

Auger-II™

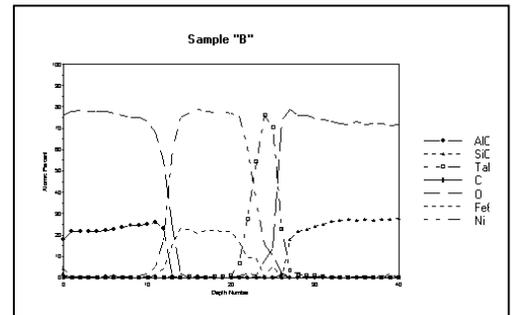
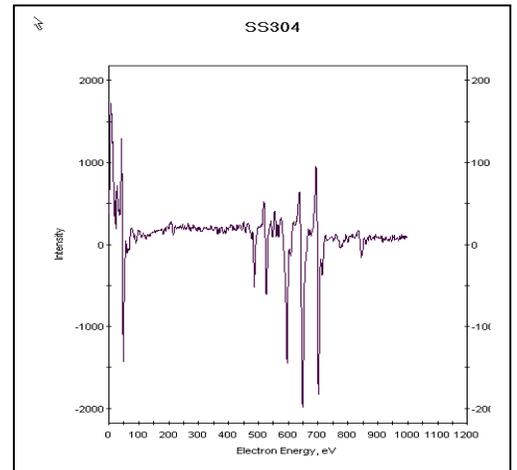
A New Computer Control System for JEOL Auger Electron Probe MicroAnalyzers Jamp-10, Jamp-10S, Jamp-30 and Jamp-7800

Introduction:

While your JEOL Auger Electron Probe MicroAnalyzer has been very reliable, producing great data over the years, the computer control system (CCS) supplied with the instrument may be showing its age. For instance, is it year 2000 compliant? Not only has development of new software for your CCS ended many years ago, but it is becoming difficult or impossible to find replacement parts for those older computers, monitors, and disk drives. While our own JAMP-10S continues to work well we also needed a computer control system replacement. For the last three years we have been working to replace the CCS with a new, IBM® compatible PC based, system.

That system is now available for your JEOL Auger! Auger-II™ controls the CMA, ion gun, scan generator, and

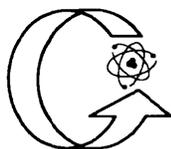
digitizes the analog signals from the channeltron electron multiplier and secondary electron detector while the Windows95 & 98® compatible software embodies the latest thinking in data collection and analysis. The choice of using an IBM® compatible computer means you can upgrade and service the system using your in-house computer support personnel. Software support for technical questions and version upgrades is available by telephone and on our world wide web site at <http://www.gellermicro.com>. This brochure will give you a brief look at Auger-II.



Rotational Depth profile

Company Background:

Who is Geller MicroAnalytical Laboratory? The company was founded in 1985 by Joe Geller, who, for 13 years, managed the JEOL (USA) Surface Analysis Laboratory and the development of the JEOL/Kevex CCS for the Jamp-10(S). Geller MicroAnalytical Laboratory, certified to ISO-9001, also offers analytical services (EPMA, SEM, Auger, XPS, metallography) and products (EPMA computer control systems, Si(Li) detector and electronics upgrades, traceable magnification and chemical standards, ion sputtering standards, and vacuum desiccators). Our staff knows surface analysis applications. From our experience we have applied this knowledge to build a CCS that will serve you well for many years to come. We participate in several societies and national and international committees including AVS, MSA, MAS, ASTM and ISO and have published and presented numerous technical papers.



