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

GB/T 34002-2017

**Microbeam analysis -- Analytical transmission electron
microscopy -- Methods for calibrating image magnification by
using reference materials having periodic structures**

微束分析 透射电子显微术 用周期结构标准物质校准图像放大倍率的方法

(English Translation)

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References

Foreword

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

This standard uses the translation method identical with ISO 29301:2010 "Microbeam analysis Transmission electron microscopy with the periodic structure of the standard material Method of calibrating image magnification".

The documents of our country that are consistent with the corresponding international documents that are normative references in this standard are as follows.

--- GB/T 27025-2008 General Requirements for Testing and Calibration Laboratory Capabilities (ISO/IEC 17025:2005, IDT) this standard made the following amendments to the original error.

--- Figure 1 11 digital camera magnification M_s to M_f ;

--- 6.6.2b) "SRM/RM" to "CRM/RM";

--- 6.9.3 Line 5 Modify 1nm to 1 μ m and Nu (nm) and Lu (nm) to Nu (μ m) and Lu (μ m) respectively;

--- Supplement ISO 5725-1:1994 referenced in Chapter 7 to normative references;

--- Table D.1 silver (Si) modified to silicon (Si), Si is a silicon (Silicon) chemical symbols, the lattice constant of 0.543nm, silver the symbol of learning is Ag, the lattice constant is 0.409 nm.

This standard by the National Microbeam Analysis Standardization Technical Committee (SAC/TC38) and focal point.

This standard was drafted. Beijing University of Science and Technology.

Introduction

Transmission electron microscopy is widely used in a series of important material micro/nano structure research, such as semiconductors, metals, nanoparticles, Polymers, ceramics, glass, food and biomaterials. This standard applies to the magnification of the image calibration, standardize the application has a periodic structure of certified reference material or reference material to calibrate the transmission electron microscope image magnification requirements.

Microbeam Analysis Transmission Electron Microscopy with Periodic Results Method for Constructing Standard Calibration Image Magnification

1 Scope

This standard specifies the transmission electron microscopy (TEM) in the large magnification range of recorded images calibration method. Standard for calibration the quasi-matter has a periodic structure such as a diffraction grating complex type, a superlattice structure of a semiconductor or a spectroscopic crystal for X-ray analysis, and carbon and gold or crystalline lattice of silicon.

This standard applies to the recorded in the photographic film or imaging plate or digital camera built-in sensor acquisition TEM image magnification rate. This standard can also be used to calibrate the scale, but does not apply to the special critical dimension length transmission electron microscope (CD-TEM) and scanning transmission electron microscopy (STEM).

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 27025-2008 General Requirements for Testing and Calibration Laboratory Capabilities (ISO/IEC 17025:2005, IDT) ISO Guide 30.1992 ISO Guide 30.1992 Terms and Definitions Related to Reference Materials (Termsanddefinitions usedinconnectionwithreferencematerials) ISO Guide 34.2000 ISO Guide 34.2000 General requirements for reference material manufacturer skills (Generalrequirements forthecompetenceofreferencematerialproducer) ISO Guide 35.2006 ISO Guide 35.2006 General Principles and Statistical Principles for Reference Material Certification (Referencema-terials-Generalandstatisticalprinciplesforcertification) ISO/IEC Guide 98-3-2008 ISO/IEC Guide 98-3-2008 Measurement uncertainty Part III. Uncertainty in measurement Degree of expression guidelines [Uncertaintyofmeasurement-Part 3: Guidetotheexpressionofuncertaintyinmeas-urement (GUM.1995)] ISO 5725-1-1994

Accuracy (accuracy and precision) of measurement methods and results Part 1. General and definitions [Accuracy (trueness and precision) of measurement methods and results-Part 1: General principles and definitions]

3 Terms, definitions and abbreviations

ISO Guide 30 as defined in the following terms and definitions apply to this document.

Coaxial alignment

A series of operations using deflectors and/or mechanical knobs to align the incident direction of the electron beam with the optical axis.

Electron beam damage Sample damage caused by electron beam irradiation.