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Australian Standard®

Surface chemical analysis—Secondary-ion mass spectrometry—Method for depth profiling of boron in silicon

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This Standard was published on 20 October 2006.

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This Standard was issued in draft form for comment as DR 06451.

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.

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First published as AS ISO 17560—2006.

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

ISBN 0 7337 7787 2

PREFACE

This Standard was prepared by the Standards Australia Committee CH-016, Spectroscopy. This Standard is identical with, and has been reproduced from ISO 17560:2002, *Surface chemical analysis—Secondary-ion mass spectrometry—Method for depth profiling of boron in silicon*.

The objective of this Standard is to provide a method for the quantitative depth profiling of boron in silicon by secondary-ion mass spectrometry (SIMS).

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.

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References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard ISO		*Australian Standard* AS ISO	
14237	Surface chemical analysis—Secondary-ion mass spectrometry—Determination of boron atomic concentration in silicon using uniformly doped materials	14237	Surface chemical analysis—Secondary-ion mass spectrometry—Determination of boron atomic concentration in silicon using uniformly doped materials

The term 'informative' has been used in this Standard to define the application of the annex to which it applies. An 'informative' annex is only for information and guidance.

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INTRODUCTION

This International Standard was prepared for the quantitative depth profiling of boron in silicon by secondary-ion mass spectrometry (SIMS).

For quantitative depth profiling, calibration is necessary both for the concentration and the depth scales of the profile measured. A procedure for the determination of boron in silicon has been established as an International Standard, ISO 14237. Thus, the calibration of boron atomic concentration is performed by following ISO 14237.

In this International Standard, standard procedures are described for depth profiling of boron in single-crystal, poly-crystal or amorphous silicon using SIMS and for depth scale calibration using stylus profilometry or optical interferometry.

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AUSTRALIAN STANDARD

Surface chemical analysis — Secondary-ion mass spectrometry — Method for depth profiling of boron in silicon

1 Scope

This International Standard specifies a secondary-ion mass spectrometric method using magnetic-sector or quadrupole mass spectrometers for depth profiling of boron in silicon, and using stylus profilometry or optical interferometry for depth scale calibration. This method is applicable to single-crystal, poly-crystal or amorphous-silicon specimens with boron atomic concentrations between 1×10^{16} atoms/cm^3 and 1×10^{20} atoms/cm^3, and to crater depths of 50 nm or deeper.

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 14237:2000, *Surface chemical analysis — Secondary-ion mass spectrometry — Determination of boron atomic concentration in silicon using uniformly doped materials*

3 Symbols and abbreviated terms

C_i total boron atomic concentration in measurement cycle i, expressed in atoms per cubic centimetre (atoms/cm^3)

C_i^{10} atomic concentration of the boron isotope with mass number 10 in measurement cycle i, expressed in atoms per cubic centimetre (atoms/cm^3)

C_i^{11} atomic concentration of the boron isotope with mass number 11 in measurement cycle i, expressed in atoms per cubic centimetre (atoms/cm^3)

d_i depth measured in measurement cycle i, expressed in micrometres (µm) or nanometres (nm)

d_t crater depth, expressed in micrometres (µm) or nanometres (nm)

I_i^{10} ion intensity of the boron isotope with mass number 10 in measurement cycle i

I_i^{11} ion intensity of the boron isotope with mass number 11 in measurement cycle i

I_i^{Si} ion intensity of silicon matrix in measurement cycle i

J_i^{10} boron to silicon ion intensity ratio for the boron isotope with mass number 10 in measurement cycle i

J_i^{11} boron to silicon ion intensity ratio for the boron isotope with mass number 11 in measurement cycle i

J_{BG}^{10} mean background boron to silicon ion intensity ratio for the boron isotope with mass number 10 in measurement cycle i

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