Quantitative HAADF-STEM tomography for *in situ* analysis of elemental redistribution in 3D

This poster presents a novel approach for studying the (re)distribution of two elements in 3D using the quantitative analysis of high angular annular scanning transmission electron microscopy (HAADF-STEM) tomographic reconstructions. Our methodology is demonstrated by studying the time-resolved alloying of anisotropic bimetallic nanoparticles in 3D. By comparing our results to energy-dispersive X-ray spectroscopy (EDX) based elemental mapping we prove the validity of the proposed method while demonstrating significantly better signal-to-noise ratio. The faster acquisition time of our method, compared to conventional techniques, enables us to follow the whole course of alloying in several types of asymmetric gold/silver core-shell nanoparticles while they are subjected to heating inside the electron microscope. The 3D compositional information obtained in this way allows for linking the dynamics of alloying to the structural properties of individual particles. The proposed methodology opens the possibility to reliably study the 3D elemental redistribution *in situ* in complex and highly anisotropic nanostructures and is applicable to a large variety of bi-elemental nanoparticles with sufficient difference in atomic numbers between the comprising elements.

References

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