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Surface ~~Chemical Analysis~~ chemical analysis — Sample handling, preparation and mounting — —

Part 1:

Documenting and reporting the handling of specimens prior to analysis

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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*. This document is Part 1 of the ISO 20579 series which replaces ISO 18117:2009 *Surface Chemical Analysis – Handling of Specimens Prior to Analysis*, Subcommittee SC 2, *Sample handling*.

The main changes are as follows:

ISO 18117 provided guidance on the handling of and the containers for specimens submitted for surface chemical analysis. It was intended as information for the user of surface analysis services as an aid in understanding the special sample handling requirements for surface analytical techniques. This information is now incorporated into part 1 of a series of four documents related to sample handling for surface analysis. Because of the importance of recording and reporting aspects of sample handling, ISO 20579-1, which replaces ISO 18117, now focuses on reporting requirements for handling of samples prior to surface analysis. The guidance and handling information from ISO 18117 are included as normative annexes.

For clarity and to maintain clear focus on reporting, the specific reporting requirements in the body of the document were kept succinct. The lengthy guidance information in 18117 contained much useful information that further explains and justifies the reporting requirements. This important guidance information, which identifies information relative to specific sample types, was retained by placing it in normative annexes, rather than in the body of the document, where it might obscure the actual reporting requirements.

This first edition of ISO 20579-1 cancels and replaces ISO 18117:2009.

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A list of all parts in the ISO 20579 series are briefly described in the Introduction and 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.

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Introduction

0.1 Introduction to the ISO 20579 series

The handling and preparation of samples for surface analysis can physically or chemically alter the surface. Therefore, reliable surface analysis depends upon knowing the analysis objectives and knowledge of the sample history including aspects of how the sample has been prepared, stored, processed, and handled prior to and during analysis. The ISO 20579 series describes the information that needs to be collected and included as part of the sample history (sample provenance information). Both ISO 20579-1 and ISO 20579-2 describe information to be recorded regarding sample handling, and storage. ~~The current~~ This document describes information needed regarding sample selection, handling, and preparation when requesting surface analysis. ISO 20579-2 provides information about sample handling, preparation, mounting and processing to be reported by an analyst. ISO 20579-3 and ISO 20579-4 focus on specific handling and reporting needs associated with nanomaterials (ISO 20579-4) and biomaterials (ISO 20579-3). Each part of this series can be used independently of the other parts, although the general reporting requirements described in this document (ISO 20579-1) and in ISO 20579-2 are applicable to a wide range of materials and are not reproduced in ISO 20579-3 and ISO 20579-4.

Although primarily prepared for the surface-analysis techniques of Auger-electron spectroscopy (AES), X-ray photoelectron spectroscopy (XPS), and secondary-ion mass spectrometry (SIMS), the methods described in this document are also applicable to many other surface-sensitive analytical techniques such as ion-scattering spectrometry, scanning probe microscopy, low-energy electron diffraction and electron energy-loss spectroscopy, where specimen handling can influence surface-sensitive measurements. AES, XPS, and SIMS are sensitive to surface layers that are typically a few nanometers thick. Such thin layers can be subject to severe perturbations caused by specimen handling or surface treatments that can be necessary prior to introduction into the analytical chamber. Proper handling and preparation of specimens is particularly critical for dependable analysis. Improper handling of specimens can result in alteration of the surface composition and unreliable data. ^{[1][2]}

0.2 Introduction to this document (ISO 20579-1)

~~ISO 20579-1~~ This document is intended for the specimen owner or someone requesting surface analytical services. It describes the minimum information regarding the analysis objectives and sample preparation that an analyst needs to know to determine if and how the desired information can be obtained. This information becomes part of sample provenance record to help validate the reliability and usefulness of data obtained from surface-analysis methods. ^[3]

Surface analysis methods measure the outer atomic layers of a specimen surface which can be inadvertently altered by inappropriate handling or preparation. Therefore, the degree of care and cleanliness required by surface-sensitive analytical techniques is usually much greater than for many other analysis methods. Appropriate careful sample selection, preparation and storage are essential for reliable surface analysis and the documentation and reporting of this information is critical to the ability to assess the validity of surface analysis information.

Although the categories of needed reporting are similar for all specimens, the details of the required sample handling can vary depending on the nature of the sample and analysis objectives. Annexes to this document and references therein provide background information useful to assist in identification of the necessary sample preparation, handling, storage, and transport requirements that maximize the ability for obtaining the desired information.

Annex A identifies three categories of analysis objectives and provides an overview of the challenges associated with sample preparation for surface analysis in the context of each desired

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objective. Included is a table summarizing relevant sample handling methods and types of specimen containers needed for the three types of analysis objectives and is intended to help those requiring surface analysis. [Annex B](#) discusses common sources of contamination and issues along with methods to minimize contamination related to sample handling. [Annex C](#) discusses topics related to sample storage and transportation.

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