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**Microbeam analysis - Analytical electron microscopy -
Vocabulary**

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Foreword

This document is in accordance with GB/T 1.1-2020 "Guidelines for Standardization Part 1. Structure and Drafting Rules of Standardization Documents".

To be drafted.

This document is revised and adopted ISO 15932.2013 "Terms of Microbeam Analysis and Analysis of Electron Microscopy".

Compared with ISO 15932.2013, this document adds Chapter 2 normative references.

This document has made the following editorial changes.

---Chapter number 0 was changed to 1, and chapter numbers 1, 2, and 38 were changed to 3, 4, 5, and 610 respectively;

---9.9 is the same as 5.2.1. This document deletes 9.9 and changes 9.10 to 9.9;

---In the references, Chinese documents that have a consistent correspondence relationship with international documents are used instead of international documents, and the order of documents has been adjusted;

---The index has been added.

This document corrects the errors in ISO 15932.2013, the main corrections are as follows.

- Corrected the definitions of the acronyms "EDS" and "EDX";
- The definition of the acronym EPMA adds "microanalyzer";
- "Scanning Electron Microscope" is added to the definition of the acronym SEM;
- 4.2.1 deleted the meaning of "momentum conservation" in the definition;
- 4.2.2 deleted "system" and "and/or momentum" in the definition;
- 5.1.3.5 "Electrostatic field" in the definition is corrected to "potential difference";
- Change the "ideal cylindrical lens" in the definition of 5.2.2.3 to "ideal lens";
- 5.4.2 Deleted the "rotational symmetry around the optical axis" in the definition;
- 5.7 The "sample and the plane forming the diffraction pattern" in the definition is corrected to "the plane where the sample and the diffraction pattern are observed (via the intermediate mirror and
Between the projection lens magnification)";
- The definition of 6.4 is changed to "Simultaneous injection to both sides or one side of the sample";
- 6.10 "In TEM observation" in the definition is changed to "In electron microscope observation";
- In the definition of 7.6, "receiving one diffracted beam with a ring-shaped dark-field detector" is corrected to "receiving one or more diffracted beams with a ring-shaped dark-field detector"
- Diffracted beam";
- 8.3 "Mass thickness" is added to the definition, and a note has been added;
- 8.6.5 Amend "[Source. ISO 22493, modified]" to "[Source. ISO 23833, modified]";
- 8.6.8 The EDS in the definition is corrected to EDX;
- 8.6.9 The EDS in the definition is corrected to EDX;
- 8.12.1 added a note;
- 9.2.2 The "camera constant" in the definition is corrected to "magnification";
- 9.7 "Probe size" in the definition is corrected to "point light source image";
- 10.3.3.1 The definition of "two Bragg diffractions in two vertically stacked crystals" is corrected to "one diffraction in crystals"
- Bragg diffraction occurs again in the beam";
- 10.3.6 corrected the concept of convergent beam.

Introduction

Analytical electron microscopy (AEM) is the application of transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM) to solid objects

Techniques and related theories for the qualitative and quantitative determination of the crystal structure, element composition and electronic state of the tiny volume. AEM analysis

Based on the physical mechanism of electron-excited X-ray energy spectrum and electron energy loss spectrum (EELS), and provide structural information of the micro-region through micro-diffraction,

At the same time, it has high-resolution imaging capabilities.

As a major subfield of microbeam analysis (MBA), AEM is widely used in various industries (high-tech industry, basic industry, metallurgical industry).

Gold, geology, biology and medicine, environmental protection, trade, etc.), and has a wide range of business environments for standardization.

The standardization of terminology in a technical field is a prerequisite for the development of standards in other aspects of the field.

This document is of great significance to the international scientific and engineering communities that need to use AEM vocabulary, which includes MBA and TEM

Unified definition of terms used in practice combined with STEM.

This document is one of a series of standards developed by ISO /TC202 (Microbeam Analysis). These standards include scanning electron microscopy terminology

(ISO 22493), terminology of electron probe microanalysis (ISO 23833) and quantitative analysis of energy spectroscopy (ISO 22309), etc. Some of them have been posted

Some of them are still under development in order to fully cover the MBA field.

Microbeam analysis, terminology of electron microscopy

1 Scope

This document defines the terms used in AEM practice. The terms that contain general concepts and specific concepts are

Self-level classification.

This document applies to all standardized documents related to AEM practice. In addition, some parts of this document are applicable to related fields (e.g.

TEM, STEM, SEM, EPMA, EDX) definitions of general terms.

2 Normative references

There are no normative references in this document.

3 Abbreviations

AEM Analytical Electron Microscope/Analytical Electron Microscopy
(analyticalelectronmicroscope/analyticalelectron

microscopy)

CBED convergent beam electron diffraction (convergentbeamelectrondiffraction)

CCD charge-coupled device (charge-coupled device)

CRT cathode ray tube (cathoderaytube)

EDS X-ray energy spectrometer (energy-dispersiveX-rayspectrometer)

EDX X-ray energy spectroscopy (energy-dispersiveX-rayspectroscopy)

EELS electron energy loss spectrometer/electron energy loss spectrometer
(electronenergylossspectrometer/electronen-

ergylossspectroscopy)

EPMA electron probe microanalysis/electronprobe microanalysis instrument
(electronprobemicroanalysis/electronprobe

microanalyser)

FFT fast Fourier transform (fastFouriertransform)

FIB focused ion beam (focusedionbeam)

FWHM (spectral peak) full width at half maximum (fulwidthathalfmaximum)

HAADF (high-angleannulardarkfield) (high-angleannulardarkfield)

HREM high-resolution transmission electron microscopy/high-resolution transmission
electron microscopy (high-resolution transmission electron microscopy)

microscope/high-resolutiontransmissionelectronmicroscopy)

LAADF (low-angleannulardarkfield) (low-angleannulardarkfield)

MBA microbeamanalysis

SE secondary electron (secondaryelectron)

SEM scanning electron microscope/scanning electron microscopy
(scanningelectronmicroscope/scanningelectronmi-