A summary of new products and services for materials research...

Photoemission Electron Microscope: The FOCUS IS-PEEM from OMICRON offers an ultimate resolution of better than 40 nm and is based on image contrast resulting from spatial variations of the secondary electron yield. The integral sample stage is fixed to the microscope, thereby suppressing mechanical vibrations and allowing high-resolution imaging. The stage is piezo-driven and offers remote-controlled sample positioning over a range of (5 × 5) mm^2. Features include an adjustable iris and contrast apertures with optional *in situ* exchange, a stigmator/deflector, and a 6-in. (15.2 cm) OD mounting flange.
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Focused Electron and Ion Beam Columns: FEI offers two-lens electron and ion columns for applications such as nanometer-scale micromachining, IC cross sectioning and failure analysis, quantum device fabrication, *in situ* SEM imaging, and more. The UHV-compatible electron columns mount to the user's system with a 4.5-in. (1.77 cm) Conflat® flange. The two-lens electron column offers a spot size of less than 20 nm and high beam currents. The two-lens ion column allows for nanometer-scale imaging, micromachining, and mapping using ion beams. The ion column also is equipped with Clean Cut Optics™ to limit beam tails.
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Environmental Scanning Electron Microscope: The ESEM FE3030 from ElectroScan™ is an ultrahigh- resolution field-emission gun-based environmental scanning electron microscope built around the Philips Electron Optics FEG-XL30 model. The ESEM offers sample magnifications higher than 150,000× with 2 nm resolution at 10 Torr gas pressure. The presence of gas in the specimen chamber eliminates charging on nonconductive samples.
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MgO Ultrafine Powders: Chemat Technology has developed a process to make high-surface-area MgO ultrafine powders. Using sol-gel reactions and pyrolysis at elevated temperatures, the process has made MgO powders with a surface area of 400 m^2/g. The process eliminates the supercritical drying step by controlling chemical reactions to produce powders of high surface area, and large quantities of ceramic powders can be made. Applications include catalysts, filters, bactericides, adsorbents, sensors, and thermal insulation.
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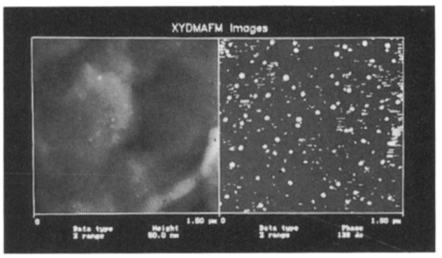

Scanning Probe Microscopy Imaging: Digital Instruments' extension to its TappingMode™ atomic force microscopy technique provides nanometer-scale information about surface structure. By mapping the phase of the cantilever oscillation during the TappingMode scan, phase imaging detects variations in composition, friction, viscoelasticity, and other properties. Applications include mapping of components in composite materials; differentiating regions of high and low surface adhesion; and identification of contaminants, for example, a polyimide contamination on an IC bond pad as seen above (topography imaging, left; phase imaging, right).
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Thermographic Temperature Monitor: The Thermograph II from B-G Instruments is a dual-channel temperature monitoring system featuring a measurement range of 30–150°F (-1.1–64.9°C). Available with ranges of 40–80°F (4.4–26.4°C) and 55–95°F (12.65–34.65°C), the system is suitable for monitoring temperatures of liquids and gases, precision machining, and manufacturing and research environments. Depending on the temperature range, accuracy can be 0.01°F (0.006°C). Thermistor probes enable users to track temperature changes. A report of temperature readings taken over a user-defined period can be printed, or users can plot data using voltage readings instead of temperature measurements.
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Multichannel Analyzer for Nuclear Spectroscopy: EG&G ORTEC's Model 926 MCA multichannel buffer can interface to any PC via the printer port. The product includes an 8k successive-approximation ADC with a fixed conversion time of < 8 μs, a histogramming memory, and MAESTRO™ MCA Emulation software compatible with Windows 95, Windows 3.1, and DOS. Gedcke-Hale dead-time correction method is included. Also offered are an ADC GATE Input for coincidence measurements, a BUSY Input for use by the live-time correction circuits, and a Pile-Up Rejection Input.
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Intermediate Voltage Electron Microscope: Argonne National Laboratory's IVEM microscope enables users to study the changes to materials from irradiation, producing images more than 1,000 times sharper than a standard light microscope. The IVEM is connected to a tandem ion beam accelerator and an ion implanter that fire atomic "bullets" of varying energies into material samples to see microscopic changes produced by ion irradiation. Users can view the materials through the microscope while the samples are being bombarded. The IVEM is part of Argonne's High Voltage Electron Microscope-Tandem National User Facility, which allocates more than two-thirds of its experimental time to scientists from universities and industry.
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High-Intensity Blue LED Chip: Cree Research's Super Blue LED Chip uses G-SiC Technology™ (GaN on SiC) and has a typical radiant output of 500 μW at 20 mA. The solid-state blue LED emitters offer chip-to-chip consistency. Applications include solid-state incandescent replacement bulbs, high ambient panel indicators, color printers and scanners, and medical and analytical instruments.
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High-Temperature Knudsen Cell: The KMB-237 from Comstock is designed for MBE and spectroscopy measurements such as laser-induced fluorescence spectroscopy and thermal- desorption mass spectrometry. Capable of producing a molecular beam of fullerenes, the KMB-237 features a water-cooled shroud and a manual shutter mechanism. Maximum temperature is 2000°C with less than 250 W power consumption. Thermal stability is < 1°C. Various mounting configurations are available, which are compatible with MBE systems and custom vacuum chambers, as well as in a multiple Knudsen Cell array on a single flange.
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Atomic Spectroscopy Database: The National Institute of Standards and Technology offers a database containing wavelengths, transition probabilities, and energy levels for most ionization stages of 28 elements from hydrogen to nickel. Each element's signature spectral lines can be used to identify and quantify materials. Users can search for specific wavelengths, energy levels, or elements, as well as change the default options for units, output, and other parameters. The DB contains 27,000 spectral lines and 45,000 energy levels.
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