Second edition
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Microbeam analysis — Selected instrumental performance parameters for the specification and checking of energy-dispersive X-ray spectrometers for use in electron probe microanalysis

Analyse par microfaisceaux — Paramètres de performance instrumentale sélectionnés pour la spécification et le contrôle des spectromètres X à sélection d'énergie utilisés en microanalyse par sonde à électrons

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 15632 was prepared by Technical Committee ISO/TC 202, *Microbeam analysis*.

This second edition cancels and replaces the first edition (ISO 15632:2002), which has been technically revised (see the Introduction, first paragraph, for details).

Introduction

Recent progress in energy-dispersive X-ray spectrometry (EDS) by means of improved manufacturing technologies for detector crystals and the application of advanced pulse-processing techniques have increased the general performance of spectrometers, in particular at high count rates and at low energies (below 1 keV). A revision of this International Standard became necessary because silicon drift detector (SDD) technology was not included. SDDs provide performance comparable to Si-Li detectors, even at considerably higher count rates. In addition, a larger detector active area results in the capability of measuring even higher count rates. This International Standard has therefore been updated with criteria for the evaluation of the performance of such modern spectrometers.

In the past, a spectrometer was commonly specified by its energy resolution at high energies defined as the full peak width at half maximum (FWHM) of the manganese Kα line. To specify the properties in the low energy range, values for the FWHM of carbon K, fluorine K or the zero peak are given by the manufacturers. Some manufacturers also specify a peak-to-background ratio, which may be defined as a peak-to-shelf ratio in a spectrum from an ^{55}Fe source or as a peak-to-valley ratio in a boron spectrum. Differing definitions of the same quantity have sometimes been employed. The sensitivity of the spectrometer at low energies related to that at high energies depends strongly on the construction of the detector crystal and the X-ray entrance window used. Although high sensitivity at low energies is important for the application of the spectrometer in the analysis of light-element compounds, normally the manufacturers do not specify an energy dependence for spectrometer efficiency.

This International Standard was developed in response to a worldwide demand for minimum specifications of an energy-dispersive X-ray spectrometer. EDS is one of the most applied methods used to analyse the chemical composition of solids and thin films. This International Standard should permit comparison of the performance of different spectrometer designs on the basis of a uniform specification and help to find the optimum spectrometer for a particular task. In addition, this International Standard contributes to the equalization of performances in separate test laboratories. In accordance with ISO/IEC 17025[1], such laboratories have to periodically check the calibration status of their equipment according to a defined procedure. This International Standard may serve as a guide for similar procedures in all relevant test laboratories.