

MMA

MINI MATERIALS ANALYZER



www.GBCsci.com
SCIENTIFIC EQUIPMENT

Who is GBC Scientific Equipment?

GBC Scientific Equipment Pty Ltd commenced operations in 1978. GBC designs, manufactures and markets a range of scientific instruments comprising Atomic Absorption spectrometers (AAS), UV-Visible spectrometers (UV-Vis), Inductively Coupled Plasma Optical Emission spectrometers (ICP-OES), Inductively Coupled Plasma Time of Flight Mass spectrometers (ICP-TOFMS), High Performance Liquid Chromatographs (HPLC) Rheometry and now—XRD.



Endorsed by the international quality standard, ISO 9001, the company prides itself on developing products, which not only meet, but exceed market expectations. GBC has been

the recipient of many international export awards, acknowledging the superior standard and world acceptance of both the organisation and the products.

The company's head office is based in Melbourne, Australia and its USA subsidiary office is situated at Arlington Heights, Illinois. Worldwide, GBC is represented by one of the largest distribution networks, in over 85 countries. Now more than 20 years after its inception, GBC is renowned in the elemental analysis field as a result of its successful AAS, ICP and UV-Vis portfolio. The company is now leading the world in instrument development, launching the most technically advanced ICP-TOFMS, the new Micro Fourier Rheometer (MFR 2100) and even more recently in **XRD- the MMA Mini Materials Analyzer**.

GBC customers benefit from our efficient and effective global organization. Access to information, applications support and technical service is never more than a phone call or email away.

ISO 9001 QUALITY ACCREDITATION

GBC has always placed a strong emphasis on quality in all aspects of our operation, from design and manufacture to the provision of service and support to our customers, and we are fully committed to continuous evaluation and improvement in all areas.

The GBC Quality Management System has been accredited to the ISO 9001 quality standard by Lloyd's Register Quality Assurance Limited. This certification is your assurance that the procedures and processes used to produce the goods and services which GBC provides comply with the relevant International Standard, and demonstrates our commitment to meeting the needs and expectations of our customers.



What is the GBC vision?

GBC Scientific Equipment

will

advance people's knowledge

and

their capacity to enhance the quality of life

for all humankind.



GBC's product lines...



AAS



HPLC



ICP-OES



ICP-oTOFMS



Rheometer



UV-Vis



XRD

eXcellent XRD solutions...



GBC Diffttech - The story of GBC Scientific Equipment and Diffraction Technology

In 2001, GBC Scientific Equipment identified XRD technology as being an excellent addition to an already strong product line-up.

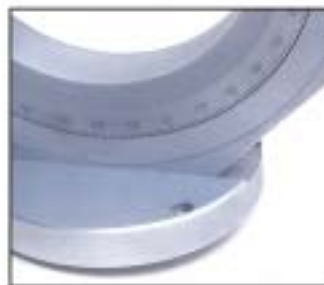
GBC Scientific Equipment met with Diffraction Technology the same year and realized that Diffraction Technology had the same level of commitment to producing quality product and providing outstanding service that GBC has had since its own beginning in 1978.

Now you can associate the name "GBC Diffttech" with world-class XRD solutions at an affordable price.

GBC Diffttech is proud to offer you the MMA - Mini Materials Analyzer. A design that was originally produced by Diffraction Technology, the GBC Diffttech MMA is an instrument that incorporates the same uniqueness, flexibility and reliability that the original design offered.

But the benefits of GBC Diffttech XRD don't stop there! The old name of Diffraction Technology - now coupled with GBC's wider support network and over 20 years of experience in producing quality analytical solutions - means GBC Diffttech XRD and the MMA - are the best XRD solutions you could ever ask for.

If you're thinking of XRD...
...think GBC Diffttech!



Find out more...

...about GBC Scientific Equipment at our website...

<http://www.gbcsci.com>

GBC Diffttech XRD - MMA

The ultimate materials analyzer

GBC Diffttech introduces you to a diffractometer which truly deserves the title of a "materials analyzer" as it offers -

- Interchangeable parallel beam and focussing geometry
- Interchangeable powder stage and Eulerian Cradle
- Parallel beam detector with 0.4 degree soller-slit collimator
- Focussing detector with interchangeable slits and Graphite monochromator
- Both detectors permanently mounted

- XOS[®] polycapillary optic giving 10 x 10 mm quasi-parallel beam
- Parallel beam radius 250 mm, focussing radius 175 mm to 250mm
- Eulerian Cradle for Texture and residual stress
- X-ray fluorescence detector for simultaneous XRF and XRD

The "Mini" part comes from the benchtop design of the cabinets but this is the only miniaturized part of the instrument (apart from the price!).

Other unique features of the instrument are -

- Light-weight with carry handles, two people can transport it.
- Revolutionary Harmonic gearbox goniometer
- Large wide - opening interlocked Leaded Acrylic doors
- Software controlled shutter with override key and front push button
- Reliable and proven electronics
- Transportable - can be moved without upsetting alignment - ideal for field use.



*Glancing Incidence /
Parallel Beam Attachment*



Standard Stage



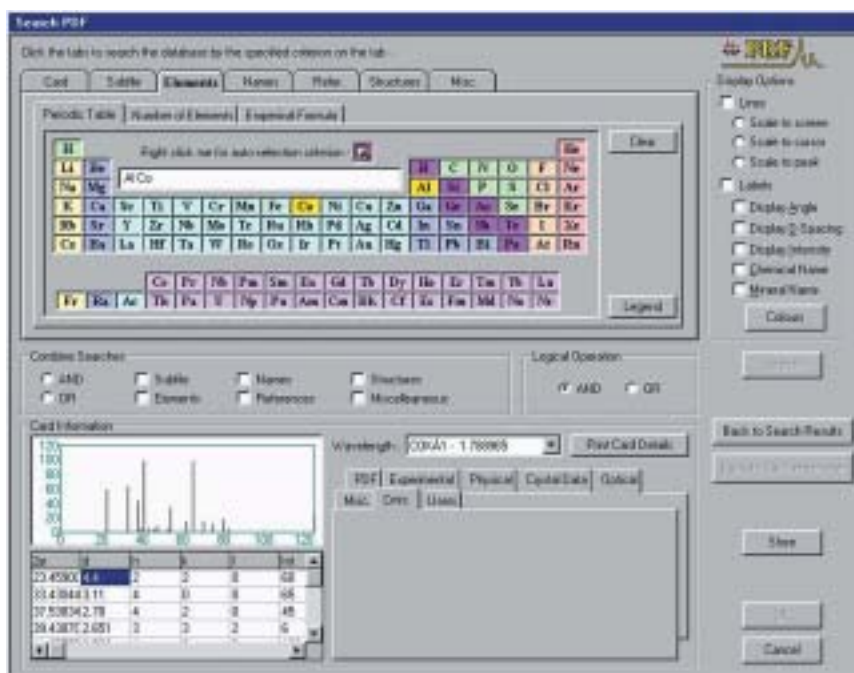
*Graphite Curved
Crystal Monochromator*

Reliable and proven design

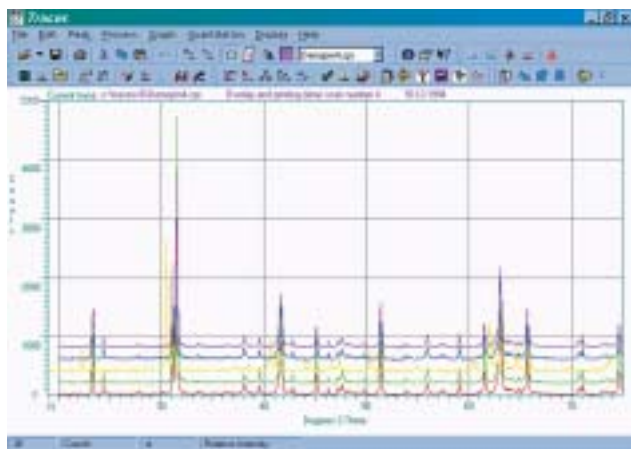
GBC Difftech XRD - MMA Software

The Software is fully capable of supporting all the functions of the hardware -

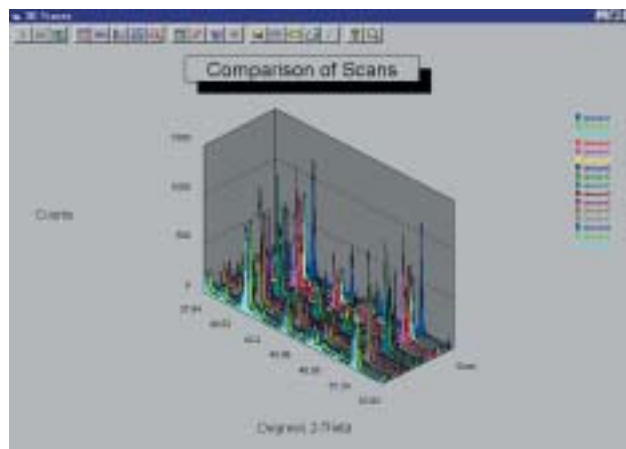
- The instrument is a true 4-axis unit with scans available in all 4 axes.
- All software modules are 32-bit applications.
- **VisualXRD** provides for multi-axis powder scanning,
- **VisualTex** provides for collection of pole figures in formats to input to all modern Texture Analysis software.
- **Tracesv6** provides screen processing of powder scans with facilities to match any package available.