**GELLER
MICROANALYTICAL
LABORATORY**

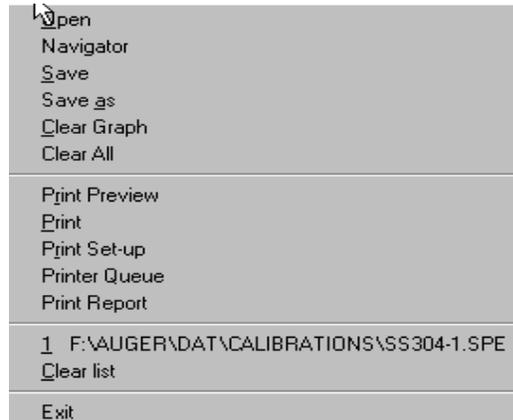
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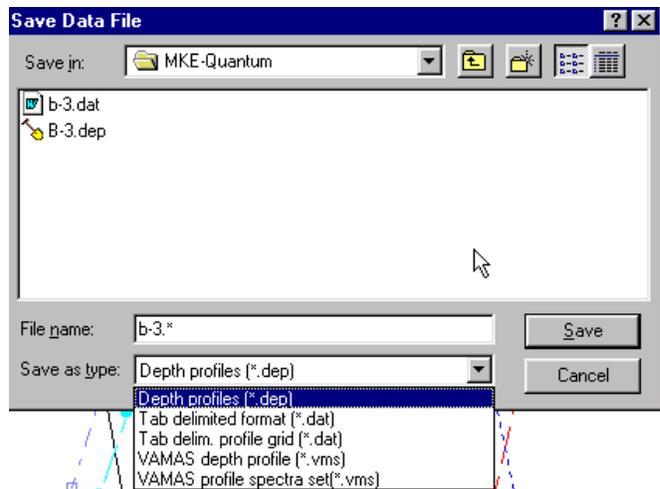
A Quick tour of Auger-II

The Auger-II toolbar is shown at the right. All functions of the program are controlled from here.

The “File” menu provides utility functions to recall, save, and print the data. The “navigator” function allows the operator to take a quick graphical look at the data in a preview screen. Other pertinent data is also displayed there. Near the screen bottom a list of the most recently files are kept for quick loading



The “Save Data File” box allows spectral and depth profile data to be saved in our efficient binary data format. The tab delimited format allows for easy data import into spreadsheet programs where you can plot the data in customized ways, or perform your own special calculations.



The VAMAS format is a method of data transfer that is in use by many manufacturers and database committees to share surface science data. Spectral data can be both loaded and saved with this format.

The “Acquire” menu controls data acquisition and performs some manual functions such as turning on the ion beam or fixing the CMA at a specific energy (to check the elastic peak energy, for example).

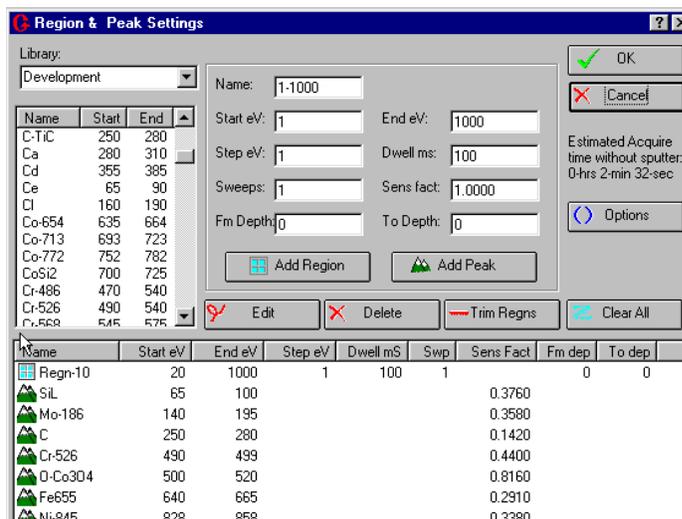


Other controls let you abort an acquisition, pause it, or simply restart from the lowest energy. Depth profiles can be extended or terminated after the current data collection scan and line scans and images (for multiple elements with background subtract) can be initiated.

