



Standard Guide for Depth Profiling in Auger Electron Spectroscopy¹

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1. Scope

1.1 This guide covers procedures used for depth profiling in Auger electron spectroscopy.

1.2 Guidelines are given for depth profiling by the following:

	Section
Ion Sputtering	6
Angle Lapping and Cross-Sectioning	7
Mechanical Cratering	8
Mesh Replica Method	9
Nondestructive Depth Profiling	10

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

1.4 *This standard does not purport to address all of the safety problems, 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

E673 Terminology Relating to Surface Analysis (Withdrawn 2012)³

E684 Practice for Approximate Determination of Current Density of Large-Diameter Ion Beams for Sputter Depth Profiling of Solid Surfaces (Withdrawn 2012)³

E827 Practice for Identifying Elements by the Peaks in Auger Electron Spectroscopy

E996 Practice for Reporting Data in Auger Electron Spectroscopy and X-ray Photoelectron Spectroscopy

E1078 Guide for Specimen Preparation and Mounting in 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.

³ The last approved version of this historical standard is referenced on www.astm.org.

E1577 Guide for Reporting of Ion Beam Parameters Used in Surface Analysis

E1634 Guide for Performing Sputter Crater Depth Measurements

E1636 Practice for Analytically Describing Depth-Profile and Linescan-Profile Data by an Extended Logistic Function

E1829 Guide for Handling Specimens Prior to Surface Analysis

2.2 *ISO Standard*:⁴

ISO/TR 22335: 2007 Surface Chemical Analysis—Depth Profiling—Measurement of Sputtering Rate: Mesh-Replica Method Using a Mechanical Stylus Profilometer

3. Terminology

3.1 *Definitions*:

3.1.1 For definitions of terms used in this guide, refer to Terminology **E673**.

4. Summary of Guide

4.1 In ion sputtering, the surface layers are removed by ion bombardment in conjunction with Auger analysis.

4.2 In angle lapping, the surface is lapped or polished at a small angle to improve the depth resolution as compared to a cross section.

4.3 In mechanical cratering, a spherical or cylindrical crater is created in the surface using a rotating ball or wheel. The sloping sides of the crater are used to improve the depth resolution as in angle lapping.

4.4 In nondestructive techniques, different methods of varying the electron information depth are involved.

5. Significance and Use

5.1 Auger electron spectroscopy yields information concerning the chemical and physical state of a solid surface in the near surface region. Nondestructive depth profiling is limited to this near surface region. Techniques for measuring the crater depths and film thicknesses are given in **(1)**.⁵

⁴ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

⁵ The boldface numbers in parentheses refer to a list of references at the end of this standard.