First Combined Scattering and Fluorescence Scanning Transmission Microscopy at the NanoMAX Beam Line at MAX IV

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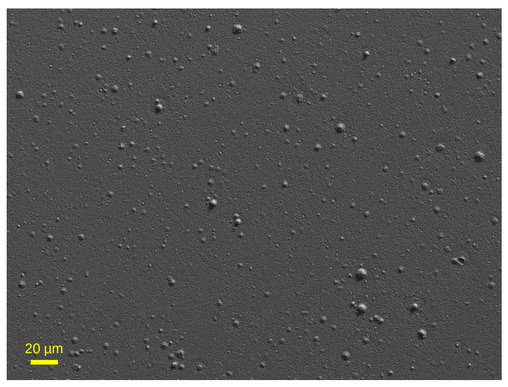
Overview & Motivation

Materials with the approximate stoichiometry Cu_2ZnSnS_4 with the crystal structure of the mineral kesterite are currently being investigated as promising materials for thin film solar cell fabrication. We acquired fluorescence and scattering maps of a pulsed layer deposited (PLD) kesterite sample at the NanoMAX beam line at MAX IV, presently in commissioning.

This (right) is what the surface looks like in the electron microscope (SEM), showing some grains due to inhomogeneity of the PLD process.

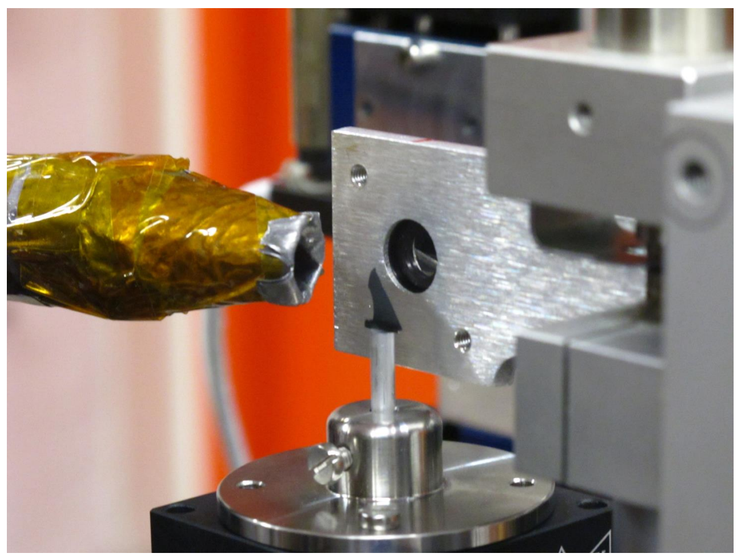
The NanoMAX beam line is still under development, and this experiment was also part of the beam line commissioning.