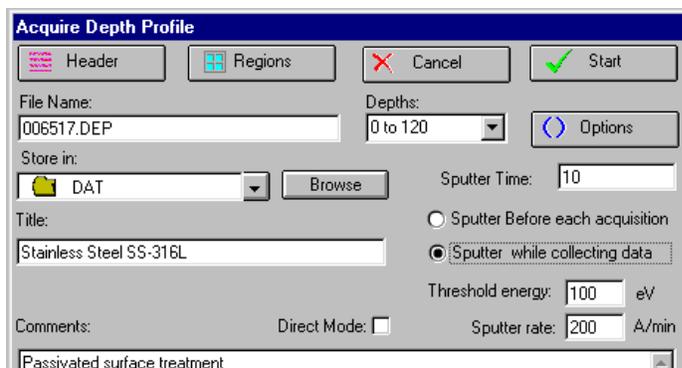
The next illustration shows how data is acquired for a spectrum or depth profile.

Depth profiles are displayed during data collection. In the frame at the right we have chosen to analyze a SS316L sample using data from a single survey spectrum. Data is collected from 20 to 1000eV while the atomic concentrations of Si, Mo, C, O, Cr Fe and Ni are displayed in real time *along* with the survey spectrum as the experiment progresses.

To save time and collect only the narrow energy regions listed in the “Start eV” and “End eV” columns, the operator would click on the “Trim Regions” button. Instead of taking 100 seconds for each scan the time would be reduced to about 30 seconds. The O and Cr regions can be reanalyzed in the assemble depth profile routine as if they were collected as one continuous energy window. Notice that the total depth profile acquisition time is displayed below the cancel button.



Once the data collection routine is established the ion sputtering rate, time, number of depths and mode is defined. In this example 120 cycles of data are collected while the ion gun continuously sputters. To prevent unwanted Auger electrons which may be excited by the ion beam we set a threshold energy for the ion beam to turn on only when Auger electrons >100eV are being collected.



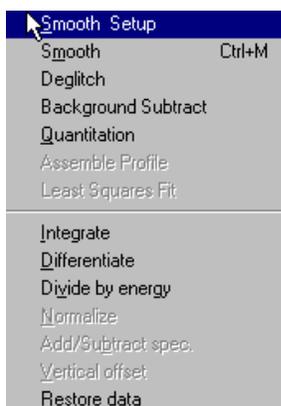
Future program enhancements will allow the data collection to stop or be modified when a preset concentration or logical condition is met.



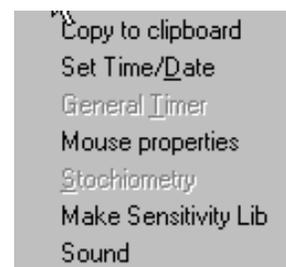
The “View” menu lets the operator restore live data as well as display information about the data collection process. For comparison purposes, existing data in the data collection computer or data on the local area network can be displayed against the data being accumulated. When depth profiling the ion sputter rate can be changed for different materials within the sample.



The “Graph” menu controls the data display functions. Data scales can be customized for comparison to previously recorded data. Labels on the charts and how the data is displayed can also be customized so that all data is displayed with the same scale expansions.



The “Data Manipulation” menu controls mathematical operations. Data can be smoothed, integrated, etc. This menu is also the gateway to our sophisticated capabilities for assembling depth profiles and applying least squares fitting criteria—some of which is described on the following pages.

