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

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**Surface chemical analysis -- X-ray photoelectron spectroscopy  
-- Reporting of methods used for charge control and charge  
correction**

表面化学分析——X射线光电子能谱-荷电控制和荷电校正方法的报告  
**(English Translation)**

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### Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules.

This standard is identical with ISO 19318:2004 "Surface chemical analysis - X-ray photoelectron spectroscopy charge control and charge correction method Report".

This standard by the National Standardization Technical Committee microbeam analysis and focal points.

### Introduction

X-ray photoelectron spectroscopy (XPS) is widely used to characterize the surface of the material. From the measured photoelectron spectra give each element of the sample surface Within the level of binding energy, the binding energy of the control elements in the sample identification table different elements (except hydrogen and helium). Usually from the inner binding energy level with respect to the pure elements corresponding to small changes in binding energy (generally between 0.1eV to 10eV) chemical elements for obtaining the measured status information. Measurement Reliable amount of the chemical shift usually need to calibrate the instrument can be combined XPS standard, the uncertainty as small as possible to 0.1eV.

Since the insulating surface of the sample charge when XPS measurement of the surface potential changes often difficult to accurately determine the binding capacity to meet Kam You do not need to determine the chemical elements or states. Solve this problem in two steps, the first step, the use of experimental methods to reduce the surface charged battery (charge control System method); the second step, after the XPS data acquisition, the correction effects of surface charge (charge correction method). Although in some cases the surface charge Accumulation make the analysis more complicated, but it still can be used as a means of obtaining information about the sample.

Surface charge and charge distribution of the sample surface, and its dependencies for the experimental conditions determined by several factors, including sample and XPS spectrometer factors related features. Charge accumulation has been well studied, it is a place on the sample surface and the inner three Dimensional phenomenon [1,2]. Charge accumulation may also occur in the depth range of the X-ray irradiated samples of the phase boundary or interface area. Since the light Electrons and secondary electrons, X-rays or heating to cause volatilization or chemical changes for some samples, charge power changes over time, such samples may it does not reach a stable potential.

Currently, there is no universally applicable method of charge control or charge correction [3,4]. This standard specifies the charge control and data acquisition (Or) the information charged the correction methods of data analysis to be provided. Appendix A provides information on the charge control and charge correction of common methods Data, in most applications are valid. In actual use, according to sample type (such as a powder, or thick film sample), characteristics of the instrument, sample scale Inch and the sample surface may require a specific degree of modification steps to select a specific charge control method.

The standards may be applied to two main areas. First, the present standard of the relevant charge will be included in the test report XPS control and (or) information charged calibration method (eg, from analysts to the user or publication) to distinguish, to evaluate, assess and reproduce insulating material Data, to ensure that a similar measure samples comparable. Second, the implementation of this standard will allow other analysts confidently using a combination of published Able to make reliable XPS data into the database.

Surface chemical analysis - X-ray photoelectron spectroscopy Report of charge control and charge correction method

## 1 Scope

This standard describes the minimum amount of data using X-ray photoelectron spectroscopy measurements - level binding energy within the insulation samples, and will report its points Charge control and charge correction method used when analyzing the results, but also gives a binding energy measurement process for charge control and charge correction Useful methods available.

## 2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document.

GB/T 22461-2008 Surface chemical analysis - Vocabulary (ISO 18115:2001, IDT) GB/T

22571-2008 Surface chemical analysis - X-ray photoelectron spectrometer energy scale calibration (ISO 15472:2001, IDT)

### 3 Terms and Definitions

The standard terms and definitions in accordance with GB/T 22461-2008.

### 4 Symbols and Abbreviations

BE binding energy, the unit is eV;

BEcorr corrected binding energy, eV units;

BE<sub>meas</sub> measured binding energy, the unit is eV;

BE<sub>ref</sub>- reference binding energy, the unit is eV;

FWHM photoelectron spectroscopy in the background above, a peak full width at half maximum, in units of eV;

XPS X-ray photoelectron spectroscopy;

deltacorr corrected energy value, added to the measured binding energy for the charge calibration, the unit is eV.

### 5 Instruments

#### 5.1

A.2 mentioned one or more charge control technology can be used most XPS spectrometer. We should follow the XPS instrument manufacturer Procedures and other documents prescribed operation XPS instrument.

#### 5.2

A.2 listed some technologies require special equipment, such as. electronics and heat gun or gold vapor deposition source.

#### 5.3

Some samples installation steps, such as. The sample was mounted in the fine metal mesh [5], to improve electrical contacting the sample with the sample table, the table can be reduced or Surface load power. ASTM E1078 and ASTM E1829 [6,7] a detailed description of this and other samples installation steps to reduce static electricity.