

Master project:

In-situ X-ray imaging of growing nanostructures

You are a physicist / nanoscientist with a passion for synchrotron methods and handling big datasets?

You would like to design the instrumentation for an X-ray experiment and take part in synchrotron beamtimes at DESY and Swiss Light Source?

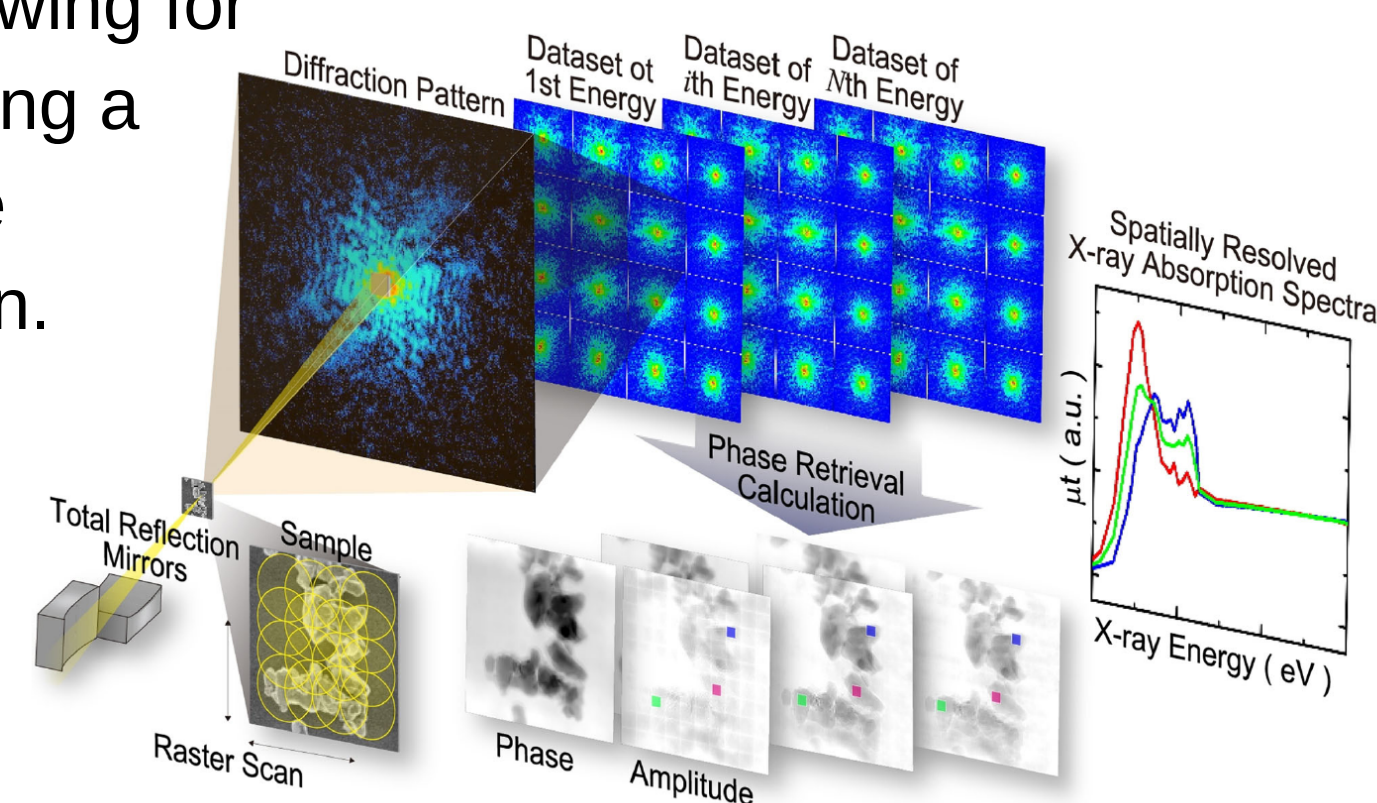
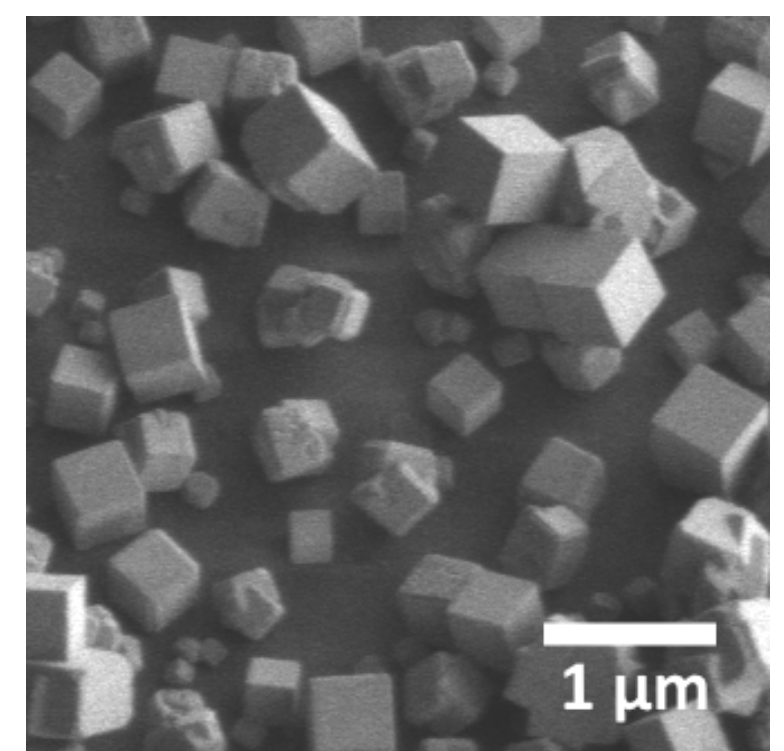
Then this is your chance!

Our group is doing research on nanomaterials to understand their complex formation pathways and hierarchical structure. For this purpose, we apply synchrotron methods in-situ to watch chemistry at work in real time.

In this project, we are aiming at applying X-ray ptychography, a coherent diffraction imaging technique, to visualize the formation as well as chemical and morphological evolution of copper-based nanoparticles with a spatial resolution of tens of nanometers. An in-situ setup allowing for stable reproducibility is going to be developed and applied during a synchrotron beamtime. The subsequent data evaluation will be demanding in terms of programming custom software in Python. The gained knowledge on the behavior of the material on the nanoscale could in the end lead to more control over nano materials synthesis in general.

Your tasks:

- Design an X-ray transparent, heatable reaction container (in-situ cell) for imaging nanoparticles during their synthesis
- Characterize the behavior of the synthesis in the custom reaction container to prepare the X-ray experiment
- Join a synchrotron beamtime
- Analyze a set of coherent diffraction imaging data



Hirose et al. *Angew. Chem. Int. Ed.* **57**, 1474 –1479 (2018)

Requirements:

Interest in instrumentation design and CAD

Interest in Python programming for data analysis

HYBRID
NANOSTRUCTURES
GROUP

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