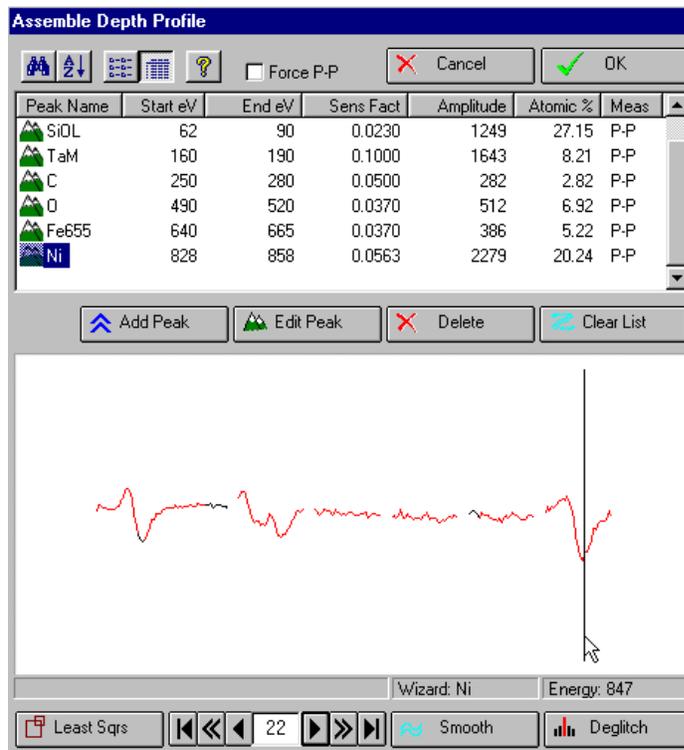


The “Utility” menu provides transferring of data through the Windows clipboard. Other utility functions are provided, as well.

The “Assemble Depth Profile” sub-menu contains the routines to produce a depth profile from previously stored data. With this routine characteristic Auger peaks can be defined, identified and then assigned. As the analyst steps through the Auger data the sensitivity factor, p-p intensities and atomic % are displayed.

When a peak is highlighted, such as the nickel peak to the right, the peak name along with its sensitivity factor is selected from the appropriate reference table (the table is stored as a Microsoft ACCESS data base).

The “Wizard”, near the screen bottom, suggests which peaks can be identified within the energy range indicated by the cursor. For better measurement of the peak intensity and peak shape we provide “Least Square Fitting” for comparison to standard reference spectra. The reference spectra can be within the depth profile or in external files. To reduce operator input and the chance of making errors data reduction setups can be automatically applied from previous samples. Notice how little noise there is in the depth on the first page of this brochure. Also notice that the atomic concentrations go to “0” at the interfaces.



Computer Control System Description:

To automate the instrument we supply ISA style boards to control the ion gun, CMA, scan generator, and digitize the Auger signal. If you have a Si(Li) energy-dispersive x-ray detector (and we have plans to integrate x-ray with Auger) the digital imaging program can map several elements plus the secondary electron and Auger signal simultaneously!

The software has been designed to be quickly learned- with no commands to memorize. Everything is logically laid out in an intuitive graphical user interface, which is aided by extensive on-line HELP. With this concept much time is saved and the operator’s productivity is greatly increased. For instance, during spectral data collection the Auger line markers and an energy cursor are active while the signal intensity and energy scale can be expanded and shifted in real time. For the impatient analyst, atomic concentrations are graphically displayed during depth profiling- even if the depth profile is being collected from a series of survey spectra. For comparison purposes, the computer screen can be divided into windows allowing several data sets to be compared during acquisition.

Other features in the software allow for post signal measurement using linear least squares. This technique greatly improves detectability and helps with measuring chemical shifts. Factor analysis is under development. To safeguard your depth profile data it is stored in a backup directory during collection. Should the computer need to be restarted the saved data will automatically be restored and the profile can be continued. We can accommodate unlimited sensitivity factors. The factors are stored in a Microsoft Access database file. The “peak wizard” will help the analyst select the proper factor to be used.

For digital images our very successful program, dPict™, has been expanded to handle Auger data where multiple Auger images can be acquired sequentially. The resulting images, in the industry standard TIF format, can be annotated, smoothed with kernel filtering operators, and then critical dimensions measured using the included tools.

Data output can be sent directly to any Windows compatible device or network printer. As previously mentioned, the included routines for plotting spectra, images and depth profiles can also be stored for later retrieval and processing. Spectral data and depth profiles can also be stored in ASCII (text) format. For customizing your graphical data a spreadsheet program (like Microsoft Excel) can be used. To make importing depth profile data easy we use a matrix array ASCII format having both the spectral intensity and atomic concentrations. This is accomplished with just a few mouse clicks Using the industry standard VAMAS format for spectral import and export your data can be universally shared.

System installation is easy. No recalibration is needed for CMA control! For digital imaging the included subroutine calibrates the electron beam raster very quickly. A typical installation required only five cables be attached. Many users are able to self-install Auger-II.

Please visit our website (<http://www.gellermicro.com>) for the latest information. We are committed to the highest level of customer support and continuous product improvement. Help on any subject is only a telephone call or email away.