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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 32495-2016

**Surface chemical analysis -- Secondary-ion mass spectrometry
-- Method for depth profiling of arsenic in silicon**

表面化学分析 二次离子质谱 硅中砷的深度剖析方法

(English Translation)

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the translation method equivalent to ISO 12406.:2010 "Surface

chemistry analysis of secondary ion mass spectrometry in the depth of arsenic analysis of silicon method".

And the normative reference in this standard international documents are consistent with the relationship between China's documents are as follows.

GB/T 22461-2008 Surface chemistry analysis Glossary (ISO 18115.:2001, IDT) this standard is proposed by the National Micro-Standardization Technical Committee (SAC/TC38).

This standard is responsible for drafting units. China Electronics Technology Group Corporation forty-sixth Institute.

Introduction

This standard is the use of secondary ion mass spectrometry (secondary-ionmassspectrometry, SIMS) on the quantitative analysis of arsenic in silicon and developed.

For quantitative depth analysis, concentration and depth calibration are essential. The national standard GB/T 20176 specifies the boron concentration in silicon the method of determination. The International Standard ISO 17560 [1] specifies the boron depth analysis method for silicon. National standard GB/T 25186 provides A method for the determination of the relative sensitivity factor (RSF) of the ion implantation reference substance. National standards GB/T 22461 established in the surface chemistry Glossary of terms in the field of terminology and spectral terminology. The standard method for quantitative analysis of arsenic in silicon in this standard will refer to these national standards.

This standard is suitable for the use of secondary ion mass spectrometry for single crystal silicon, polysilicon, amorphous silicon arsenic elements in depth analysis, and with stylus Surface profiler or optical interferometer depth calibration method.

Surface chemistry analysis secondary ion mass spectrometry Depth analysis of arsenic in silicon

1 Scope

This standard specifies the method of depth analysis of arsenic in silicon with a sector magnetic field or a quadrupole secondary ion mass spectrometer, Stylus profiler or optical interferometer depth calibration method. This standard applies to arsenic atoms in the range of 1×10^{16} atoms/cm³ ~ 2.5×10^{21} atoms/cm³ monocrystalline silicon, polysilicon, amorphous silicon samples, pit depth of 50nm and above.

2 Normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 20176-2006 Surface chemistry analysis Secondary ion mass spectrometry Determination of boron atomic concentration in silicon by homogeneous dopants (ISO 14237.:2010, IDT) GB/T 25186-2010 Surface Chemical Analysis Secondary Ion Mass Spectrometry The relative sensitivity factor was determined by ion implantation reference material (ISO 18114.:2003, IDT) ISO 18115-1 Surface chemistry analysis Glossary Part 1. Terminology and spectrum terminology (Surfacechemicalanalysis-Vocabulary-Part 1. General terms and terms used in spectroscopy)

3 Terms and definitions

The terms and definitions defined in ISO 18115-1 apply to this document.

4 Symbols and abbreviations

Ci depth analysis of the i-th cycle, the arsenic atomic concentration, expressed in atomic volume per atom (atoms/cm³) d depth analysis to find the relative sensitivity factor with the depth, expressed in cm (cm) di The depth at which the i-th cycle is tested, expressed in cm (cm) dt pit depth, expressed in centimeters (cm) Ii tests the i-th cycle, the arsenic ion intensity, expressed in counts per second (counts/s) IiSi tests the i-th cycle, the matrix silicon ion strength, expressed in counts per second (counts/s) IBG arsenic average background strength value, expressed in counts per second (counts/s) the ratio of arsenic ions to silicon ion intensity at the i-th cycle of the test the ratio of average background strength to silicon ion strength of JBG arsenic n Total number of test cycles RSFimp The relative sensitivity of arsenic injected into the reference substance is expressed in terms of atomic volume per unit (atoms/cm³) T total sputtering time, expressed in seconds (s) tiAs In the first cycle of the test, the initiation time of arsenic ions is expressed in seconds (s)