AS ISO 14606—2006
ISO 14606:2000

AS ISO 14606—2006

Australian Standard®

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

This Australian Standard® was prepared by Committee CH-016, Spectroscopy. It was approved on behalf of the Council of Standards Australia on 20 September 2006.
This Standard was published on 20 October 2006.

The following are represented on Committee CH-016:

- Australian Chamber of Commerce
- Australian Institute of Physics
- CSIRO Energy Technology
- Department of Defence (Australia)
- Department of Natural Resources and Mines Qld
- National Association of Testing Authorities Australia
- Queensland Health Scientific Services

Additional Interests:

- Curtin University of Technology
- La Trobe University
- University of Newcastle
- The University of New South Wales
- The University of Queensland
- University of South Australia

This Standard was issued in draft form for comment as DR 06404.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting **www.standards.org.au**

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at **mail@standards.org.au**, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard®

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

First published as AS ISO 14606—2006.

Published by Standards Australia, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 7795 3

PREFACE

This Standard was prepared by the Standards Australia Committee CH-016, Spectroscopy. This Standard is identical with, and has been reproduced from ISO 14606:2000, *Surface chemical analysis—Sputter depth profiling—Optimization using layered systems as reference materials*.

The objective of this Standard is to provide guidance on the optimization of sputter depth profiling parameter using appropriate single-layered and multi-layered reference materials in order to achieve optimum depth resolution as a function of instrument settings.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text 'this International Standard' should read 'this Australian Standard'.

(c) A full point should be substituted for a comma when referring to a decimal marker.

CONTENTS

Page

Annexes

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].

AUSTRALIA STANDARD

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 International Standard, the following terms and definitions apply.

NOTE The terms used in this International Standard follow basically ASTM E673-97[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 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 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[7].

2.5
analysed 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