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

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**Surface chemical analysis - Electron spectroscopies - Procedures for identifying,
estimating and correcting for unintended degradation by X-rays in a material
undergoing analysis by X-ray photoelectron spectroscopy**

表面化学分析 电子能谱 X射线光电子能谱分析中X射线致材料非预期损伤的识别
、评估和校正程序

(English Translation)

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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 for standardization documents" Drafting.

This document is equivalent to ISO 18554:2016 "Surface chemical analysis, X-ray photoelectron spectroscopy, X-ray induced Procedures for the identification, evaluation, and correction of unexpected damage to materials.

This document adds a chapter on "Normative References".

Introduction

X-ray photoelectron spectroscopy (XPS) usually uses soft X-rays as the excitation source to measure the photoelectrons and Auger electrons emitted from the sample surface.

In its most widely used mode, the X-ray flux intensity is low and the distribution range is large. Therefore, this technique is usually considered to be used for surface. However, since its use as a surface analysis technique, reports have shown that the elemental composition of the sample surface may change during the test. For some materials, it is necessary to consider the elemental composition of the sample surface during the test.

The damage caused by the XPS analysis is corrected when possible[1]~[4].

Methods for identifying, evaluating, and correcting unintended X-ray-induced damage to materials.

Surface chemical analysis Electron spectroscopy X-ray photoelectron Unexpected damage to materials caused by X-rays in energy spectrum analysis Identification, Assessment and Correction Procedures

1 Scope

This document specifies the non-predicted changes in the elemental composition or chemical state of a sample caused by X-ray irradiation in X-ray photoelectron spectroscopy (XPS) analysis.

Requirements for methods of identification, assessment and correction of chronic injuries.

This document only applies to unexpected damage caused by X-rays, which results in a decrease or increase of less than 30% in the peak intensity of the photoelectron spectrum.

This document does not involve comparisons between different types of materials, nor does it address the mechanism, depth, or chemical nature of the damage.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

region

Select the portion of the photoexcitation for spectral acquisition and analysis.

NOTE 1 The region may be chosen because it contains the major or minor peak for a given element, or because it represents the shape or slope of the background in that energy range, e.g. a fine scan.

NOTE 2 This use of region is not to be confused with analysis region.

timezero

The start time of X-ray irradiation of the sample.

4 Symbols and abbreviations

The following symbols and abbreviations apply to this document.

AZ. The linear rate of change of I_t, Z derived from the degradation of a given element or chemical state C. quantitatively calculated percentage of contaminated carbon atoms
Dcontamination. thickness of the contamination layer on the sample surface DI. Damage Index E. Kinetic energy of the detected electron, in eV FWHM. Half Peak Width
 $I_{Z, corrected}$. The intensity of a given photoelectron peak after the formation of the corrected contamination layer $I_{Z, measured}$. The measured intensity of a given photoelectron peak affected by the contamination layer $I_{0, Z}$. Undamaged photoelectron intensity of a given element Z or chemical state Z I_f, S . Final photoelectron intensity of a given element in the test spectrum