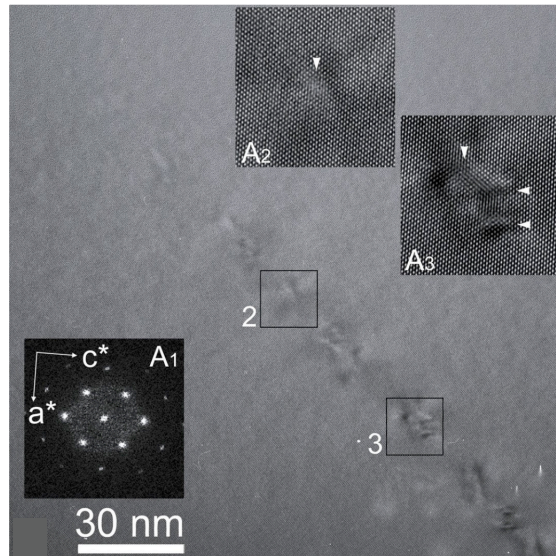
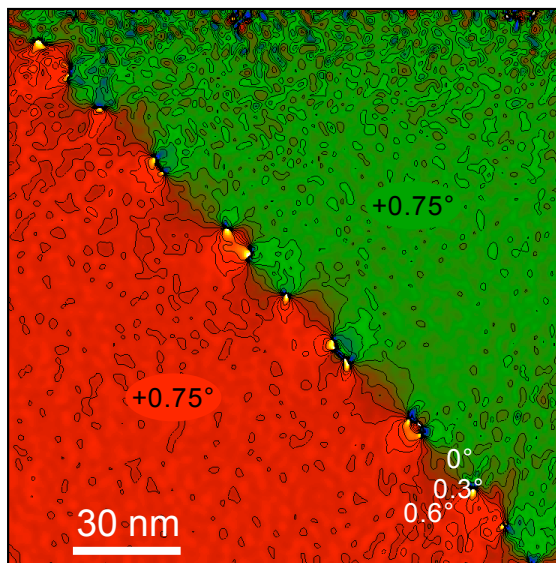


Geometrical Phase Analysis



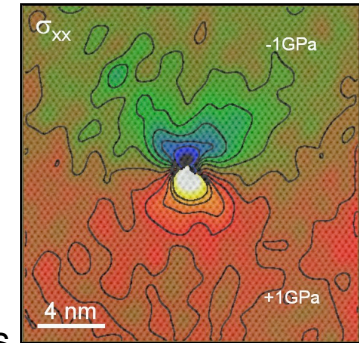
high resolution image



rotation map

GPA generates fully quantitative deformation and strain maps from standard HREM images.

GPA is based on geometric phase algorithms originally developed by Martin Hÿtch [1].



Key Features

- ◆ Determines geometric phase images using choice of masks and real-space averaging [1]
- ◆ Generates 2D deformation tensor from digital HREM images (see left for local rigid-body rotation of crystalline lattice determined from original 4000 pixel square image [2])
- ◆ Allows calculation of colour maps and contours of strains (see above right for stresses around an edge dislocation [3])
- ◆ Corrects for optical distortions due to the projector lens system of the electron microscope [4]

References:

- [1] M.J. Hÿtch, E. Snoeck and R. Kilaas, Ultramicroscopy 74 (1998) 131–146. Quantitative measurement of displacement and strain fields from HREM micrographs
- [2] C. L. Johnson, M. J. Hÿtch, P. R. Buseck, PNAS 101 (2004) 17936-17939. Nanoscale waviness of low-angle grain boundaries
- [3] M. J. Hÿtch, J-L. Putaux, J-M. Pénisson, Nature 423 (2003) 270-273. Measurement of the displacement field around dislocations to 0.03Å by electron microscopy
- [4] F. Hÿe et al. J. Electron Microscopy (2005). Calibration of projector lens distortions