



Contribution ID: 420

Type: Poster

Single Nanowire Studies at the GINIX Nanofocus

Monday, 17 September 2018 17:45 (15 minutes)

Semiconductor nanowires (NWs) are crystalline nanostructures which are intensely researched in areas such as electronics, light-emitting devices, and quantum optics. In particular, nanowire-based solar cells have shown strong development in recent years [1,2]. While the mean crystal parameters can be measured easily for large numbers of NWs, the strain/stress and bending of individual NWs have only by measured at synchrotron radiation facilities.

The small length scales of NWs, with a diameter of around 200 nm and a length of about 2 μm , asks for new kinds of focusing optics. We have used Multilayer Zone Plates (MZPs) that can focus hard x-ray energies down to 2D spot sizes below 10 nm [3,4], and hence are suited to spatially map out the NW crystal lattice or act as local stimulus in X-ray beam induced current (XBIC) experiments [5].

We report on recent imaging experiments and in-operando studies on individual shell-core nanowires, which are paralleled by advances on MZP optics and imaging. Real-time data analysis resolves another bottleneck we faced at recent beamtimes.

[1] J. Wallentin et al: InP Nanowire Array Solar Cells Achieving 13.8% Efficiency by Exceeding the Ray Optics Limit, *Science* 339 (2013).

[2] M. Borgström et al: Nanowires With Promise for Photovoltaics, *IEEE JSTQE* 17 (2011).

[3] F. Döring et al: Sub-5 nm hard x-ray point focusing by a combined Kirkpatrick-Baez mirror and multilayer zone plate, *Opt. Express* 21 (2013).

[4] M. Osterhoff et al: Towards multi-order hard X-ray imaging with multilayer zone plates, *J. Appl. Cryst.* 46 (2015).

[5] J. Wallentin et al: Hard X-ray Detection Using a Single 100 nm Diameter Nanowire, *Nano Letters* 14 (2014).

Primary authors: OSTERHOFF, Markus (Röntgenphysik Göttingen); Dr WALLENTIN, Jesper (Lund University); Mr SOLTAU, Jakob (Röntgenphysik Göttingen); Dr SPRUNG, Michael (DESY); Prof. SALDITT, Tim (Röntgenphysik Göttingen)

Presenter: OSTERHOFF, Markus (Röntgenphysik Göttingen)

Session Classification: Poster session 1

Track Classification: P6 Nanomaterials and nanostructures