1- and 2D Detectors and Sample Fluorescence in XRD

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In the last decade, electronic 1- and 2-dimensional X-ray detectors have replaced scintillation detectors and X-ray films for both Single Crystal, and Powder Diffraction. For many applications, these detectors bring orders of magnitude increase in data collection efficiency, and as a result of that, they allow us to increase productivity and/or collect data with a higher accuracy within a reasonable time frame.

A consequence of these more 'open' detection systems is that they are more susceptible to scattered radiation, and also to photons with a wavelength differing from the chosen characteristic radiation, such as K-Beta radiation and sample fluorescence. This is especially visible in powder XRD as the traditional Bragg-Brentano diffractometer geometry includes a focusing diffracted beam monochromator, which takes out a lot of unwanted radiation.

For high-speed X-ray detectors, a focusing diffracted beam monochromator does not exist. This does not mean, however, that it is not possible to record diffractograms with a good peak-to-background ratio. Especially with sample fluorescence, there are a lot of options for obtaining a good result and this contribution is aimed to help selecting the best one. Measurements were analyzed which were carried out on samples of the first row of transition metals, ranging from Ti to Ga as a function of the following variables: tube anode material, use of incident or diffracted beam monochromators, use of incident or diffracted beam beta filters, Pulse Height Discrimination settings, and generator settings.

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