The built in ICDD® Database access assists you in identifying your sample



Overlay trace scans to compare results



Advanced graphics features enable you to do 3-D plots

Impressive processing power

GBC Difftech XRD - MMA

What can it do better?

First, Texture - the availability of parallel beam geometry using a polycapillary optic means better intensity by a factor of 10 x, better particle statistics by a factor of 20 x

(based on a Schulz collimator irradiated area of 5 mm² vs 100 mm² for the polycapillary optic), no stage translation needed, same peak width at all Chi angles, Chi angles up to 85 deg useable, thin film textures can be done with a sensitivity unobtainable before.

Second, Thin Film - the polycapillary optic has an intrinsic collimation of approx. 0.3 deg so its performance at very low angles is excellent, sensitivity is better by a factor of typically 5 x, no slits are needed, but an aperture can be used to limit irradiated area at glancing angles.

Alternatively, the MMA can be fitted with a graded d-shaping mirror optic for enhanced surface analysis at higher resolution, or capillary methods to minimize preferred orientation.

The powder stage has very precise height adjustment in a 3 point mounting (micrometer height setting an option).

Third, Powder, Parallel mode - There is no focussing requirement, so there is no requirement to fix sample height, samples can be rough and irregular, Peaks will always be in calibration, intensities at high angles are better by a factor of 10 x (based on a 1 deg. slit irradiated area of 1 mm x 10 mm vs 10 mm x 10 mm for the polycapillary optic), the X-ray fluorescence detector gives simultaneous chemical data to aid qualitative ID.

Fourth, Powder, Focussing mode - for high resolution focussing scanning, the powder stage has tripod mount allowing very precise height adjustment, Radius is variable from 175 mm out to 250 mm ($K\alpha_1$ and $K\alpha_2$ peaks completely separated at 80 deg. with $CuK\alpha$), the X-ray fluorescence detector gives simultaneous chemical data to aid qualitative ID.

Fifth, Residual Stress - The slim-line Eulerian Cradle can go to 155 deg 2Theta, the lack of defocussing and retention of peak shape means better peak centroid measurement and better intensities mean better statistics and faster measurements.



Eulerian Cradle



*High Temperature Stage
PAAR HTK-16®*



XOS® Polycapillary Optic

Precision components

GBC Difftech XRD - MMA

Specifications

X-ray Generator	Type Max. Power kV range mA range Power Stability Ripple Long Term Stability	IGBT Technology 3.0kw 0-60kv 0-80mA 230 VAC +- 10% 0.005% for full load change 0.005% for 10% rms line change 0.03% rms 0.01% over 8 hours
Goniometer	Type Radius Range Min. Step Size Slow Speed Scanning Speed Optics Monochromators Stages	Twin co-axial harmonic Independent axes Zero Backlash 180 to 250mm, variable -30° to 160°, depends on focussing configuration 0.002° 120°/min with multi-pass averaging 0.0002°\min to 60°\min Interchangeable slit focussing & parallel (polycapillary) optic Graphite with removable soller slit, Glancing Incidence with LiF crystal Standard Stage, Eulerian Cradle - many custom stages can be fitted.
Detectors & Counting Electronics	Detector Type Linearity HV PHA Option	Xe proportional, Be Window to 50000 CPS to 2kV Computer Controlled MBraun 50mm linear PSD Area Detectors
Eulerian Cradle	Type Ranges Min Step Sizes	Micro-thin bearing and timing belt Chi +105° to -155° Phi 360° Chi 0.002° Phi 0.008°
Optics	Slit Holder Parallel Beam	Soller Slit and interchangeable slits Pre-aligned dovetail XOS [®] Polycapillary with 10 X 10mm cross section Graded d-spacing mirror from Osmic [®]
Options	Options Type Options - Auto Loader Type Options	Fluorescence Detector Si PIN Diode Peltier Cooled, mounted on Screw - in slide mount Amp/Power Supply/Interface/ software/MCA Board included 5 Samples, rotary High Temperature Stages Controlled environment stages Base cabinet provides extra storage space

Excellent specifications

MMA Dimensions

Packed - 1300 x 900 W x 1100 H

Unpacked - 1100 x 700 W x 900 H

MMA Weights

Packed - 110 Kg

Unpacked - 90 Kg

Cover Photography

Crocoite (geological sample) from Adelaide Mine, Dundas, Tasmania
Photo courtesy of Albert Chapman Collection / Australian Museum, Nature Focus

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GBC SCIENTIFIC EQUIPMENT

Manufacturer of world-class scientific instruments and accessories -
AA, HPLC, ICP-OES, ICP-TOFMS, Rheometry, UV-Vis and XRD

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