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**Microbeam analysis — Analytical  
electron microscopy — Vocabulary**

*Analyse par microfaisceaux — Microscopie électronique analytique  
— Vocabulaire*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

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The committee responsible for this document is ISO/TC 202, *Microbeam analysis*, Subcommittee SC 1, *Terminology*.

## Introduction

Analytical electron microscopy (AEM) is a technique used to qualitatively determine and quantitatively measure the elemental composition and examine the electronic state of the small volume of solid material observed by transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM). AEM is based on the physical mechanism of electron-stimulated X-ray spectrometry and electron energy loss spectrometry (EELS). AEM also provides structural information from small regions by microdiffraction while still possessing the capability of high-resolution imaging.<sup>[9]</sup>

As a major sub-field of microbeam analysis (MBA), AEM is widely applied in diverse business sectors (high-technology industries, basic industries, metallurgy and geology, biology and medicine, environmental protection, trade, etc.) and has a wide business environment for standardization.

The standardization of terminology in a technical field is one of the basic prerequisites for the development of standards on other aspects of that field.

This International Standard is relevant to the international scientific and engineering communities that require an AEM vocabulary that contains consistent definitions of terms, as they are used in the practice of MBA combined with TEM and STEM.

This International Standard is one developed in a package of standards on scanning electron microscopy (SEM; ISO 22493), electron probe X-ray microanalysis (EPMA; ISO 23833), energy-dispersive X-ray spectrometry (EDS; ISO 22309), etc., which have been either already developed or are to be developed by ISO/TC 202, *Microbeam analysis*, to completely cover the field of MBA.



# Microbeam analysis — Analytical electron microscopy — Vocabulary

## 0 Scope

This International Standard defines terms used in the practice of AEM. It covers both general and specific concepts classified according to their hierarchy in a systematic order.

This International Standard is applicable to all standardization documents relevant to the practice of AEM. In addition, some parts of this International Standard are applicable to those documents relevant to the practice of related fields (e.g. TEM, STEM, SEM, EPMA, EDX) for the definition of those terms common to them.

NOTE See also the ISO online browsing platform (OBP): <https://www.iso.org/obp/ui/>

## 1 Abbreviated terms

AEM	analytical electron microscope/microscopy
CBED	convergent beam electron diffraction
CCD	charge-coupled device
CRT	cathode ray tube
EDS	energy-dispersive X-ray spectrometer/spectroscopy
EDX	energy-dispersive X-ray spectrometer/spectroscopy
EELS	electron energy loss spectrometer/spectroscopy
EPMA	electron probe microanalysis
FFT	fast Fourier transform
FIB	focused ion beam
FWHM	full width at half maximum
HAADF	high-angle annular dark field
HREM	high-resolution transmission electron microscope/microscopy
LAADF	low-angle annular dark field
MBA	microbeam analysis
SE	secondary electron
SEM	scanning electron microscopy
STEM	scanning transmission electron microscope/microscopy
TEM	transmission electron microscope/microscopy