

Non-traditional Multilayer Kirkpatrick-Baez Optics for various laboratory applications

Part 2. Four-corners and multi-corners optic

Boris Verman, Bodo Ehlers, RIT, Inc,
boris.verman@rigaku.com

For applications, which do not put requirements to the incident beam convergence-divergence (as local XRF, for instance), more than one or two-corners could be used to construct multilayer Kirkpatrick-Baez optic to gain efficiency. The four-corners approach is particularly attractive. One design version of it allows to build four-corners optic using four mirrors gaining this way twice in efficiency compare with two-corners optic without involving additional optical components. Several versions of Beam Modules (a subsystem incorporating a microfocusing source and an optic) with four-corners optic were designed, built, tested and incorporated in semi metrology tool as x-ray beam generators for micro-XRF. Average performances of the existing Beam Modules and expected parameters of ones being under development are given in the table.

Four-corners optic based Beam Modules performances

Radiation	Cr Kalpha		AuLbeta		MoKalpha	
	existing	expected	existing	expected	existing	expected
Flux, Mph/s	160	250	23	47	29	55
Beam width at the optic focal plane, micrometers	27	23	30	25	28	24

Multi-corners optic is a logical extension of four-corner optic if further improvement in efficiency is needed. However, this approach is not the most natural solution for delivering a significant amount of x-ray photons from the source to a local area on the sample. A polycapillary optic and three-dimensional (ellipsoidal) multilayer optic can perform this task better in some instances with a visibly simpler design. Results of expected performances simulations for these three optics and recommendations about preferable areas of applications will be discussed.