

An Overview of New Products at the Denver X-ray Conference

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This article provides a brief overview of some of the latest spectroscopy-related equipment and supplies scheduled to be introduced at the 2003 Denver X-ray Conference at the Denver Marriott Tech Center Hotel in Denver, Colorado, August 4–8, 2003.

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GBC SCIENTIFIC

The model XR-100CR high-resolution detector will be introduced at the 2003 Denver X-ray Conference (DXC) by **Amptek** (Bedford, MA). The XR-100CR incorporates a solid-state design, a Si-PIN detector, a thermoelectric cooler, a hermetic package, a wide detection range, and a beryllium window. The detector reportedly achieves a resolution of less than 155 eV and improved resolution at high counting rates. The XR-100CR was selected for NASA's Mars Pathfinder Mission, where it will be placed on the Sojourner arm to perform rock and soil analysis via x-ray fluorescence (XRF) techniques.

Bruker AXS (Madison, WI) will introduce three products at 2003 DXC. The S2 Ranger energy dispersive x-ray fluorescence (EDXRF) spectrometer integrates the computer, touch screen, printer, and vacuum pump in a single cabinet. Users can add new samples to the x-y autosampler even during measurement. The D4 Endeavor XRD diffractometer will handle 66 to 120 samples of variable sizes and shapes. The

diffractometer can be used for qualitative and quantitative phase analysis, micro-strain and crystallite size determination, residual stress analysis, and crystal structure refinement and solution. Quantitative phase analysis can be automated with TOPAS Rietveld software. The S4 Pioneer XRF spectrometer is designed for beryllium-uranium

analysis of solids, liquids, and powders. The S4 Pioneer instrument combines 4-kW technology, analytically intelligent software, and versatile sample handling in 0.8 m² of laboratory space.

The Eagle III μ -Probe benchtop micro-XRF elemental analyzer from **EDAX** (Mahwah, NJ) uses capillary optics to concentrate the x-ray beam to a 100- μ m diameter on the sample. The instrument includes high-intensity x-ray optics, a CCD video imaging camera, and motorized xyz stage to allow nondestructive, simultaneous sodium through uranium analysis on solids, liquids, and powders. The Eagle III XPL configuration equips the instrument with a variable spot size of 35 to 150 μ m and an automated primary filter control. The analyzer can be used for nondestructive testing, forensics, failure analysis, coating thickness and composition measurements, particle/inclusion analysis, and quality control.

The MMA minimaterials analyzer x-ray diffractometer from **GBC Scientific** (Arlington Heights, IL) is designed for all routine powder diffraction tasks in

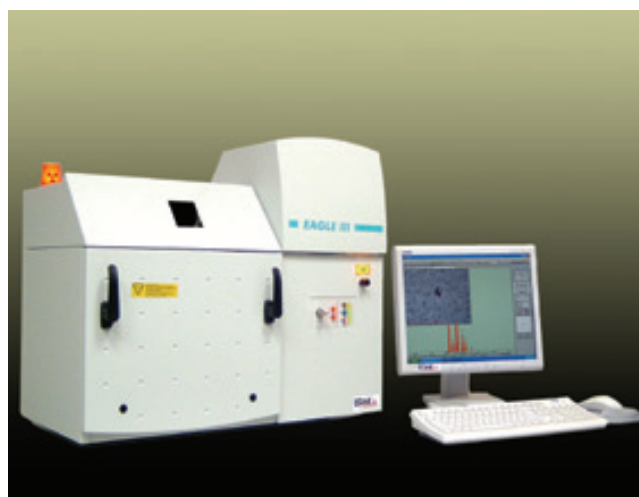


parallel beam and focusing modes. According to the company, when the MMA is in parallel beam mode, with the polycapillary optic, the MMA offers 10× better intensity and 20× better particle statistics, compared with traditional technologies. The diffractometer gives high-definition pole figures with short counting times for texture, as well as for powder patterns on irregular surfaces.

The company also offers an x-ray fluorescence detector accessory for the MMA, which provides chemical confirmation information to assist in the search/match identification of compounds in a sample.

GBC Scientific's "Slim-line" Eulerian Cradle accessory extends the MMA's capabilities to texture and orthogonal psi residual stress analysis. The cradle can go as high as 155° 2- θ , retaining peak shape and intensity for techniques such as residual stress analysis.

The company's new 32-bit software is designed for multiaxis powder scanning and collection of pole figures. Traces v6 combines texture analysis software and screen processing of powder scans.



