GaAs nanowire heterostructures: single photon emission and energy harvesting

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Nanowires are filamentary crystals with a tailored diameter between few and ~100 nm. Their especial morphology and dimensions render them especially interesting for the study of low dimensional semiconductor physics and for opto-electronic and energy harvesting applications. In my talk, I will show two of our latest results obtained with self-catalyzed GaAs nanowires: 1) the formation of extremely high quality GaAs quantum dots in an AlGaAs shell to be used in quantum information technology (Fig.1) and 2) the advantages of nanowires in next generation photovoltaics which constitute a potential way to overcome the Shockley-Queisser limit in efficiency (Fig.2).

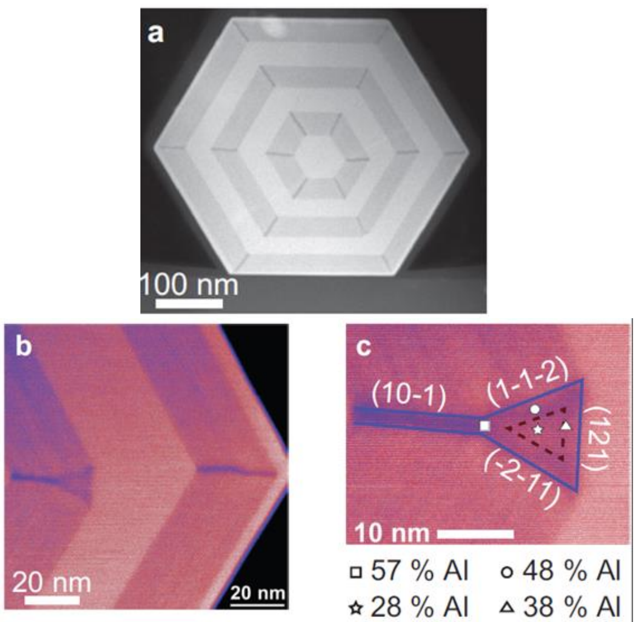

Figure 1. **a**, Aberration-corrected high-angle annular dark-field STEM image of the cross-section of a GaAs nanowire coated with multiple AlGaAs/GaAs shells. **b** and **c**, Zoom-in of a [1].

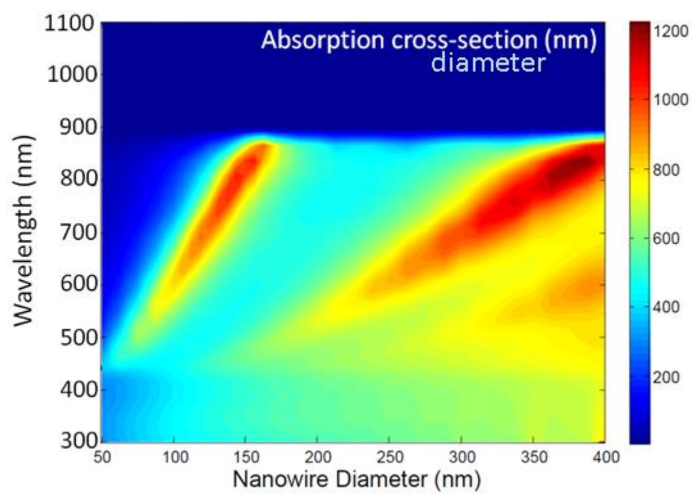

Figure 2. Calculated diameters of the absorption cross-section of 2 µm long standing GaAs nanowires as a function of their diameter and incident wavelength. For certain diameters an broadband enhancement in light absorption is predicted [2].

[1] M. Heiss et al, *Nature Mater.* **12**, 439 (2013)
[2] P. Krogstrup et al, *Nature Photon*, **7**, 306 (2013)