



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

Fevola, Giovanni; Ramos, Tiago; Lucas, Mariana M.; Rein, Christian; Andreasen, Jens Wenzel

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Fevola, G., Ramos, T., Lucas, M. M., Rein, C., & Andreasen, J. W. (2017). *First Combined Scattering and Fluorescence Scanning Transmission Microscopy at the NanoMAX Beam Line at MAX IV*. Poster session presented at DESY Photon Science Users' Meeting 2017, Hamburg, Hamburg, Germany.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

First Combined Scattering and Fluorescence Scanning

Transmission Microscopy at the NanoMAX Beam Line at MAX IV

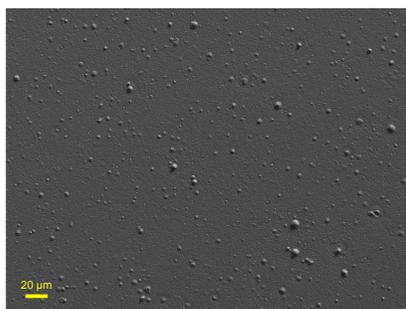
Giovanni Fevola, Tiago Ramos, Mariana M. Lucas, Christian Rein, Jens W. Andreasen

Overview & Motivation

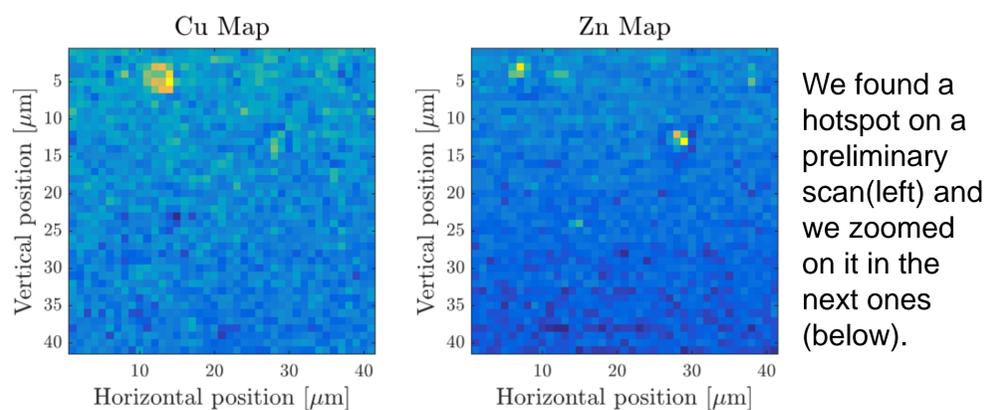
Materials with the approximate stoichiometry $\text{Cu}_2\text{ZnSnS}_4$ with the crystal structure of the mineral kesterite are currently being investigated as promising materials for thin film solar cell fabrication. We acquired fluorescence and scattering maps of a pulsed layer deposited (PLD) kesterite 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.

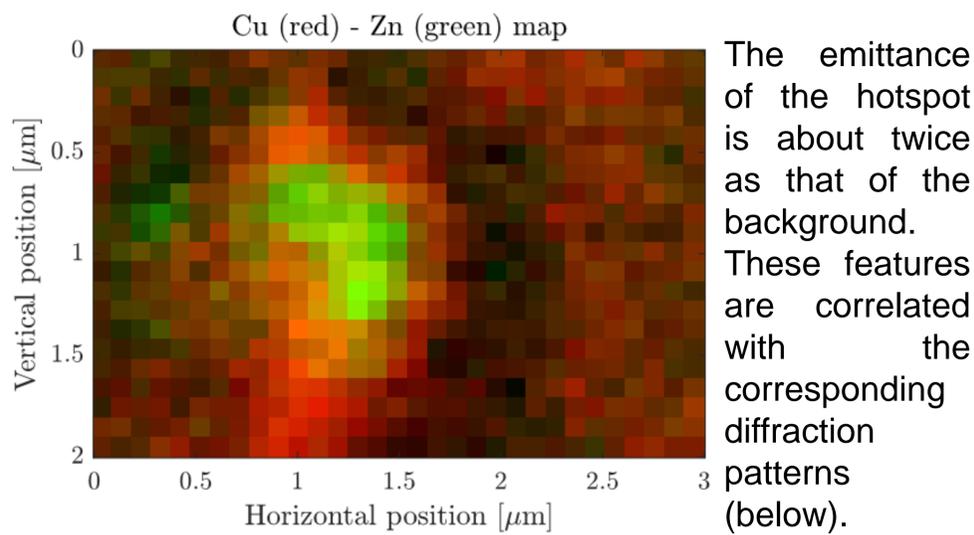
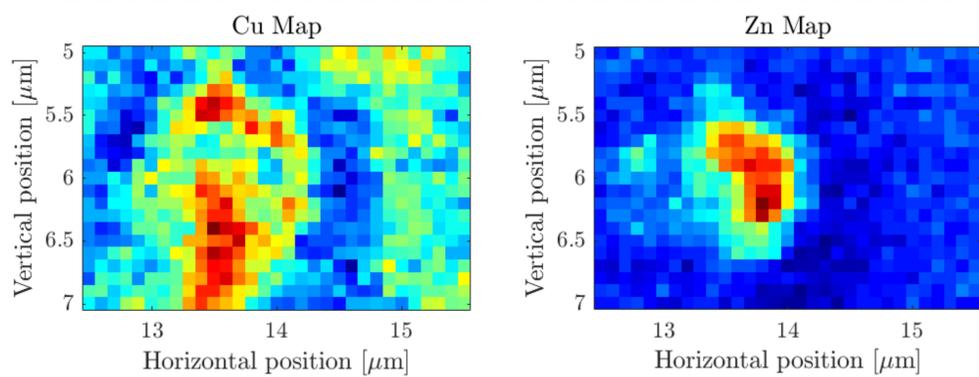
The NanoMAX beam line is still under development, and this experiment was also part of the beam line commissioning.



