

## Memorex Corporation

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### Memorex Corporation—Quality, Value, Service.

Founded in 1961, Memorex employs nearly 11,000 highly skilled people in more than 100 locations throughout the world. With modern headquarters and major manufacturing facilities in Santa Clara, California, Memorex also has production facilities in Liege, Belgium; Nogales, Mexico; Eau Claire, Wisconsin; and Irvine, Santa Ana, and Anaheim, California plus a network of regional warehousing and distribution centers.

Memorex is a worldwide supplier of high technology equipment and magnetic recording media used in data storage, retrieval and communications. The growing line of products today includes high quality disc, tape and semiconductor data storage systems; telecommunications processors and terminals; computer tape, disc packs and data modules; audio and video tapes; word processing supplies; and field engineering and facilities management services.



# MEMOREX SCANNING AUGER MICROSCOPY SERVICES





# Consider Memorex Laboratories

## The Leading Edge in Materials Characterization

While not a new science, the full potential of electron spectroscopy in the study of chemical systems has only recently enjoyed widespread recognition. Applications for the characterization of elemental and chemical composition of both surfaces and interfaces span a very broad spectrum of disciplines and industries. Research, engineering, manufacturing, quality control, in fact, virtually all fields where chemical problems exist may well benefit from advancements made in electron spectroscopy.

One of the leading electron spectroscopy methods currently available for materials characterization is Scanning Auger Microscopy, a microbeam analytical technique that offers significant advancements over microprobe and other surface techniques. With the Auger process, a more comprehensive materials characterization may be obtained to provide a greater spectrum of data for analysis.

The Auger process involves a three electron transition which enables an analysis of all elements except hydrogen and helium at a sample depth of 5-20 Angstroms. The specimen is placed in an ultrahigh vacuum. An electron beam with a range of 3 to 10kV is focused on the sample surface. The beam, upon striking an inner shell electron (Electron I) creates a vacancy. An outer shell electron (Electron II) drops into this vacancy causing an energy release. This release of energy forces another electron (Electron III) out of the outer shell. By measuring the energy yield of this, the Auger Electron (Electron III), the atomic element from which the electron was ejected can be identified. This measure of energy yields a spectrum unique to each individual atomic element.



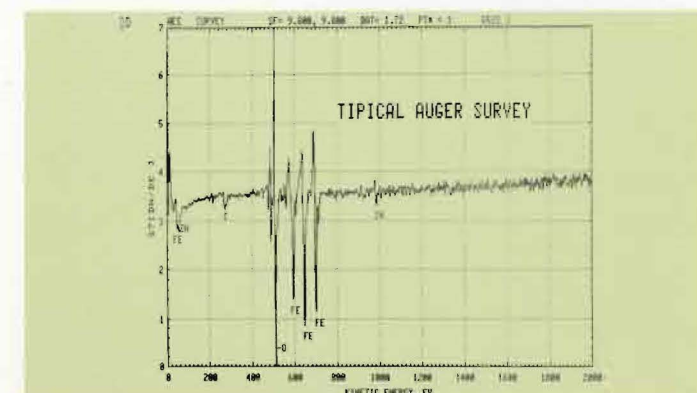
Diagram of Auger Process

This process analyzes the top few atomic layers (approximately 10 Angstroms) of the sample surface. However, combined with ion sputter etching, subsequent layers can also be characterized. Beam diameters can be as low as 2000Å allowing imaging of the sample area as well as analyses of the elements in the area. Both quantitative and qualitative data can be obtained with sensitivities as low as 0.1% and resolution of a few electron volts.

Test data may be reported in several ways, depending on user requirement.

**General Survey 0-2000eV**—All elements except hydrogen and helium exhibit Auger transitions in this region.

Data obtained either in first derivative or Pulse Count



General Survey 0-2000eV.

Below is a typical SED imaging; however, images up to 10,000X can be obtained.



Image at 500X

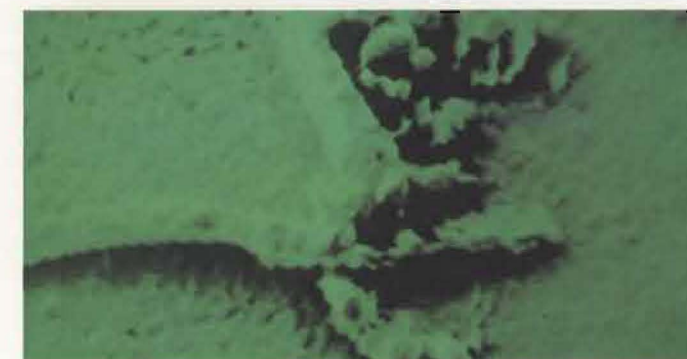


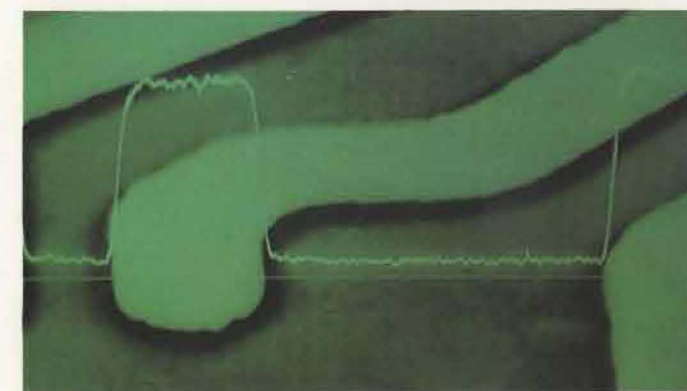
Image at 2000X

**Line Scan Mode** involves the scanning of the beam across any position of the sample and analyzing for a particular element.

