

# NEW PRODUCTS

The descriptions of the new products listed in this section are based on information supplied to us by the manufacturers, and in some cases by independent sources. PHYSICS TODAY can assume no responsibility for their accuracy. To facilitate inquiries about a particular product, a Reader Service Card is attached inside the back cover of the magazine.

## FOCUS ON MICROSCOPY

### Scanning Thermal Microscopy Module for Surface Thermal Gradients

Digital Instruments has introduced a new scanning thermal microscopy module for qualitatively measuring two-dimensional thermal gradients on surfaces with scanning probe microscopes of Digital's Nanoscope, Multimode, and Dimension series. Scanning thermal microscopy can be used, for example, to examine semiconductor electrical circuits for thermal gradients, to evaluate magnetoresistive head performance for data storage, or to identify hot spots that might indicate the failure of an integrated circuit.

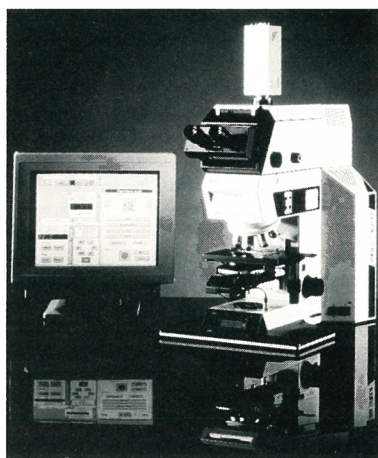
Resolution depends on the sample. The best observed spatial resolution—100 to 200 nm—was measured on electrically biased magnetoresistive stripes of magnetic data-storage read elements. The nominal maximum temperature is about 300°C.

The module includes scanning thermal microscopy electronics added on to the user's Multimode or Dimension AFM head, plus software, tip holder and five AFM probes with integrated thermal sensors. *Digital Instruments, 520 East Montecito Street, Santa Barbara, California 93103*

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### Automated Microscope with Infinity Optics for Biomedical or Materials Research

With the introduction of its new model DM RXA microscope, Leica claims to have taken a significant step toward automation, system integration and computer control of optical microscopy. The new microscope is designed for use in biomedical and materials research.



The DM RXA is a modular instrument that can be controlled by a personal computer. All of the microscope functions use software protocols compatible with Windows 95 and Windows NT.

The microscope can be used, for example, for telemicroscopy, or by remote control in contaminated rooms. An RS232C interface enables provides computer control of all motorized functions, including precise z-axis repositioning and three levels of fine focus. The motorized 6- or 7-place nosepiece is changed by push button. Zoom observation is motorized. The imaging module has a zoom magnification range of 0.9–2.5×, providing a total microscope magnification range of up to 6250×. *Leica, 111 Deer Lake Road, Deerfield, Illinois 60015*

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### Scanning Probe Microscopy in High-Temperature and Liquid Environments

The Autoprobe VP2 scanning probe microscope from Park Scientific Instruments is designed to allow atomic force

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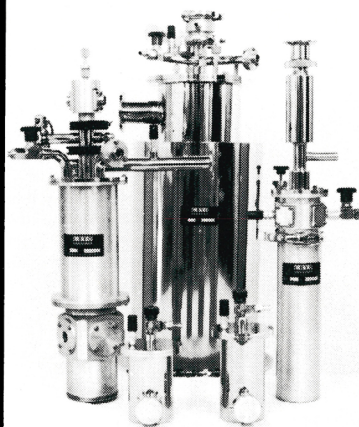
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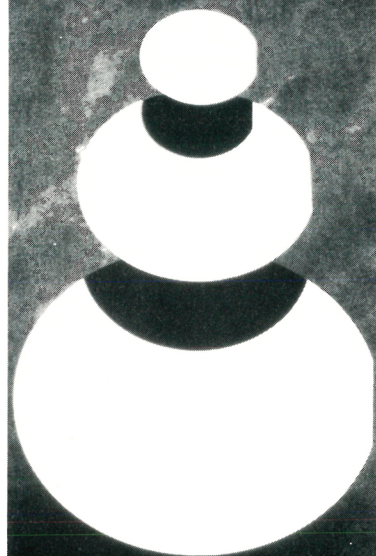
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and scanning tunneling microscopy measurements in an ultrahigh-vacuum environment. Images have been acquired for AFM up to 300 °C and for STM up to 600 °C. The architecture of the microscope head allows transfer of samples from several directions, and the microscope's piezoresistive cantilever system is said to ease *in situ* interchange of AFM and STM probes. The VP2 also allows a variety of spectroscopic measurements, including current and conductance as functions of voltage and probe position. The Windows-95-compatible software handles data acquisition and image processing. Applications include temperature-dependent analyses in surface physics and condensed matter physics.

