, of appropriate size, which is placed in contact with the specimen. The ion-sputtering rate is determined from the quotient of sputtered depth measured by a stylus profilometer and sputtering time by assuming a constant sputtering rate. This Technical Report provides a method to convert the ion-sputtering time scale in a depth profile to depth.

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1 Scope

This Technical Report describes a method for determining ion-sputtering rates for depth profiling measurements with Auger electron spectroscopy (AES) and X-ray photoelectron spectroscopy (XPS) where the specimen is ion-sputtered over a region with an area between 0,4 mm² and 3,0 mm². This Technical Report is applicable only to a laterally homogeneous bulk or single-layered material where the ion-sputtering rate is determined from the sputtered depth, as measured by a mechanical stylus profilometer, and sputtering time.

This Technical Report provides a method to convert the ion-sputtering time scale to sputtered depth in a depth profile by assuming a constant sputtering velocity. This method has not been designed for, or tested using, a scanning probe microscope system. It is not applicable to the case where the sputtered area is less than 0,4 mm² or where the sputter-induced surface roughness is significant compared with the sputtered depth to be measured.

2 Terms and definitions

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

2.1

sputtering time

time for which the specimen surface is ion-bombarded

2.2

sputtered depth

distance (perpendicular to the surface) between the original surface and the analysed specimen surface after removal of a measurable amount of material as a result of sputter depth profiling

[ISO 18115:2001 ^[1]]

2.3

sputtering rate

quotient of sputtered depth and sputtering time

2.4

grid mesh

electroformed mesh, typically of 3 mm overall diameter, consisting of an array of mesh openings or apertures

NOTE A mesh of 75 lines per inch is recommended. ^[2]