INTERNATIONAL STANDARD

ISO 18115-1

Third edition
2023-06

Surface chemical analysis — Vocabulary —

Part 1: General terms and terms used in spectroscopy

Analyse chimique des surfaces — Vocabulaire —

Partie 1: Termes généraux et termes utilisés en spectroscopie

Reference number
ISO 18115-1:2023(E)

© ISO 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO 2023 – All rights reserved

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms related to general concepts in surface chemical analysis **1**
4 Terms related to particle transport in materials **11**
5 Terms related to the description of samples **20**
6 Terms related to sample preparation **23**
7 Terms related to instrumentation **24**
8 Terms related to experimental conditions **27**
9 Terms related to sputter depth profiling **36**
10 Terms related to resolution **40**
11 Terms related to electron spectroscopy methods **45**
12 Terms related to electron spectroscopy analysis **48**
13 Terms related to X-ray fluorescence, reflection and scattering methods **66**
14 Terms related to X-ray fluorescence, reflection and scattering analysis **69**
15 Terms related to glow discharge methods **70**
16 Terms related to glow discharge analysis **70**
17 Terms related to ion scattering methods **78**
18 Terms related to ion scattering analysis **80**
19 Terms related to surface mass spectrometry methods **84**
20 Terms related to surface mass spectrometry analysis **88**
21 Terms related to atom probe tomography **96**
22 Terms related to multivariate analysis **98**
Bibliography **107**
Index **108**

© ISO 2023 – All rights reserved

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 1, *Terminology*.

This third edition cancels and replaces the second edition (ISO 18115-1:2013), which has been technically revised.

The main changes are as follows:

— revision of definitions related to resolution;

— introduction of definitions related to atom probe tomography;

— introduction of emerging methods such as HAXPES, NAPXPS, GEXRF;

— removal of repeated or redundant definitions and references;

— reorganisation of the terminology into subject-specific sections;

— removal of Annexes according to ISO requirements.

A list of all parts in the ISO 18115 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2023 – All rights reserved

Introduction

Surface chemical analysis is an important area which involves interactions between people with different backgrounds and from different fields. Those conducting surface chemical analysis can be materials scientists, chemists, or physicists and can have a background that is primarily experimental or primarily theoretical. Those making use of the surface chemical data extend beyond this group into other disciplines.

With the present techniques of surface chemical analysis, compositional information is obtained for regions close to a surface (generally within 20 nm) and composition-versus-depth information is obtained with surface analytical techniques as surface layers are removed. The surface analytical terms covered in this document extend from the techniques of electron spectroscopy and mass spectrometry to optical spectrometry and X-ray analysis. The terms covered in ISO 18115-2 relate to scanning-probe microscopy. The terms covered in ISO 18115-3 relate to optical interface analysis. Concepts for these techniques derive from disciplines as widely ranging as nuclear physics and radiation science to physical chemistry and optics.

The wide range of disciplines and the individualities of national usages have led to different meanings being attributed to particular terms and, again, different terms being used to describe the same concept. To avoid the consequent misunderstandings and to facilitate the exchange of information, it is essential to clarify the concepts, to establish the correct terms for use, and to establish their definitions.

The terms are classified under Clauses 3 to 22:

— Clause 3: Terms related to general concepts in surface chemical analysis;

— Clause 4: Terms related to particle transport in materials;

— Clause 5: Terms related to the description of samples;

— Clause 6: Terms related to sample preparation;

— Clause 7: Terms related to instrumentation;

— Clause 8: Terms related to experimental conditions;

— Clause 9: Terms related to sputter depth profiling;

— Clause 10: Terms related to resolution;

— Clause 11: Terms related to electron spectroscopy methods;

— Clause 12: Terms related to electron spectroscopy analysis;

— Clause 13: Terms related to X-ray fluorescence, reflection and scattering methods;

— Clause 14: Terms related to X-ray fluorescence, reflection and scattering analysis;

— Clause 15: Terms related to glow discharge methods;

— Clause 16: Terms related to glow discharge analysis;

— Clause 17: Terms related to ion scattering methods;

— Clause 18: Terms related to ion scattering analysis;

— Clause 19: Terms related to surface mass spectrometry methods;

— Clause 20: Terms related to surface mass spectrometry analysis;

— Clause 21: Terms related to atom probe tomography;

— Clause 22: Terms related to multivariate analysis.

© ISO 2023 – All rights reserved

Surface chemical analysis — Vocabulary —

Part 1:
General terms and terms used in spectroscopy

1 Scope

This part of the ISO 18115 series defines terms for surface chemical analysis. It covers general terms and those used in spectroscopy, while ISO 18115-2 covers terms used in scanning-probe microscopy and ISO 18115-3 covers terms used in optical interface analysis.

2 Normative references

There are no normative references in this document.

3 Terms related to general concepts in surface chemical analysis

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
interface
boundary between two phases having different chemical, elemental, or physical properties

3.2
surface
interface (3.1) between a condensed phase and a gas, vapour, or free space

3.3
measurand
quantity intended to be measured

[SOURCE: ISO/IEC Guide 99:2007,[1] 2.3, modified — The notes to entry have been deleted.]

3.4
analyte
substance or chemical constituent that is subjected to measurement

3.5
chemical species
atom, molecule, ion, or functional group

© ISO 2023 – All rights reserved