

Use of Excitation Beam Conditioning to Optimize Energy Dispersive XRF Results

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X-ray Excitation beam conditioning has been implemented in Energy Dispersive XRF measurements from almost the inception of XRF instrumentation. The types of conditioning devices employed include transmission filters, secondary targets, polarizers and various shaped reflectors. The goals for excitation conditioning are generally to improve elemental detection limits over certain energy ranges of the spectrum. The mechanism for improving those limits mostly involve reducing scattered background from polychromatic sources to a greater extent than the fluoresced signal, but it can also be that conditioning serves to reduce other effects such as Bragg diffraction or electronic artifacts.

Implementation of any specific beam conditioning device in an EDXRF spectrometer must consider the geometry required to achieve the conditioning effect desired. Implementations will be discussed for transmission filters in a micro-XRF spectrometer and Bragg polarizer and shaped reflector in a benchtop XRF system each with relatively low power X-ray tubes in the range of 50W. Applications will be discussed covering a variety of inorganic and organic materials.