Peak Heights Represent Relative Concentrations of Element



SEM Image



Line Scan and SEM Image



# Memorex Now Offers Super Sam Services

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*Scientific Personnel at Microprocessor*

Memorex, through its Analytical and Surface Spectroscopy Laboratory, now offers a full range of Scanning Auger Microscopy services on a contract basis. Staffed by highly experienced personnel, with backgrounds in chemistry, metallurgy, and material science, this advanced facility is establishing new standards in microbeam analytical capabilities by providing the requisite sophistication for acquisition of data.



*Scientific Personnel at Computer System*

The heart of the Memorex laboratory is the SUPER SAM 590, a unique microprocessor-based, microbeam analytical system manufactured by Physical Electronics. This new system provides superior performance and flexibility for data collection, storage, and processing. The SUPER SAM 590 offers a number of advantages over similar equipment. For example:

- More accurate micrographs and faster analysis result from the increased stability of the beam and its reduced diameter (less than  $0.2\mu\text{m}$ ).
  - Rastering capabilities enable the analysis of a much larger surface area of the sample.
  - Versatility in the mode of operation permits data to be compiled and presented according to the specifications of each individual's needs.
  - A more precise reading is achieved due to SUPER SAM's capability to analyze a considerably smaller sample volume than other comparable systems.
  - A more complete elemental analysis is provided because of its ability to identify elements down through atomic numbers  $Z = 3$  (all elements except hydrogen and helium).
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**Mapping Mode** involves the scanning of an entire surface of a sample creating an Auger image of relative intensities of an element of interest.



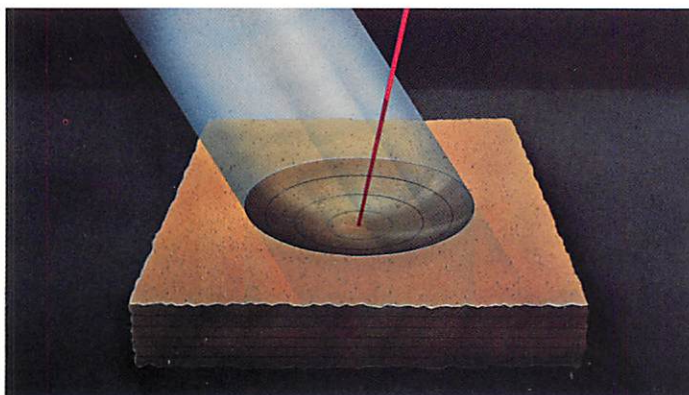
*SEM Image*



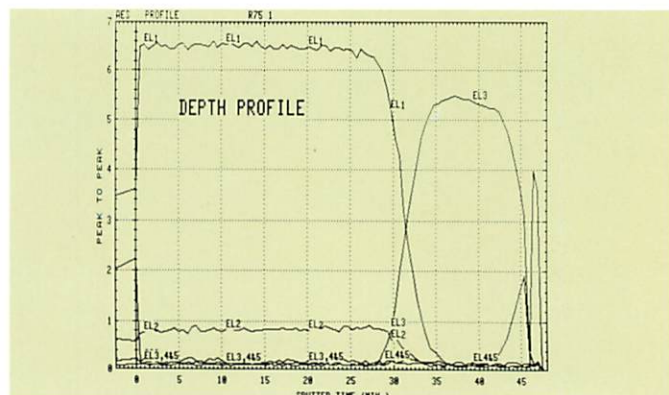
*Auger Map(Gold)*

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**Profiling** involves the Ion Sputter Etching (using Argon or Krypton) of a sample so that a depth elemental analysis may be obtained.



*Ion Sputter Etching Theory*



*Example of Typical Profile*

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Memorex's Analytical and Surface Spectroscopy Laboratory is helping identify chemical problems in a wide range of sciences and industries such as Semiconductor, Memory Storage, Computer, Electronic, Aerospace, Forensic, Metallurgical, Geological, and Ceramic. Analyses done in these areas is helping to answer questions regarding such problem areas as Corrosion, Degradation, Contamination, Diffusion, Fatigue, Cracking, Adhesion, Cohesion, Adsorption/Absorption, Desorption, and Erosion.

For additional information regarding how Memorex Analytical Surface Spectroscopy Laboratory can help meet your needs, call (408) 987-0588 or drop us a line at the following address:

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