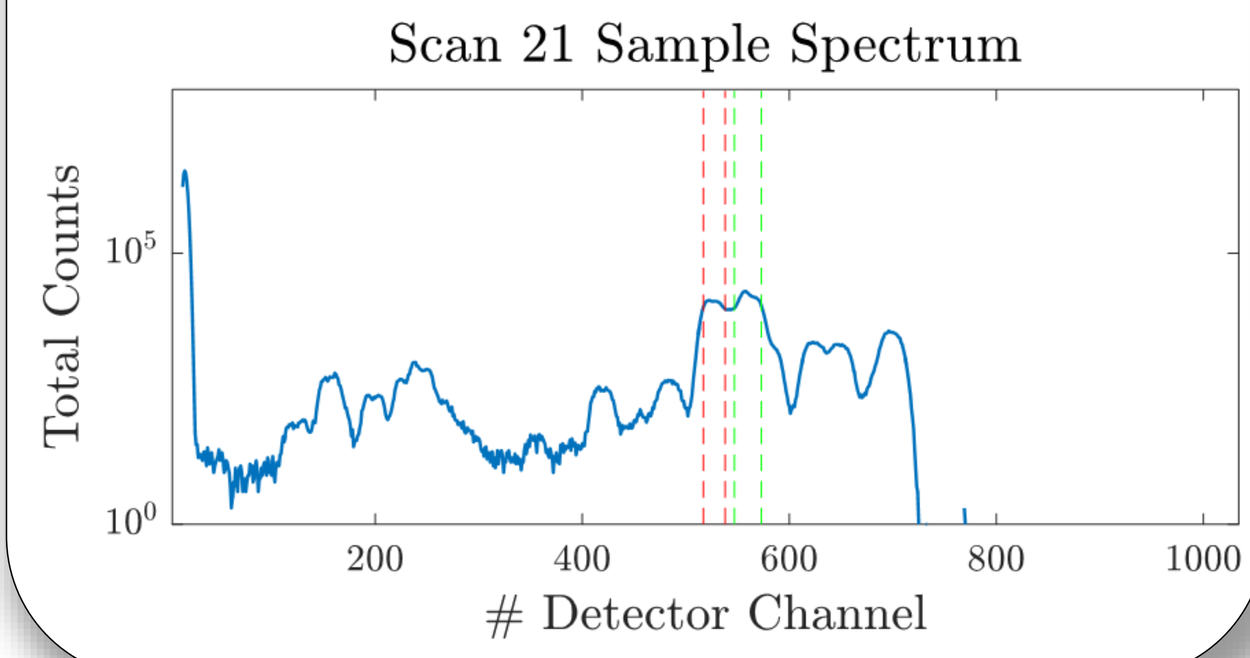
Experimental Setup & Methods

-Fluorescence detector-sample beam relative position

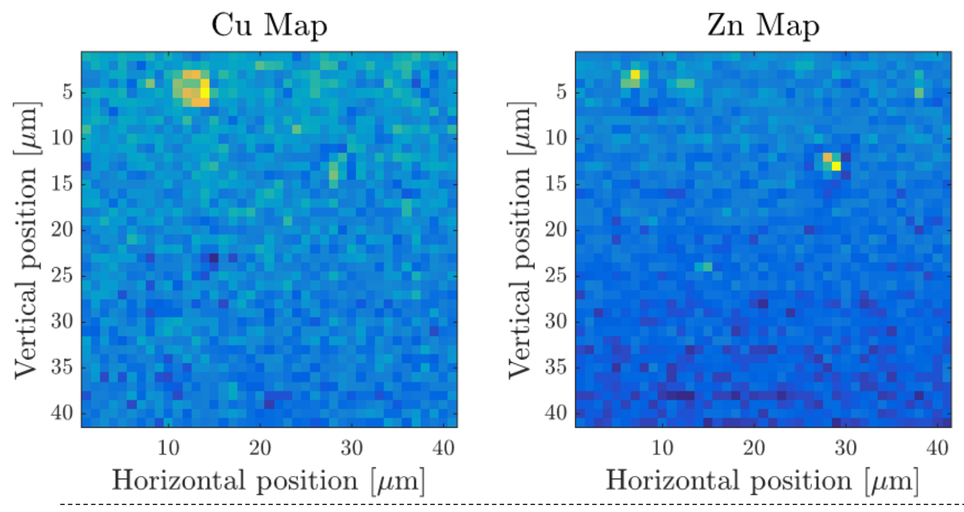
-The forward (small angle) scattering pattern is measured 4.3 m from the sample with a Pilatus detector to verify correlation with the fluorescence map.



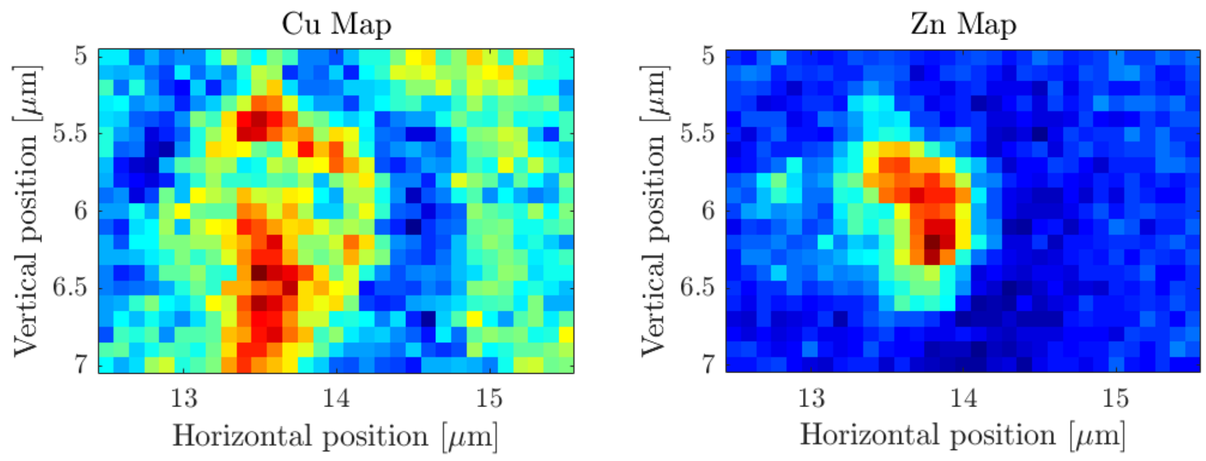
-The fluorescence map of an element is obtained by integrating the counts over the element's band.

