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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 29732-2021

**Surface chemical analysis - Medium resolution auger electron
spectrometers - Calibration of energy scales for elemental
analysis**

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foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules of Standardization Documents"

drafted:

This document replaces GB/T 29732-2013 "Energy for elemental analysis by medium resolution Auger electron spectrometer for surface chemical analysis"

Standard Calibration", compared with GB/T 29732-2013, except for editorial modifications, the main technical changes are:

---Change the "Resolution" in the file to "Resolution":

This document is identical to ISO 17973:2016 "Energy Scale for Elemental Analysis by Medium Resolution Auger Electron Spectrometer for Surface Chemical Analysis"

calibration":

Please note that some content of this document may be patented: The issuing agency of this document assumes no responsibility for identifying patents:

Introduction

Auger Electron Spectroscopy (AES) is widely used for surface analysis of materials: By comparing the energy and shape of the Auger electron peak, identify the

Contains different elements other than hydrogen and helium: Usually, when the calibration uncertainty of the energy standard reaches 3 eV, the attribution of the peak can be determined: This document is only applicable to

Analysis for this level of accuracy (for higher level of accuracy analysis can be found in ISO 17974):

The calibration method for the kinetic energy scale specified in this document uses reference materials such as pure copper and pure aluminium (or pure gold): because the flaw is accurate

The effect of the degree level is not obvious, so the test for instrument defects is not included in the document:

Traditionally, the kinetic energy of Auger electrons is referred to the vacuum level, and this reference value is still used by many analysts: However, the vacuum energy level is not easy to determine,

The same instrument will differ by more than 0.5eV: Although the use of vacuum levels as a reference generally does not lead to ambiguity of element attribution, it can lead to

Uncertainty of high-resolution measurements related to chemical states: Therefore, when designing Auger electron spectroscopy and X-ray photoelectron spectroscopy instruments, the kinetic energy is

The Fermi level is used as a reference, which is 4.5eV higher than that of the vacuum level: According to this document, users can freely choose the parameters suitable for their work:

Exam level:

Medium Resolution Auger Electron Spectrometer for Surface Chemical Analysis

Energy Scale Calibration for Elemental Analysis

1 Scope

This document specifies a calibration method for an Auger electron spectrometer kinetic energy scale with an uncertainty of 3 eV for the identification of surface conventional elements:

White: In addition, this document also specifies a method for determining the calibration period:

This document applies to instruments in direct mode or differential mode whose resolution is less than or equal to 0.5%, and the peak value of the modulation amplitude in differential mode is

2eV, equipped with an inert gas ion gun or other sample cleaning method, a spectrometer with an electron gun of 4keV or higher beam energy:

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to this document:

ISO 18115 Surface chemical analysis- Vocabulary

Note: GB/T 22461-2008 Surface Chemical Analysis Vocabulary (ISO 18115:2001, IDT)

3 Terms and Definitions

Terms and definitions defined in ISO 18115 apply to this document:

4 Symbols and Abbreviations

The following symbols and abbreviations apply to this document:

AES Auger Electron Spectroscopy

a Measured energy scalar error

b Measured zero offset error, in electron volts (eV)

E_{corr} Kinetic energy result after calibration of E_{meas}, in eV

E_{meas} Kinetic energy measured in eV

E_{meas,n} Kinetic energy measured for the nth peak in Table 1, in eV

E_{ref,n} The kinetic energy reference value for the nth peak in Table 1, in eV

FWHM Half-height peak width, in eV

FWHM of the W peak

Δ offset energy, for n=1, 2, 3, 4 peaks (see Table 1), subtract the reference kinetic energy value from the average of the measured calibration peak kinetic energy

given in eV

Additional correction to E_{meas} after ΔE_{corr} calibration to provide corrected kinetic energy results

β The energy scale scan rate of the simulated system in electron volts per second (eV/s)

τ Time constant of the analog detector electronics in seconds (s)