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Instrumental Performance Parameters for Specification and Check of Energy Dispersive X-Ray Spectrometers as in the International Standard ISO 15632

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Simple procedures for specifying and checking the performance of energy dispersive X-ray spectrometers (EDS) have been since 2002 available in form of the international standard ISO 15632:2002 [1]. When specifying their spectrometers all major EDS manufacturers refer meanwhile to this standard. Main spectrometer parameters such as energy resolution can be determined as recommended in there. Just several years ago the Si-Li detector has been the mostly widespread type of detector. Since four-five years, silicon drift detector (SDD) EDS providing comparable (in many cases even better) energy resolutions at much higher count rates than the conventional Si-Li's have got the breakthrough on the market.

At high and very high count rates the energy resolution becomes mostly worse than at low count rates. On the need of introduction of representative count rate values covering a broad count rates range at which the resolution shall be specified there are different opinions in the community. The same holds for the need of specification of the best energy resolution or of the dead time. Spectrometer artefacts such as pile-up effects are observed to a more or a lesser extent. Especially at energies below 1 keV the pile-up effect is mostly more critical. There are experts which mean that the peak stability is the most relevant spectrometer property. Both the characterization of the spectrometer efficiency at high energies (where the detector crystal thickness is determining) and the influence of the greater and greater acceptance angle of the detector are also presently insufficient.

About all these issues above some proposals of evaluation criteria from the experts in the field [2] will be presented and offered to discussions. The reliability/suitability of the existent materials dedicated to the spectrometer performance check, but at high count rates (high electron beam currents), was tested. New materials as test specimens and processing software are also proposed.

References

[1] ISO 15632:2002 Microbeam analysis --Instrumental specification for energy dispersive X-ray spectrometers with semiconductor detectors
[2] The author thanks to all the experts in the working group WG 4 of ISO/TC202 Microbeam Analysis: Dr. B. Anderhalt (EDAX/Ametek), Dr. S. Arai (Horiba), Mr. O. Fiedler (Eumex), Dr. J. Friel (USA), Dr. J. Hirsch (ThermoFisher), Dr. M. Lahaye (University of Bordeaux, FR), Dr. L. Maniguet (CMTC Grenoble), Dr. R. Mott (PulseTor), Dr. Nicholas Ritchie (NIST), Dr. F. Robaut (CMTC Grenoble), Dr. R. Terborg (Bruker Nano), Dr. S. Sivonen (Finnland), Dr. P. Statham (Oxford Instruments) and Dr. H. Takahashi (JEOL). Technical support from Dr. J. Zhao and Mrs. L. Rong (ISO/TC202), Dr. M. Schmitt (DIN) and Dr. R. Marinenko (NIST) is acknowledged, too.

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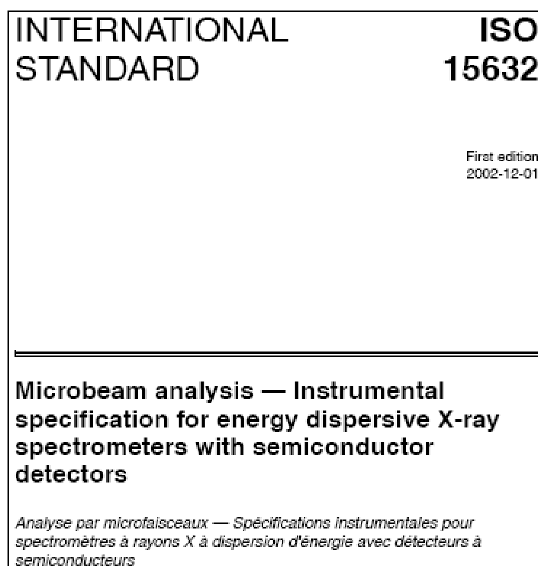


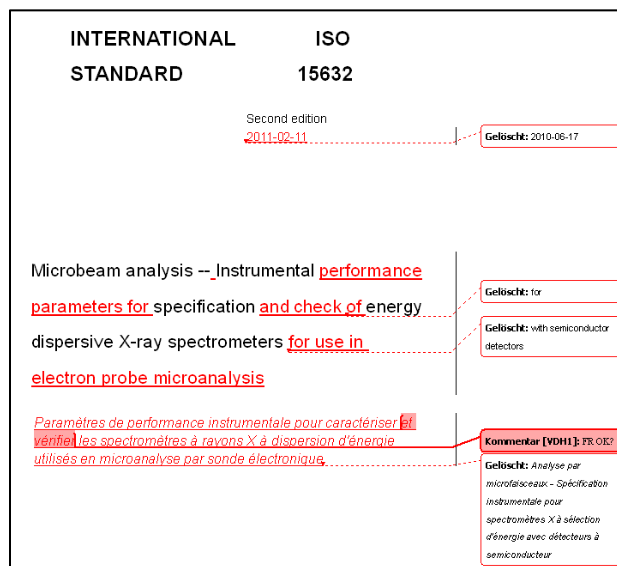
INTERNATIONAL STANDARD

ISO 15632

First edition
2002-12-01

Microbeam analysis — Instrumental specification for energy dispersive X-ray spectrometers with semiconductor detectors

Analyse par microfaisceaux — Spécifications instrumentales pour spectromètres à rayons X à dispersion d'énergie avec détecteurs à semiconducteurs



INTERNATIONAL STANDARD

ISO 15632

Second edition
2011-02-11

Microbeam analysis -- Instrumental performance parameters for specification and check of energy dispersive X-ray spectrometers for use in electron probe microanalysis

Paramètres de performance instrumentale pour caractériser et vérifier les spectromètres à rayons X à dispersion d'énergie utilisés en microanalyse par sonde électronique

Gelöscht: 2010-06-17

Gelöscht: for

Gelöscht: with semiconductor detectors

Kommentar [VDH1]: FR OK?

Gelöscht: *Analyse par microfaisceaux – Spécification instrumentale pour spectromètres X à sélection d'énergie avec détecteurs à semiconducteur*

FIG. 1. Front page of the original standard (2002) and actual front page of the revised version (February 2011).

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