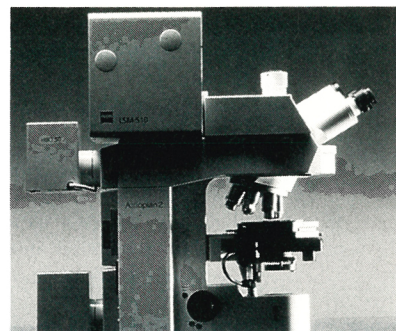
Also available is the Microcell, a liquid cell for ambient scanning probe microscopes. The cell holds approximately 100 microliters of liquid, and its input and output ports allow fluids to be exchanged rapidly without removing the cell from the microscope. Applications include studies of surface response to liquids in biomedical physics and materials science. *Park Scientific Instruments, 1171 Borregas Avenue, Sunnyvale, California 94089*

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## Confocal, High-Resolution Laser Scanning Microscope

The new LSM 510 laser scanning microscope from Carl Zeiss, intended primarily for biomedical research, combines confocal microscopy with a high level of automation. It combines the compact LSM 510 scanning module with the firm's upright Axioplan 2 microscope or the inverted Axiovert microscope. The module can be attached to either type of microscope. This arrangement is claimed to provide the user with the shortest possible light paths, to ensure high optical precision and stability as well as flexibility. The modular design facilitates upgrading and retrofitting.

In the LSM 510 module, six detectors are integrated in a compact space. Each of the four confocal channels has its own computer-controlled optical spatial filter. That's particularly useful for multifuorescence applications. The maximum resolution is provided by 2048 × 2048 pixels. Twelve-bit analog-to-digital conversion provides 4096 brightness levels for each pixel. The system's large scanning fields displays small details without loss of information. Because the microscope stands



and the laser scanning module are motorized, one can switch rapidly between different techniques. *Carl Zeiss Inc., One Zeiss Drive, Thornwood, New York 10594*

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## Nanopositioning Systems for Scanning Probe Microscopy

Queensgate's new NPS series of "next generation" nanopositioning systems addresses the need for higher positioning precision in scanning probe microscopy at the atomic level of resolution. With electronics designed to control the firm's nanometer-precision mechanisms, this new series uses digital-signal-processing NPS3000 controllers, which combine piezoelectric drive amplifiers, capacitance position-sensing circuitry and servomechanism control capability.

Built-in digital algorithms are claimed to minimize settling times and the effects of mechanical resonances. Proprietary control techniques allow 21-bit resolution. That, we are told, is 30 times better than what was previously available. The system's virtual front panel facilitates the user's control of all operating parameters, including the servo-loop setup. *Queensgate Instruments, 90 Merrick Avenue, Suite 600, East Meadow, New York 11554*

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## Scanning Probe Microscope for Many Modes in Different Vacuums and Temperatures

JOEL USA is offering its new model JSTM4200D multipurpose scanning probe microscope, capable of imaging in ambient atmosphere or high vacuum, and over a considerable temperature range. Its imaging modes include scanning tunneling microscopy and

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**NIMs**  
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**RELIABILITY**



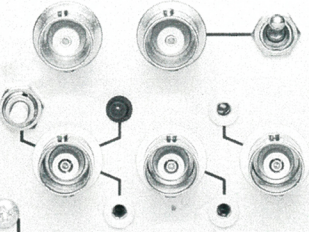
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spectroscopy, current-imaging tunneling spectroscopy, atomic and frictional force microscopies, AFM in noncontact and discrete-contact modes, lateral-modulation FFM, magnetic force microscopy, and micro-viscoelasticity microscopy.

