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2D Ptychography from single semiconductor nanowires

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2D dimensional ptychograpy in Bragg geometry is powerful synchrotron radiation technique to study the shape and strain of the nano-objects. We applied 2D ptychography to determine the axial displacement field of single core-shell-shell semiconductor nanowires (NWs). The NWs were grown on silicon (111) substrates and are radially composed of a 140 nm GaAs core, 10 nm In0.10Ga0.90As shell and a 30 nm GaAs outer shell. The NWs are typically 2-3 μm long. 2D ptychography experiment has been performed at beamline ID01 of the ESRF, Grenoble, using coherent x-rays with energy of 9 keV and a beam size of 150 x 200 nm² (FWHM). Using a two dimensional detector diffraction patterns were collected at the GaAs (111) Bragg peak. Parallel to the ptychography experiment, the same NWs have been measured using coherent X-ray diffraction imaging (CXDI) to record 3D reciprocal space maps at three different positions along the NW growth axis in a similar way as shown in Ref. [2]. The displacement field was retrieved from 2D ptychography data using the PyNX software [1]. The displacement field along the NW growth axis of NW1 is rather homogeneous, in contrast it appears inhomogeneous for NW2. The CXDI results are in good agreement with the 2D ptychography reconstructions because it shows homogeneous phase at NW1 but phase changes along the growth axis at NW2 are found.

References
[1] Mandula et. al. J. Appl. Cryst. 49 (2016), 1842-1848
[2] Davtyan. et. al. J. Appl. Cryst. (2017). 50, 673-680

Primary authors: Mr DAVTYAN, Arman (Faculty of Science and Engineering, University of Siegen, 57068 Siegen, Germany); Dr FAVRE-NICOLIN , Vincent (ESRF- The European Synchrotron, 71 Avenue des Martyrs, Grenoble, France); Dr B. LEWIS, Ryan (Paul-Drude-Institut für Festkörperelektronik, Hausvogteiplatz 5–7, 10117 Berlin, Germany); Dr KÜPERS , Hanno (Paul-Drude-Institut für Festkörperelektronik, Hausvogteiplatz 5–7, 10117 Berlin, Germany); Dr GEELHAAR , Lutz (Paul-Drude-Institut für Festkörperelektronik, Hausvogteiplatz 5–7, 10117 Berlin, Germany); Dr KRIEGNER, Dominik (Max-Planck-Institute for Chemical Physics of Solids, Nöthnitzer Straße 40, 01187 Dresden, Germany); Mr BAHRAMI, Danial (Faculty of Science and Engineering, University of Siegen, 57068 Siegen, Germany); Mr AL HASSAN, Ali (Faculty of Science and Engineering, University of Siegen, 57068 Siegen, Germany); Mr PIETSCH, Ullrich (Faculty of Science and Engineering, University of Siegen, 57068 Siegen, Germany)

Presenter: Mr DAVTYAN, Arman (Faculty of Science and Engineering, University of Siegen, 57068 Siegen, Germany)

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