

A micro beam collimator for high resolution XRD investigations with conventional diffractometers

Description

This invention relates to x-Ray characterisation techniques. A collimating system has been developed for condensing hard x-rays, providing very thin but intense low divergent beams. This technique for beam compression and focusing can be used in conventional X-ray diffractometers with Bragg-Brentano geometry. To overcome low intensity of incident and diffracted lights, the presented micro-beam was purposely designed with a line-shaped rectangular cross-section thin enough in one direction such that fine structure changes can be detected, but long enough in the other direction such that a large number of grains are exposed for diffraction. Due to this high brilliance, the condenser can be operated in common X-ray diffractometers to perform high resolution structure analysis of very thin but long solid layers or interfaces.

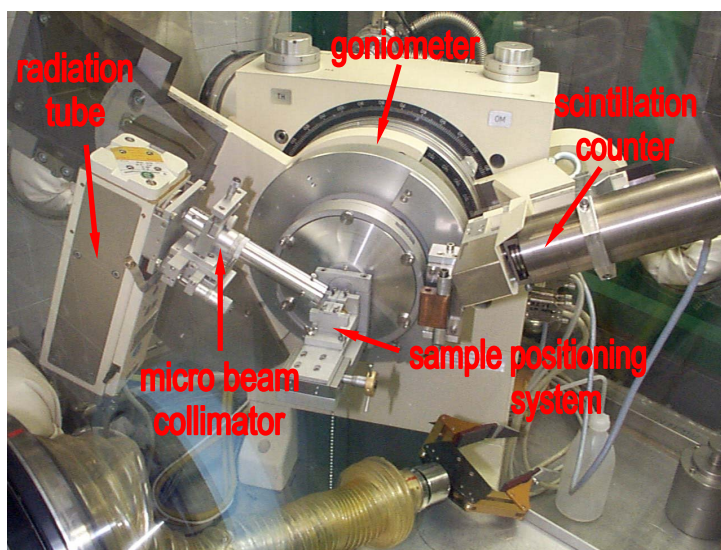
Compared to glass-capillary construction, the presented metallic concentrator shows some additional advantages: constant intensity of the beam during operation (no heating effect); no radiation leakage through the reflecting walls; no radiation damages in the reflecting Ni-plates, hence decrease in reflecting power. The low beam divergence also allows placing the micro-beam device at higher distances from the sample surface without sensible loss of spatial resolution.

Innovative aspects and main advantages

- Total reflection critical angle much higher than glass capillary tubes
- Higher mechanical resistance than glass allowing more stable and longer capillary constructions
- Structural analysis of very thin but long samples
- Constant beam intensity during operation (no heating effects)
- No radiation leakage
- No radiation damages
- Higher analysis distances

Areas of application

- x-Ray diffractometry
- x-Ray lithography



Stages of development

Patent Priority date	27/09/2000
Patent granted	CA2423150 EP1193492
Patent pending	JP, US

Mature technology. License available.

Scientific Contact

Dr. Dimitrios Papaioannou
Joint research Centre, ITU
European Commission
D-76125 Karlsruhe, Germany
Tel: (+49)7247-951281
Email address: papaioannou.dimitrios@jrc.it

Licensing Contact

Intellectual Property and Scientific Collaboration Unit
DG JRC - European Commission
B-1049 Brussels, Belgium
Email: JRC-TechTransfer@ec.europa.eu

Reference: file n°2661