



Standard Terminology Relating to Surface Analysis¹

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1. Scope

1.1 This terminology is related to the various disciplines involved in surface analysis.

1.2 The definitions listed apply to (a) Auger electron spectroscopy (AES), (b) X-ray photoelectron spectroscopy (XPS), (c) ion-scattering spectroscopy (ISS), (d) secondary ion mass spectrometry (SIMS), and (e) energetic ion analysis (EIA).

2. Abbreviations

2.1 Abbreviations commonly used in surface analysis are as follows:

AES	Auger electron spectroscopy
BS	backscattering spectroscopy
CHA	concentric hemispherical analyzer
CMA	cylindrical mirror analyzer
EIA	energetic ion analysis
eV	electron-volts
ESCA	electron spectroscopy for chemical analysis
FABMS	fast atom bombardment mass spectrometry
FWHM	full width at half maximum peak height
ISS	ion scattering spectroscopy
pp	peak-to-peak
RBS	Rutherford backscattering spectroscopy
RFA	retarding field analyzer
SAM	scanning Auger microprobe
SIMS	secondary ion mass spectrometry
SNMS	sputtered neutral mass spectrometry
XPS	X-ray photoelectron spectroscopy

3. Terminology Definitions

adventitious carbon referencing—XPS, determining the charging potential of a particular specimen by comparing the experimentally determined binding energy of the C 1s binding energy from absorbed hydrocarbon on the specimen with a standard binding energy value.

NOTE 1—A nominal value of 285.0 is often used for the binding energy of the relevant C 1s peak, although some analysts prefer specific values in the range 284.6 eV to 285.2 eV depending on the nature of the substrate.

analysis:

analysis area (specimen)—two-dimensional region of a specimen surface measured in the plane of that surface from

which the entire analytical signal or a specified percentage of that signal is detected.

analysis volume (specimen)—three-dimensional region of a specimen surface from which the entire analytical signal or a specified percentage of that signal is detected.

analysis volume (spectrometer)—three-dimensional region within a spectrometer from which the entire analytical signal or a specified percentage of that signal is detected.

analyzer transmission—see **spectrometer transmission**.

angle:

collection—SIMS, the angle between the normal to the original specimen surface and the axis of the secondary ion collection optics.

of detector—EIA, SIMS, the angle between the incident beam direction and the direction pointing from the beam spot to the center of the detector.

of emission—AES, XPS, the angle of emission or ejection of electrons from a solid measured relative to the normal to the surface.

of incidence—the angle between the incident beam and the normal to the surface.

of scattering—EIA, the angle between the incident beam direction and the direction in which a particle is traveling after it is scattered. If the particle is incident on the detector, this angle will be the same as **angle of detector**.

solid, of detector—EIA, the solid angle intercepted by the detector, with the radius originating at the beam spot.

takeoff—AES, XPS the angle at which particles leave a specimen measured relative to the plane of the specimen surface. (see **angle of emission**).

angle lapping—a method specimen preparation in which a specimen is mechanically polished at an angle to the original surface.

NOTE 2—This angle may often be less than 1° so that depth information with respect to the original surface is transformed lateral information.

angle resolved AES—the recording of Auger electron spectra as a function of angle emission.

angular distribution of secondary ions—see **secondary ions**.

attenuation coefficient—for a parallel beam of specified particles or radiation, the quantity μ in the expression $\mu\Delta x$ for the fraction removed in passing through a thin layer Δx of a substance in the limit as Δx approaches zero, where Δx is measured in the direction of the beam.

¹ This terminology is under the jurisdiction of ASTM Committee E42 on Surface Analysis and is the direct responsibility of Subcommittee E42.02 on Terminology.

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