The basic instrument is vibrationally isolated by a pneumatic table. High vacuum is achieved by interfacing a small turbopump to the table. A bell jar is provided and an accessory collar is available for vacuum interfacing. An optional liquid-nitrogen stage allows cooling to 100 K, or one can heat samples to 800 K.

The microscope is operated by a Windows-based controller. It includes an oscilloscope function, simultaneous 4-channel input, and multiwindow image display. One can convert the slow scan image to television rate for videotaping of dynamic processes. **JOEL USA, 11 Dearborn Road, Peabody, Massachusetts 01960**

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## Variable-Temperature Ultrahigh-Vacuum Scanning Probe Microscope

Omicron's new variable-temperature ultrahigh-vacuum scanning probe microscope lets the user do scanning tunneling microscopy at temperatures from 25 to 1500 K and atomic force microscopy from 25 to 900 K. This makes possible structural investigation of temperature-dependent processes on nonconducting surfaces.

The AFM uses a needle sensor with a temperature-compensated quartz resonator that carries the tip, vibrating at 1 MHz normal to the surface. In the AFM mode, the needle sensor replacing the STM tip can be used immediately, without any adjustment. A high-sensitivity phase detector provides distance regulation by measuring the phase shift caused by interaction with the surface. The instrument has resolved monatomic steps on Au(111) and Si(111) reconstructions. **Omicron Associates, 1738 N. Highland Road, Suite G101, Pittsburgh, Pennsylvania 15421**

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## High-Resolution, High-Contrast Transmission Electron Microscope

The H-7500 transmission electron microscope from Hitachi Scientific Instruments is designed to provide high resolution, high contrast and a wide field

of view. The device achieves magnifications up to 600 000 $\times$ , and still allows full area observation on a 160-mm screen at magnifications as low as 700 $\times$ . The device's side-entry goniometer is designed to facilitate refinding areas of interest, and the Windows-compatible software automates high-voltage application and beam setting.

The TEM has a "stigmator" to facilitate focusing and correct for astigmatism at low magnification. A pre-irradiation system prevents specimen drift and damage to the supporting membrane, and it is claimed to provide a low dose to minimize damage for beam-sensitive specimens. The device is intended for biomedical applications. **Hitachi Scientific Instruments, 7 Ivanhoe Road, Hogwood Lane Industrial Estate, Finchampstead, Wokingham, Berkshire RG40 4QQ, UK**

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## Charge-Coupled Device Imaging System for Astronomy

The Aurora astronomical imaging system from Photometrics is designed to provide both high-resolution imaging and a large field of view. The 2048  $\times$  2048-pixel, 30.7 mm  $\times$  30.7 mm charge-coupled device sensor is sensitive to light in the wavelength range 200–1000 nm. When cooled to  $-90^{\circ}\text{C}$  by the liquid-nitrogen cooling system, a typical camera has a dark current of 3 electrons per pixel per hour, a read noise of 5 electrons and a nonlinearity of 0.8%. Each camera comes with documentation detailing its measured dark current, read noise, linearity, full-well capacity, detector gain and bias. Temperature is regulated by a closed-loop controller to within 0.1  $^{\circ}\text{C}$ , and the 2-liter dewar provides up to 18 hours of continuous operation. The camera's shutter is controlled by means of a transistor-to-transistor logic signal, and the device can be integrated with a personal computer. **Photometrics, 3440 East Britannia Drive, Tucson, Arizona**

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## New Literature

**Remote video inspection**—Olympus America has published a brochure describing its model IV6C5 video imagescope—a 6-mm-diameter CCD sensor designed to probe difficult-to-reach equipment interiors. **Olympus America, Industrial Products Group, Two Corporate Center Drive Melville, New York 11747-3157**