Polycapillary X-ray Optics for Micro XRF and XRD

XOS is the leading global manufacturer of polycapillary X-ray optics. These state-of-the-art optics capture a large solid angle of X-rays from a source and redirect them to a micron-sized focal spot or highly collimated beam. The use of polycapillary optics can significantly enhance the performance of X-ray analysis in many applications, including X-ray fluorescence (XRF) and X-ray diffraction (XRD).

Unpackaged Polycapillary Optics

Packaged Polycapillary Optics

Features and Benefits

- X-ray flux density gain up to 10,000 times greater than conventional pinhole collimator
- Focal spot as small as 5μm
- Broad spectral bandwidth: 10eV-50keV
- Customizable optic design for optimal performance
- Halo reduction optics optimized for high-energy applications
- Increased analytical speed in micro XRF for fine-feature analysis and high-resolution mapping
- Large, quasi-parallel X-ray beam for XRD and XRF

Custom Optic Solutions

XOS offers custom polycapillary X-ray optic solutions based on customer application requirements. Below are typical X-ray optic geometries, performance specifications and applications.

Focusing Optics							
Working distance (mm)	2	4	9	20	50	100	200
Focal spot size* (μm, FWHM, 17.4keV)	7	15	25	45	100	180	300
Intensity gain* (vs a plnhole collimator of same size, 100mm from the source)	6000	4500	3500	2000	800	300	120

Applications include micro-XRF for elemental mapping, plating thickness and fine feature analysis.

Note: *With a 100μm X-ray source.

Half-focusing Optics (XRF/XAS)					
Working distance (mm)	2	4	9	20	50
Focal spot size* (μm, FWHM, 17.4keV)	7	15	25	45	100
Intensity gain* (vs a pinhole collimator of same size)	850	550	400	200	80

Applications include micro XRF, micro XAS, and confocal XRF.

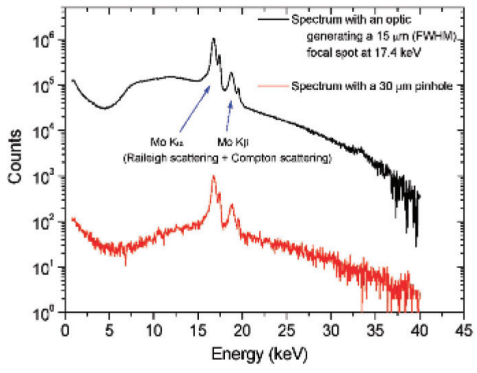
Note: *With an incident beam of 2mm in diameter and a divergent angle of <0.5mrad

Collimating/Parallel Beam Optics (XRD/WDS/XRF)								
Output beam diameter (mm)	0.5	1	2	3	4	6	10	15
Intensity gain*	12	45	130	250	370	470	680	850

Applications include powder XRD, texture and stress analysis, WDS and confocal XRF.

Note: *With a 50μm X-ray source at 8keV, The IFD of the optics is 18mm and the output divergent angle is 0.2 degree.

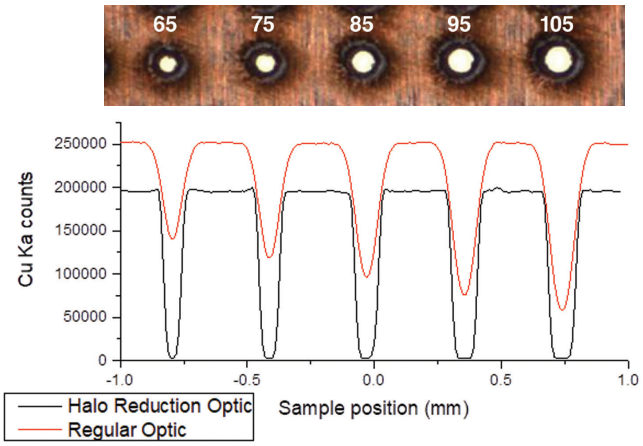
Figure 1: Spectra of X-rays Scattered from Plexiglas



Comparison of MXRF spectra generated using a focusing polycapillary optic and a pinhole aperture. The spectra was collected by scattering a Mo beam off Plexiglas.

Figure 2: High-resolution XRF Mapping Using a Halo Reduction Polycapillary Optic

1D XRF scan (bottom), of a copper PCB sample (top), using both a regular and a halo reduction polycapillary optic, each with a 15μm focal spot. The high-energy halo effect is clearly visible with regular optic while it is eliminated with the halo reduction optic.



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