



Standard Guide for Specimen Preparation and Mounting in Surface Analysis¹

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1. Scope

1.1 This guide covers specimen preparation and mounting prior to, during, and following surface analysis and applies to the following surface analysis disciplines:

1.1.1 Auger electron spectroscopy (AES),

1.1.2 X-ray photoelectron spectroscopy (XPS and ESCA), and

1.1.3 Secondary ion mass spectrometry (SIMS).

1.1.4 Although primarily written for AES, XPS, and SIMS, these methods will also apply to many surface sensitive analysis methods, such as ion scattering spectrometry, low energy electron diffraction, and electron energy loss spectroscopy, where specimen handling can influence surface sensitive measurements.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

E983 Guide for Minimizing Unwanted Electron Beam Effects in Auger Electron Spectroscopy

E1127 Guide for Depth Profiling in Auger Electron Spectroscopy

E1523 Guide to Charge Control and Charge Referencing Techniques in X-Ray Photoelectron Spectroscopy

E1829 Guide for Handling Specimens Prior to Surface Analysis

¹ This guide is under the jurisdiction of ASTM Committee E42 on Surface Analysis and is the direct responsibility of Subcommittee E42.03 on Auger Electron Spectroscopy and X-Ray Photoelectron Spectroscopy.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 *ISO Standards:*³

ISO 18115–1 Surface chemical analysis—Vocabulary—Part 1: General terms and terms used in spectroscopy

ISO 18115–2 Surface chemical analysis—Vocabulary—Part 2: Terms used in scanning-probe microscopy

3. Terminology

3.1 *Definitions*—For definitions of surface analysis terms used in this guide, see ISO 18115-1 and ISO 18115-2.

4. Significance and Use

4.1 Proper preparation and mounting of specimens is particularly critical for surface analysis. Improper preparation of specimens can result in alteration of the surface composition and unreliable data. Specimens should be handled carefully so as to avoid the introduction of spurious contaminants in the preparation and mounting process. The goal must be to preserve the state of the surface so that the analysis remains representative of the original.

4.2 AES, XPS or ESCA, and SIMS are sensitive to surface layers that are typically a few nanometres thick. Such thin layers can be subject to severe perturbations caused by specimen handling (**I**)⁴ or surface treatments that may be necessary prior to introduction into the analytical chamber. In addition, specimen mounting techniques have the potential to affect the intended analysis.

4.3 This guide describes methods that the surface analyst may need to minimize the effects of specimen preparation when using any surface-sensitive analytical technique. Also described are methods to mount specimens so as to ensure that the desired information is not compromised.

4.4 Guide E1829 describes the handling of surface sensitive specimens and, as such, complements this guide.

5. General Requirements

5.1 Although the handling techniques for AES, XPS, and SIMS are basically similar, there are some differences. In general, preparation of specimens for AES and SIMS requires

³ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

⁴ The boldface numbers in parentheses refer to a list of references at the end of this standard.