Simultaneous X-ray Fluorescence and Diffraction Imaging with the Color X-ray Camera

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The Color X-ray Camera [1] is a unique imaging spectrometer capable of recording both the position and energy of each X-ray event on the detector. This enables simultaneous X-ray fluorescence and X-ray diffraction measurements to occur [2]. Up to now, this technique has been restricted to single analysis points, but with newly developed advanced data processing and automation routines, it is now possible to perform simultaneous XRD-XRF imaging on samples of almost any size using a stage scanning system. With the CXC, the time per point required is usually between 200 ms and 1.5 s. In this relatively short measurement time, a full X-ray spectrum with an energy resolution of 145 eV at Mn K\textsubscript{α} is recorded along with a diffraction pattern with an angular range of approximately 150° 2θ. Figure 1 shows the results from the analysis of a multi-layered (PMZT) semiconductor structure. The X-ray beam (Mo anode, 35 kV at 800 µA) was collimated to a circular probe with a diameter of approximately 4 mm at the sample surface. The experiment was performed using the forward scattering geometry. This presentation will focus on the method of simultaneous XRD-XRF imaging, along with the practical applications of this new technique.

![Figure 1](image-url)

**Figure 1:** Images from a forward scattering, simultaneous XRD-XRF imaging experiment on a PMZT semiconductor structure. Although the XRD and XRF signals are simultaneously acquired with the CXC, they can be separated to reveal numerous structures on the sample.

References: