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

GB/T 30701-2014

**Surface chemical analysis -- Chemical methods for the collection of elements
from the surface of silicon-wafer working reference materials and their
determination by total-reflection X-ray fluorescence (TXRF) spectroscopy**

表面化学分析 硅片工作标准样品表面元素的化学收集方法和全反射X射线荧光光谱法(TXRF)测定

(English Translation)

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Foreword

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

This standard uses the translation method identical with ISO 17331:2004 "Surface chemical analysis work standard silicon sample surface chemical elements Collection methods and a total reflection X-ray fluorescence spectrometry (TXRF) determination. " this standard incorporates ISO 17331:2010 amendments, the provisions of these amendments has been involved through its external 2004/Amd.1 Vertical wire (||) side margin positions were marked.

The standard micro-beam analysis by the National Standardization Technical Committee (SAC/TC38) and focal points.

This standard was drafted. China Institute of Metrology.

Introduction

In the semiconductor industry, commonly used total reflection X-ray fluorescence spectrometry (TXRF) measuring the wafer surface metal impurities.

ISO 14706 specifies the silicon surface of the metal impurity atoms measuring surface density between 1×10^{10} atoms/cm² ~ 1×10^{14} atoms/cm² Range TXRF method also provides atomic surface density of from 5×10^8 atoms/cm² ~ 5×10^{12} atoms/cm² range Gas Decomposition (VPD).

In VLSI (ULSI) manufacturing, the current very low levels required for wafer surface (less than 10^{10} atoms/cm²) gold Genus impurities measured.

Standard samples with low content of metal impurities in TXRF analysis is important (see ISO 14706), but the service life of standard samples are Limit, especially when considering the surface contamination. Thus, the need for sample preparation of working standards for standardization.

This standard applies to the calculation of the standard and test silicon wafer surface of the metal impurities. Between 9 laboratories in different countries completed Tests showed that this standard method has good reproducibility and repeatability.

Surface chemical analysis work standard silicon sample surface Chemical elements collection methods and a total reflection X-ray Fluorescence Spectrometry (TXRF) Determination

1 Scope

This standard specifies the silicon surface of the sample standard work of elemental iron and/or nickel chemical collection methods (vapor phase decomposition of acid droplets or direct Decomposition) and a total reflection X-ray fluorescence spectrometry (TXRF) assay.

NOTE: to use graphite furnace atomic absorption spectroscopy or inductively coupled plasma mass spectrometry instead of total reflection X-ray fluorescence spectroscopy to determine the collected element.

This standard applies to atomic surface density of from 6×10^9 atoms/cm² ~ 5×10^{11} atoms/cm² range of iron and/or nickel.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document.

(Trueness and precision) - Part 2 Accuracy GB/T 6379.2-2004 measurement methods and

results. the standard measurement to determine the party Method repeatability and reproducibility of the basic method of multiplexing (ISO 5725-2:1994, IDT) ISO 14644-1:1999 Cleanrooms and associated controlled environments - Part 1. Classification of air cleanliness (Cleanrooms and associated controlled environments-Part 1. Classification of air cleanliness) ISO 14706:2000 Surface chemical analysis element wafer surface contaminated total reflection X-ray fluorescence spectrometry (TXRF) Determination [Surface chemical analysis-Determination of surface elemental contamination on silicon wafers by total-reflection X-ray fluorescence (TXRF) spectroscopy]

3 Terms and Definitions

The following terms and definitions apply to this document.

Working standard samples working reference material Specified in ISO 14706 for calibration wafers.

Calibration sample calibration specimen for calibrating and dried residue containing known amounts of iron and/or nickel silicon.

Calibration solution Preparation of the sample solution for calibration.

Internal standard A known amount of vanadium or scandium, used to normalize the residue iron and the fluorescent X-ray intensity/or nickel.