

SELECTING THE APPROPRIATE X-RAY OPTIC FOR THE RIGHT APPLICATION

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In laboratory-based micro X-ray fluorescence (MXRF) there is a variety of X-ray optics which can spatially modify the excitation x-ray beam. These range from the simple single capillary to capillary bundles to the complex doubly curved crystals (DCC). Although apertures are used in commercial instrumentation for beam modification, they merely restrict the beam to a certain spot size on the sample; whereas the optics mentioned each have specific characteristics which enables spatially restricted elemental analyses. Each optic offers its own unique features which can provide spectroscopic enhancements not available in the other x-ray optics. The single capillary can be fabricated in a variety of shapes to enable increased flux and high spatial resolution, albeit at the cost of x-ray flux on the sample. The polycapillary offers high x-ray intensity at the sample by focusing the x-rays to spots as small as 10 micrometers. The high x-ray intensity translates into high sensitivity which is particularly useful in elemental mapping. The DCC optics are useful in generating high sensitivity and low background. These attributes are especially desirable in instances where low detection limits are desired. The high sensitivity is achieved from the monochromatic nature of the DCC, while still retaining the point focusing capability. The features of each optic will be highlighted with selected samples, illustrating sensitivity, background reduction and spatial resolution.