
**Surface chemical analysis — Auger
electron spectroscopy and X-ray
photoelectron spectroscopy — Methods
used to determine peak intensities and
information required when reporting
results**

*Analyse chimique des surfaces — Spectroscopie des électrons Auger
et spectroscopie de photoélectrons par rayons X — Méthodes utilisées
pour la détermination de l'intensité des pics et informations requises
pour l'expression des résultats*



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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.

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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 20903 was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 5, *Auger electron spectroscopy*.

This second edition cancels and replaces the first edition (ISO 20903:2006), which has been revised to include an additional annex (Annex B) giving advice on the selection of the limits between which the peak intensity is measured in X-ray photoelectron spectroscopy.

Introduction

An important feature of Auger electron spectroscopy (AES) and X-ray photoelectron spectroscopy (XPS) is the ability to obtain a quantitative analysis of the surface region of a solid sample. Such an analysis requires the determination of the intensities of spectral components.

There are several methods of peak-intensity measurement that are applicable to AES and XPS. In practice, the choice of method will depend upon the type of sample being analysed, the capabilities of the instrumentation used, and the methods of data acquisition and treatment available.

This International Standard is expected to have two main areas of application. First, it provides a description of methods that may be used in the determination of the intensity of a peak for an element in a given spectrum. Information is given on the origin of uncertainties in the processes involved, and on how these uncertainties may be reduced. Second, this International Standard specifies reporting requirements for the methods used for peak-intensity measurements so that other analysts may use published results with confidence.

Surface chemical analysis — Auger electron spectroscopy and X-ray photoelectron spectroscopy — Methods used to determine peak intensities and information required when reporting results

1 Scope

This International Standard specifies the necessary information required in a report of analytical results based on measurements of the intensities of peaks in Auger electron and X-ray photoelectron spectra. Information on methods for the measurement of peak intensities and on uncertainties of derived peak areas is also provided.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18115-1, *Surface chemical analysis — Vocabulary — Part 1: General terms and terms used in spectroscopy*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18115-1 apply.

4 Symbols and abbreviated terms

A	peak area
AES	Auger electron spectroscopy
b	number of channels over which intensities are averaged to obtain a baseline
eV	electron volts
n	number of channels in a spectrum
XPS	X-ray photoelectron spectroscopy
y_i	number of counts in the i th channel of a spectrum
ΔE	channel width (in electron volts)
Δt	dwell time per channel (in seconds)
$\sigma(A)$	standard deviation of calculated peak area

5 Methods for peak-intensity determination — Direct spectrum

5.1 General

Figure 1 a) shows a portion of an X-ray photoelectron spectrum in which intensity is plotted as a function of kinetic energy increasing to the right or of binding energy increasing to the left. The intensity is plotted usually in units of counts or sometimes in units of counts per second. Intensities may also be plotted as a digitized