Atomically resolved tomographic reconstruction of nanoparticles from single projection: influence of amorphous carbon support

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Abstract

Nanostructures have a wide range of applications due to their unique geometry and arrangement of atoms. For a precise structure-property correlation, information regarding atomically resolved 3D structures of the nanostructure is of utmost benefit. Though modern aberration-corrected transmission electron microscopes can resolve atoms with sub-angstrom resolution, an atomic-scale 3D reconstruction of the nanostructure is a challenge using tilt series tomography due to high radiation damage. Instead, inline 3D holography-based tomographic reconstructions from single projection registered at low electron doses are more suitable for defining atoms positions at nanostructures. Nanostructures such as nanoparticles are generally supported on amorphous carbon film for TEM experiments. However, neglecting the influence of carbon film on the tomographic reconstruction of the nanoparticle may lead to ambiguity. In order to address this issue, the effect of amorphous carbon support was quantitatively studied using simulations and experiments, and it was revealed that increasing thickness and/or density of carbon support increases distortion in tomograms [1].

References:

[1] Pritam Banerjee, **Chiranjit Roy**, Subhra Kanti De, Antonio J. Santos, Francisco M. Morales, Somnath Bhattacharyya, "Atomically resolved tomographic reconstruction of nanoparticles from single projection: Influence of amorphous carbon support", ***Ultramicroscopy, Volume 221, 2021***, 113177. https://doi.org/10.1016/j.ultramic.2020.113177