Introduction

Semiconductor nanowires have attracted considerable attention for use in applications such as solar cells, light emitting diodes and new transistor designs [1], a knowledge of defect structures in these wires is critical [2]. Here we propose using thin annular detectors in a scanning transmission electron microscope (STEM) to map the positions of defects such as dislocations in semiconductor nanowires. We test this method on a heterostructure nanowire that shows both changes in mass-thickness contrast and in diffraction contrast from crystallographic defects.

Variable Inner Detector Angle STEM

Visualising diffraction contrast in semiconductor nanowires

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Conclusions

Preliminary results illustrating the use of ADF STEM to analyse defects in semiconductor nanowires have been presented. Future work will involve scaling of the intensities in images before subtraction, as well as division rather than subtraction of images. If successful, the approach could in principle be combined with electron tomography to provide three-dimensional information about both localized defects and strain.

References: