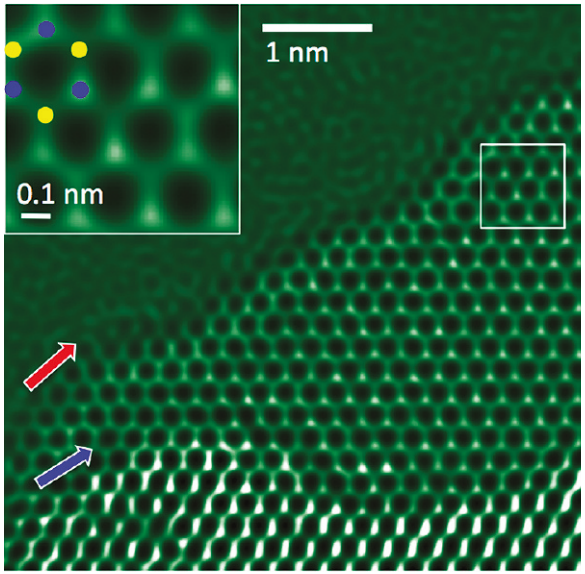
FTSR

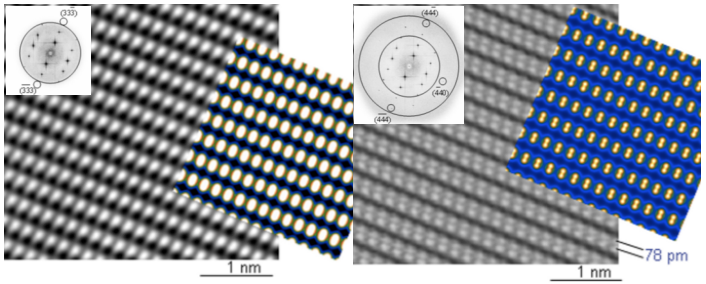
DigitalMicrograph Plug-in

Focal and Tilt Series Reconstruction

Exit Wave Reconstruction and Cs-Compensation Software



Phase of the complex exit wave of BN membrane. Arrows mark a freestanding monolayer edge (red) and a supported multilayer step edge (blue). [3]



Phase of exit wavefunctions for <112> silicon restored from focal series (left) and tilt series (right) data. Insets show Fourier transforms of the restored exit waves and simulated wavefunctions. [4]

FTSR works with a focal series or tilt series of HREM images to reconstruct the complex wave function at the specimen exit surface.

FTSR uses a Wiener filter developed by Angus Kirkland et al. [1, 2].

Key Features

- Reconstructs the complex wave function at the specimen exit surface from a focal series (FSR) or a tilt series (TSR).
- Determines individual defocus values as well as astigmatism from a small amorphous region or contamination layer.
- Compensates for spherical aberration as well as other residual aberrations.
- Makes more quantitative structure analysis possible.
- Extends resolution substantially using a tilt series (TSR).

References:

[1] R. R. Meyer, A. I. Kirkland and W. O. Saxton: A new method for the determination of the wave aberration function for high resolution TEM: 1. Measurement of the symmetric aberrations; Ultramicroscopy, 92 (2002) 89-109.

[2] R. R. Meyer , A. I. Kirkland and W. O. Saxton: A new method for the determination of the wave aberration function for high-resolution TEM.: 2. Measurement of the antisymmetric aberrations; Ultramicroscopy, 99 (2004) 115-123.

[3] J. S. Kim, K. B. Borisenko, V. Nicolosi, A. I. Kirkland: Controlled radiation damage and edge structures in boron nitride membranes; ACS Nano, 5 (2011) 3977-86.

[4] S. Haigh, H. Sawada, A. I. Kirkland: Atomic structure imaging beyond conventional resolution limits in the transmission electron microscope; Phys. Rev. Letts, 103 (2009) 126101(4).