AS ISO 14237—2006
ISO 14237:2000

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Australian Standard®

Surface chemical analysis—Secondary-ion mass spectrometry—Determination of boron atomic concentration in silicon using uniformly doped materials

STANDARDS
Australia

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- Curtin University of Technology
- La Trobe University
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- The University of New South Wales
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PREFACE

This Standard was prepared by the Standards Australia Committee CH-016, Spectroscopy. This Standard is identical with, and has been reproduced from ISO 14237:2000, *Surface chemical analysis—Secondary-ion mass spectrometry—Determination of boron atomic concentration in silicon using uniformly doped materials*.

The objective of this Standard is to ensure that the procedure for the quantitative determination of boron analysis in single-crystalline silicon using secondary reference materials, calibrated by a certified reference material implanted with boron, is achieved.

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 substitutes for a comma when referring to a decimal marker.

(d) The ISO document listed as normative reference in Clause 2 has not been adopted as an Australian Standard.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

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INTRODUCTION

This International Standard was prepared for the determination by secondary-ion mass spectrometry (SIMS) of boron atomic concentrations in uniformly doped silicon wafers.

SIMS needs reference materials to perform quantitative analyses. Certified reference materials are only available for limited matrix-impurity combinations, and they are costly. SIMS inevitably consumes these reference materials at every measurement. Thus, secondary reference materials which can be prepared by each laboratory and calibrated using a certified reference material are useful for daily analyses.

In this International Standard, a standard procedure is described for quantitative boron analysis in single-crystalline silicon using secondary reference materials calibrated by a certified reference material implanted with boron.

AUSTRALIAN STANDARD

Surface chemical analysis — Secondary-ion mass spectrometry — Determination of boron atomic concentration in silicon using uniformly doped materials

1 Scope

This International Standard specifies a secondary-ion mass spectrometric method for the determination of boron atomic concentration in single-crystalline silicon using uniformly doped materials calibrated by a certified reference material implanted with boron. This method is applicable to uniformly doped boron in the concentration range from 1×10^{16} atoms/cm^3 to 1×10^{20} atoms/cm^3.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, this publication do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 5725-2:1994, *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.*

3 Principle

An oxygen-ion beam or a caesium-ion beam is impinged onto the sample surface and the emitted secondary ions of boron and silicon are mass-analysed and detected.

Uniformly doped secondary reference materials are calibrated by using an ion-implanted primary reference material and are used as working reference materials.

4 Reference materials

4.1 Primary reference material

A primary reference material is used for the determination of the boron atomic concentration of the secondary reference materials. The primary reference material shall be a certified reference material (CRM) of silicon implanted with boron.

NOTE NIST Standard Reference Material 2137 (referred to hereinafter as NIST SRM) is the only CRM of boron in silicon at this moment.