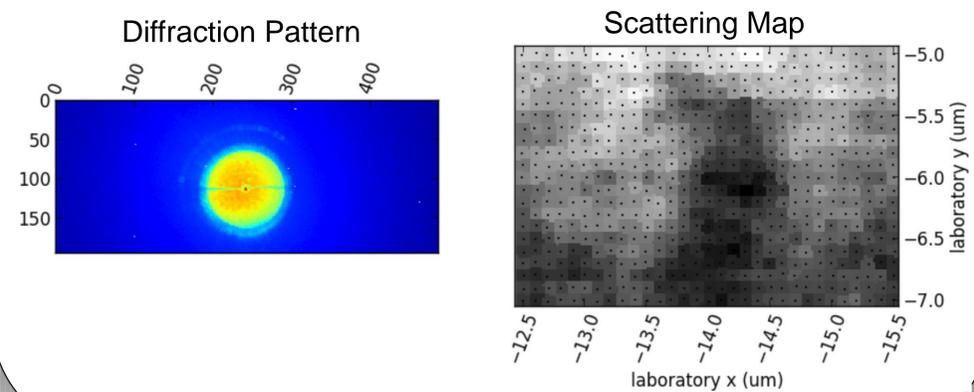
Results



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

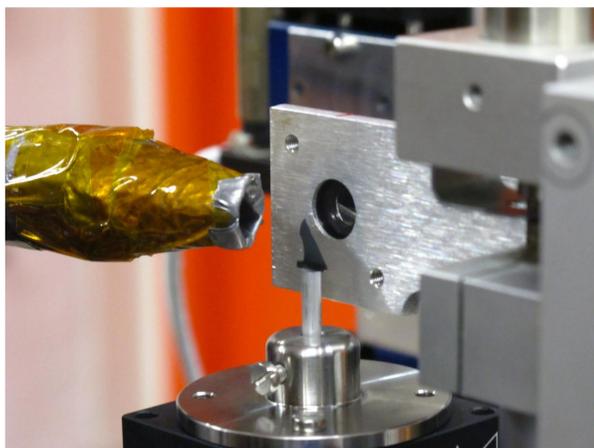


The emittance of the hotspot is about twice as that of the background. These features are correlated with the corresponding diffraction patterns (below).



Experimental Setup & Methods

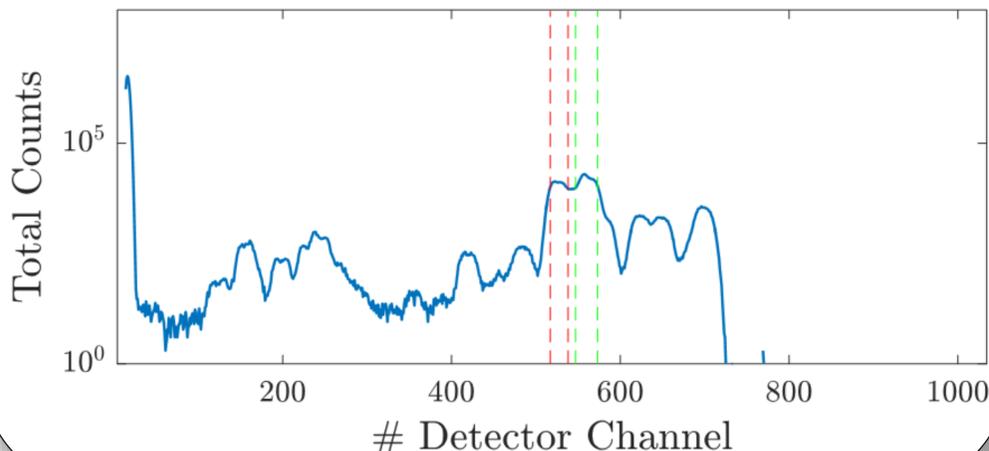
-Fluorescence detector-sample beam relative position



-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.

Scan 21 Sample Spectrum



Acknowledgements

We thank scientists Gerardina Carbone, Ulf Johansson, Alexander Björling, and Marianne Liebi for beamline assistance and help in devising the experimental setup.