



SCANNING AUGER MICROANALYSIS (SAM)

Scanning Auger Microanalysis (SAM) is an analysis technique that determines elemental composition and some chemistry of surfaces and interfaces. The technique has a sampling depth of 2-3 nm and is appropriate for films as thin as a few monolayers with a lateral resolution of 50 nm. It is limited to conductive samples but can also show the spatial distribution of elements on a surface. The technique is also useful for depth profiling and will show elemental depth distributions from 1 to 2000 nm when used in conjunction with ion-milling. SAM detects all elements (except hydrogen and helium) at concentrations greater than 0.1 atomic percent.

SAM Applications Include:

Materials Evaluation

Identification of surface contaminants
Verification of surface homogeneity
Diffusion studies
Catalyst degradation
Interface analysis

Failure Analysis

Corrosion analysis
Stain identification
Lifted lead bond evaluation
Material delamination analysis
Metal embrittlement evaluation

Quality Control

Comparison of good to bad samples
Verification of surface process modification
Relative thickness on thin films

Principle of Operation:

The sample is scanned with a focused electron beam which causes Auger electrons (low energy) to be emitted from the surface. The energies of the Auger electrons are then measured providing an elemental analysis of the top few monolayers of the surface.

An argon ion beam can be used to remove surface layers from the sample, to expose a fresh surface for analysis or to produce a depth profile showing changes in elemental concentration with depth.

Data Output:

SAM data is presented as plotted spectra for the raw qualitative data, as tables for semi-quantified data, and electronic images for elemental maps (distributions). Depth profiles are presented as plotted spectra.

Sample Constraints:

The sample can be up to 1.5 cm x 1.5 cm x 0.5 cm in size. Most solid conductive samples (metals, microelectronics, powders) and some insulating samples (polymers, glasses, and ceramics) may be analyzed. The sample must be compatible with a 10⁻⁹ torr vacuum and not susceptible to electron beam effects such as decomposition or desorption.

4 Arrow Drive, Woburn, Massachusetts 01801 ▲ Telephone: (781) 938-0300 ▲ Fax: (781) 935-5087