

ICS 71.040.40

CCS G04



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

GB/T 22461.2-2023

**Surface chemical analysis - Vocabulary - Part 2: Terms used in
scanning probe microscopy**

表面化学分析 词汇 第2部分：扫描探针显微术术语

Issued on: May 23, 2023

Implemented on: September 1, 2023

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Scanning Probe Microscopy Terminology	1
4 Contact Mechanics Model Terminology	7
5 Scanning Probe Method Terminology	8
6 Scanning Probe Microscopy Supplementary Terminology	27
34 Reference 37 index	38

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 part 2 of GB/T 22461 "Vocabulary for Chemical Analysis of Surfaces": GB/T 22461 has issued the following parts:

--- Part 1: General terms and genealogy terms;

--- Part 2: Scanning probe microscopy terminology: This document is modified to adopt ISO 18115-2:2021 "Vocabulary for Chemical Analysis of Surfaces Part 2: Terminology for Scanning Probe Microscopy": Compared with ISO 18115-2:2021, this document has made the following structural adjustments:

---Chapter 3 corresponds to 3:1 of ISO 18115-2:2021, and the term entry numbers in Chapter 3 are adjusted in order of mention: The technical differences between this document and ISO 18115-2:2021 and the reasons are as follows:

---Changed the statement of the scope of Chapter 1 and increased the scope of application to meet the drafting requirements of my country's documents: The following editorial changes have been made to this document:

--- Deleted the URL information of the ISO /IEC terminology database in Chapter 3;

---Delete the duplicated content in Note 2 of 4:3, Note 2 of 4:4, and Note 2 of 4:5 that overlaps with the definitions of corresponding terms;

--- Deleted the definition sources of 5:2, 5:24, 5:48, 5:110, 5:114, 5:132, because the source document ASTM E1813-96 has been repealed;

--- Changed Note 1 and Note 4 of 7:25, and changed "ISO 4287" to "ISO 21920-2", because the latter has replaced the former;

--- Added index: Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents: This document was proposed and managed by the National Microbeam Analysis Standardization Technical Committee (SAC/TC38): This document is drafted by: Shanghai Institute of Metrology and Testing Technology, Peking University, Shanghai Jiaotong University, Chinese Academy of Sciences Shanghai Applied Physics graduate School: The main drafters of this document: Cai Xiaoyu, Zhu Xing, Shen Yi, Sun Jieli, Hu Jun, Li Yuan:

Surface chemical analysis is an important field that involves interactions between people from different fields and backgrounds: engage in surface Chemical analysts may be materials scientists, chemists, or physicists, and their background may be experimental or theoretical: use surface chemistry The data included not only the above-mentioned personnel, but also personnel from other disciplines: Through the existing surface chemical analysis technology, the composition information from the area close to the surface (generally within 20nm) can be obtained, when After the surface layer is removed, composition-depth information can also be obtained with this technique: GB/T 22461 "Vocabulary for Surface Chemical Analysis" consists of two parts:

--- Part 1: General terms and genealogy terms: Covers terms such as electron spectroscopy, mass spectrometry, and spectroscopy and X-ray analysis:

--- Part 2: Scanning probe microscopy terminology: Covers terminology related to scanning probe microscopy: The concepts for the above technologies originate from the broad fields of nuclear physics and radiation science, as well as physical chemistry and optics: A wide range of academic fields has led to With different interpretations of terms, the same concept will be described with different terms: In order to avoid misunderstandings and to facilitate the exchange of information For flow, it is necessary to clarify the concept and adopt the correct terminology to determine its definition: In contact mechanics, the basic theory is usually expressed by an abbreviation: To avoid confusion, Chapter 4 of this document defines these acronyms: No:

4 The model described in Chapter 1 assumes that the contact material is homogeneous and isotropic, with linear elastic properties: For heterogeneous, anisotropic, nonlinear, viscoelastic or other elastoplastic materials for which contact models can be found in the literature: Surface Chemical Analysis Glossary Part 2: Terminology for scanning probe microscopy

1 Scope

GB/T 22461.2-2023 is Part 2 of the Chinese vocabulary of surface chemical analysis, covering scanning probe microscopy. SPM is the family in which an instrument's mode names have multiplied faster than agreement on what they mean: tapping, intermittent contact and AM-AFM describe the same thing in different manufacturers' language, while quantitative measurements of stiffness and adhesion depend on which contact mechanics

model was assumed, a choice that is often left unstated. The standard defines the scanning probe microscopy terms, the contact mechanics model terms, the scanning probe method terms, and supplementary terms for both the microscopy and the methods, with an informative annex of abbreviations. It took effect on 1 September 2023.

This document defines the terms of scanning probe microscopy in the field of surface chemical analysis and gives a list of relevant abbreviations (see Appendix A): This document is applicable to the teaching, scientific research, design, manufacture, preparation of relevant technical documents and documents related to scanning probe microscopy in surface chemical analysis: Books and technical exchanges:

2 Normative references

This document has no normative references:

3 Scanning Probe Microscopy Terminology

3:1 < SNOM > Microscopy using a near-field (5:88) light source to obtain Raman spectra: This method illuminates the sample surface with appropriately polarized light, and The metal probe tip (5:120) is placed in the near field area of the sample surface: 3:

2 Atomic force microscopy atomic-force microscopy; AFM Surface imaging methods that mechanically scan surface profiles: Install the sharp probe tip (5:120) on the flexible cantilever beam (5:18) to The probe senses the surface force and then detects deflection of the probe: NOTE 1 AFM is capable of highly quantitative imaging of insulating or conducting surfaces (5:69):

Note 2: Some atomic force microscopes fix the position of the probe tip and move the sample along the x, y, z directions; others fix the sample position Position and move the probe tip:

Note 3: AFM can be used in environments such as vacuum, liquid phase, controlled atmosphere or air: Original images can be obtained on suitable samples with a sharp tip and appropriate imaging sub-resolution:

Note 4: A wide variety of forces can be measured, including normal force (5:91), and lateral force (5:77), frictional force (5:62) or shear force: The technical points corresponding to the latter three Also known as lateral force microscopy (3:13), friction microscopy (3:11), shear force microscopy (3:37): AFM is a general term whose scope covers appendices Microscopy of various force measurements in A:

Note 5: AFM can be used to measure the surface normal force of each pixel in the imaging area:

Note 6: Normally, for an atomic force microscope probe whose tip radius is less than 100nm, the normal force needs to be less than 0.1μN, and the specific value depends on

the sample material. Otherwise, it will cause irreversible deformation of the surface and excessive wear of the probe tip. 3:3 chemical force microscopy (chemical-force microscopy; CFM LFM (3:13) or AFM (3:2) mode), detect the interaction between the functionalized modified sharp probe tip (5:120) and specific molecules resulting deviation:

Note: LFM (3:13) is the most commonly used mode:

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