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Surface chemical analysis - Guidelines to sample handling, preparation and mounting - Part 4: Reporting information related to the history, preparation, handling and mounting of nano-objects prior to surface analysis

表面化学分析 样品处理、制备和安装指南 第4部分: 报告表面分析前纳米物体相关的来历、制备、处理和安装信息

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting.

This document is Part 4 of GB/T 42658 "Guidelines for Sample Handling, Preparation and Installation for Surface Chemical Analysis". GB/T 42658 has been the following sections have been published.

---Part 4: Report the origin, preparation, handling and installation information related to the nanoobject before surface analysis.

This document is equivalent to ISO 20579-4:2018 "Guidelines for sample handling, preparation and installation for surface chemical analysis Part 4: Reporting" Information on the origin, preparation, handling and installation of nanoobjects prior to surface analysis.

Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents.

Introduction

GB/T 42658 "Guidelines for Sample Handling, Preparation and Installation for Surface Chemical Analysis" is converted from ISO 20579 and is intended to it provides guidance for analysts and scientific researchers engaged in surface chemical analysis on the operation, storage, installation and handling of products. GB/T 42658 it is planned to consist of 4 parts.

---Part 1: Recording and reporting of pre-analytical sample processing;

---Part 2: Recording and reporting the preparation and installation of analytical samples;

---Part 3: Biological materials;

---Part 4: Report the origin, preparation, handling and installation information related to the nanoobject before surface analysis.

Each part of GB/T 42658 can be used independently of other parts. Part 1 is to record and report pre-analytical sample handling.

Part 2 is about documenting and reporting the preparation and setup of analytical samples. The general methods described in both parts are applicable to a wide range of material tables.

surface chemical analysis, but will not be repeated in the documentation for a specific material. Part 3 applies to preanalytical sample handling, preparation and installation of biological materials.

Pack. Part 4 is this document.

The methods described in this document are mainly Auger electron spectroscopy (AES), X-ray photoelectron spectroscopy (XPS) and secondary ion mass spectrometry (SIMS).

Methods of sample handling, preparation and setup for surface analysis techniques, but also for many other surface-sensitive analytical techniques such as ion dispersion Radiation spectroscopy, scanning probe microscopy, low-energy electron diffraction and electron energy loss spectroscopy. Sample handling may affect measurements by surface-sensitive analytical techniques value. AES, XPS and SIMS are sensitive to surface layers of several

nanometers thickness. The surface layer may cause damage to the sample before it is sent to the analysis chamber.

Necessary operation or surface treatment is seriously disrupted. Therefore, proper sample handling and preparation are particularly critical for reliable analysis. sample Improper handling can result in altered surface composition and unreliable data.

Although the types of samples requiring surface analysis require careful preparation, as noted by ISO 20579-1 and ISO 20579-2 [1], nano Objects present additional challenging issues to avoid artifacts caused by manipulation and preparation of materials prior to analysis [2]. In ISO 20579-1 and the type of method described in ISO 20579-2 is generally applicable to nanomaterials, but due to the characteristics of nanoscale objects it is important to document this carefully.

How these and other methods are implemented. This document indicates the need to report on sample preparation operations and preparations used for surface analysis.

Minimum information that becomes part of the sample source information to help ensure the reliability of data obtained from surface analysis methods and applicability [3]. Appendix A provides background on some of the unique aspects of nanoobjects that require reporting. Appendix B provides a list of research groups around the world an overview of the methods used to extract particles from solution when preparing bodies for surface chemical analysis. Appendix C shows a sample data sheet Example. Although focused on the surface chemistry analysis of nanoscale objects, many topics apply to nanomaterials more generally.

Nanomaterials include materials with nanoscale internal structures or surface structures, that is, nanostructured materials, and materials with one or more nanoscale Objects with meter-scale dimensions are nano-objects. Nanoscale objects, in particular, present a range of challenging issues of characterization that may Inhibit or delay the scientific and technological impact of nanoscience and nanotechnology [4-10]. These characterization methods are documented by ISO/TC229 (Na Technology), and many documents on particle size measurement have been developed by ISO/TC24/SC4. Because nanoscale objects are composed of a large number of Surface and interface composition, many experts [4][11] emphasized the importance of properly characterizing its surface and interface, and in ISO/T R14187.2011 [12] the role of surface chemical analysis methods for characterizing nanomaterials is discussed.

Many nano-objects are produced and stored far from equilibrium, exposed to varying temperatures during manipulation and subjected to different measurements.

In different environments, they are particularly easy to change over time [4]. In the synthesis, aging or source of precursor chemicals, as well as processing or Seemingly small changes in storage have been found to produce materials with significantly different properties or lifetimes [13-15]. Such a small change is huge Large effects complicate the

performance of repeatable experiments and emphasize the importance of sample provenance in providing complete information on sample and analytical effects.

These types of issues prompted the Organization for Economic Co-operation and Development (OECD) to develop a guideline on sample preparation and safety testing when manufacturing nanomaterials.

Guidance document for experimental dosimetry. This guidance document covers the many factors that can affect materials involved in safety testing and the information that should be reported.

However, the implications of these issues extend far beyond safety trials.

Many nanoobjects are produced or stored in liquid environments. Although it is well recognized that as much as possible in the "natural" environment of the material it is important to perform analysis in the environment[4][9], but the methods usually used to characterize the surface of nano-objects involve taking samples from natural or working environments.

Remove the material and expose it to atmosphere and/or vacuum. There are a variety of methods used to transport materials from their natural environment and submit them for analysis.

materials in order to maintain or maximize the useful information that can be obtained from the analysis. Use caution and care when preparing, storing and handling samples Accurate reporting of processes is essential for reliable understanding of measurement results.

To reproduce and validate experimental findings [3][4], to reduce conflicting information in the literature [15], and to reliably resolve issues such as product life and employment Important topics such as industry and public health-related issues require accurate reporting of sample handling and origin of nanoobjects.

Surface chemistry analysis sample handling, preparation and setup Guidance Part 4: Reporting Surface Analysis Before Nano Information about the origin, preparation, handling and installation of objects

1 Scope

This document gives information on data sheets, certificates of analysis, reports or other publications involving the handling of nanoobjects when preparing them for surface chemical analysis.

information that should be reported in the material. This information is necessary to ensure the analytical reliability and reproducibility required to advance research and technology applying these materials.

required, and to obtain an appropriate understanding of the possible environmental and