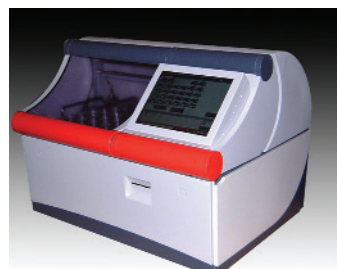
The Shimadzu MICRO EDX spectrometers from **Kratos Analytical** (Chestnut Ridge, NY) are designed for micro-analyzing materials such as electronic components, circuit boards, and foreign matter in food. A new Polycapillary Lens system (patent pending) generates the sensitivity and resolution required to perform microanalysis of areas as small as 50 μm . A new optical system (patent pending) irradiates the sample from above. The arrangement of the capillaries and detector allows minimal attenuation of the primary and fluorescence x-rays and permits the analysis of light to heavy elements in air.

The Cryostream Plus from **Oxford Cryosystems** (Oxford, United Kingdom, and Boston, MA) is a modified model in the company's Cryostream 700 series, offering an extended temperature range of 80–500 K. The Cryostream Plus is designed for users who need to heat their samples to temperatures higher than 200 °C for phase transition studies, or driving off solvents in pharmaceutical powder work, but who also need to reach temperatures as low as 80 or 100 K. The Cryostream Plus retains high temperature stability of more than 0.1 K and low liquid nitrogen consumption.

The company also announces the launch of PheniX, a closed-cycle helium cryostat designed for cooling flat plate powder samples on standard vertical powder diffractometers down to temperatures as low as 11 K. It has a fast cool-down time, achieving 20 K in 35 min and 11 K in a further 25 min. To facilitate sample change, the PheniX has a warm-up time of only 40 min. The cryostat also has a moving sample stage that allows scattered x-rays to be collected in the full 2- θ range as the stage rotates with the goniometer.

The Twin-X benchtop XRF spectrometer from **Oxford Instruments** (High Wycombe, United Kingdom) allows the rapid, nondestructive measurement of solids, liquids, powders, and pastes. The system combines two detector technologies offering performance over a wide elemental range. Other features include a 10-position autosampler and an integrated PC. The XRF spectrometer can be used for applications including production control, research and development, and education.

PANalytical (Almelo, The Netherlands) will be showcasing two products at 2003 DXC. The X'Pert PRO Alpha-1 system is a diffractometer that includes a symmetrical incident beam Johansson monochromator and the company's X'Celerator detector. The company reports that the monochromatic diffractograms obtained with the instrument have excellent peak-to-background ratio and a resolution that can only be improved by synchrotron diffractometers equipped with analyzer crystals.



The system features PreFIX technology, allowing reconfiguration of the x-ray optical setup. For example, the system can be changed from a para-focusing setup to a Debye-Scherrer geometry, in which the powder sample is in a tiny glass capillary, suitable for analysis of organic samples.

The Epsilon 5 is an EDXRF spectrometer optimized for low-level detection of heavy elements. The system detects elements from sodium to uranium in solid, pressed-powder, granular, liquid, thin-film, and loose material samples. Measurements can be performed in a vacuum or helium atmosphere. The system combines three-dimensional, polarizing optical geometry with the company's 600-W x-ray tube. Operating at a maximum power

of 600 W with excitation voltages from 24 to 100 kV, the tube's Gd anode enhances the fluorescence of elements in the rhodium to barium range. As many as 15 programmable polarizing targets can be mounted in the instrument, allowing it to be tuned to get low detection limits for a large number of elements.

The ZSX Primus XRF spectrometer from **Rigaku** (The Woodlands, TX) offers mapping and small sampling capabilities, and features a mapping system that can be added in the field according to application requirements. The instrument integrates a sample-handling system, changeover between helium and vacuum environments, and a thin end window tube.

The X-Beam product line from **X-Ray Optical Systems** (Albany, NY) delivers a stable x-ray beam through the integration of low-power, air-cooled x-ray sources with the company's polycapillary and doubly curved crystal optics.



In addition to its polychromatic x-ray beam products, the company is introducing a parallel beam version for application in XRD instruments, as well as a monochromatic product featuring small spot, intense, and stable x-ray beams for use in monochromatic micro-XRF analysis. The plug-and-play system design enables in-the-field exchanges and reportedly delivers consistent performance from beam to beam.

Features include a shutter assembly compatible with regulatory requirements and as many as three integrated x-ray beam filters. Intensity gain and sample spot size reduction enhancements have also been incorporated into the product line. ■