

ULTRA GID – THIN FILM CHARACTERIZATION THE SMART WAY

ULTRA GID is a unique and versatile set up for **In-Plane Grazing Incidence Diffraction (IP-GID)**. IP-GID is especially useful for the characterization of ultra thin films with thicknesses in the range down to some nanometers.

The ULTRA GID allows reproducible switching of the incident, line focus X-ray beam between two orientations – parallel and perpendicular with respect to plane of diffraction. In the parallel orientation, the line focus beam is parallel to the sample surface resulting in a drastical increase of primary beam intensity for IP-GID applications.

Furthermore, the incident beam angle can be tuned $\pm 3^\circ$ by a motorized rotation. This is used to set the required incident angle or for depth profiling of thin films in IP-GID applications.

All other thin film applications – like X-ray reflectometry, texture, stress and high resolution X-ray diffraction – are accomplished with the perpendicular beam orientation.

The complete ULTRA GID set up typically consists of a horizontal D8 DISCOVER equipped with an Eulerian cradle. The recommended primary optics is a 60 mm third generation Göbel Mirror with Rotary Absorber, slit holder and collimator. Optional a two-bounce Ge(220) monochromator for high resolution applications can be added. For IP-GID applications a well-defined penetration depth is achieved by keeping the sample parallel to the scattering plane using the zeta/xi tilt stage. For the detection of the diffracted beam a parallel beam attachment is recommended.



Fig. 1: In the ULTRA GID set up the X-ray source can be reproducibly switched between two orientations.

The flexibility to orient the X-ray beam parallel to the sample surface combined with the high-flux Göbel Mirror optics is crucial for IP-GID measurements on ultra thin films. This provides an increased IP-GID film signal by a factor of up to 100 (for typical sample sizes of 10 mm x 10mm), in comparison to a point focus set up .

The ULTRA GID is the perfect extension of features of the D8 DISCOVER DIFFRACTION SOLUTIONS. It fits the needs of ultra thin film research including organic thin films and magnetic films.



Fig. 2: In the IP-GID configuration the line focus X-ray beam is oriented parallel to the scattering plane.



Fig. 3: For all other applications the line focus beam is perpendicular to the scattering plane.

Specifications

The ULTRA GID set up includes a double dove tail track and a motorized tube rotation with cables.

Technical Data

Tube rotation (motorized)

Range
Accuracy

Incident beam angle

$\pm 3^\circ$
<0.01°

Compatibility

D8 DISCOVER with horizontal goniometer
¼-circle or centric Eulerian cradle
258 mm measurement height
Zeta/xi tilt stage

Primary measurement circle radius

Predefined 454 mm for IP-GID
Variable for all other applications

Accessories (required)

One free port on a 4-axis motor driver board

Order number

Upgrade
With system

A18B300
7KP2025- 3T (including high voltage cable and tube housing)

BRUKER AXS GMBH
OESTLICHE RHEINBRUECKENSTR. 49
D-76187 KARLSRUHE
GERMANY
TEL. +49 (0) 721 595-2888
FAX +49 (0) 721 595-4587
EMAIL info@bruker-axs.de
www.bruker-axs.de

BRUKER AXS, INC.
5465 EAST CHERYL PARKWAY
MADISON, WI 53711-5373
USA
TEL. (+1) (800) 234-XRAY
TEL. (+1) (608) 276-3000
FAX (+1) (608) 276-3006
EMAIL info@bruker-axs.com
www.bruker-axs.com