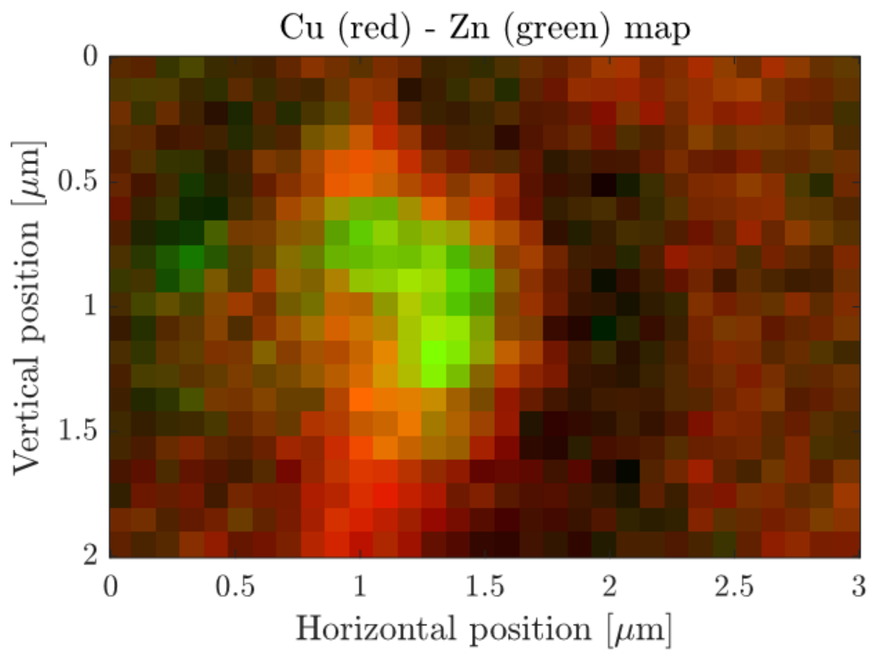


Results

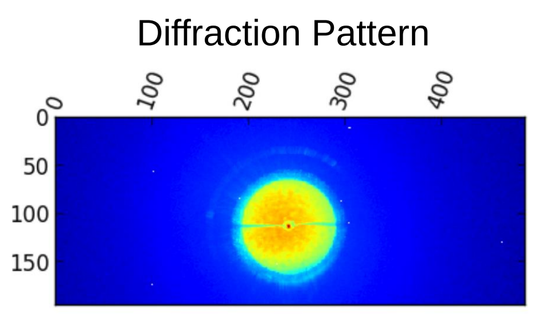


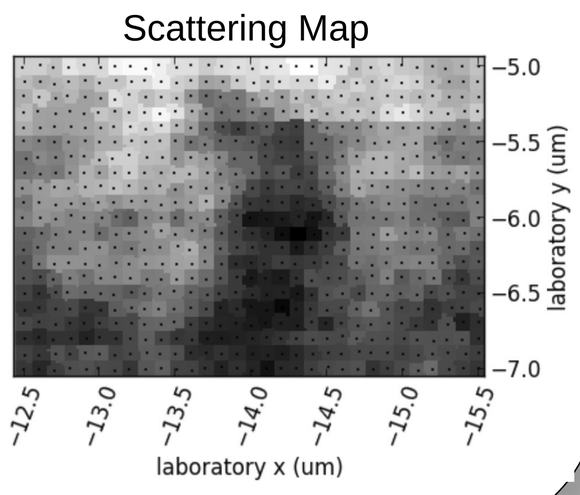
We found a hotspot on a preliminary scan(left) and we zoomed on it in the next ones (below).





The emittance of the hotspot is about twice as that of the background. These features are correlated with the corresponding diffraction patterns (below).





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