

## **T5-PL3: Insights on III-V engineered nanowires for high-efficiency solar cells**


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Free-standing nanowire (NW) heterostructures of III-V compound semiconductors are promising nano-systems for the fabrication of engineered efficient solar cells [1], novel and efficient light-emitting (LEDs, diode lasers) devices [2], as well as for fast and polarization-sensitive photo-detectors, finally solving persistent challenges of silicon integration [3]. They are also strong candidates to the realization of future nanoscale single-photon emitters [4]. Moreover, dense arrays of III-V compound NWs can constitute the active layer of advanced solar cells with enormous improvement in solar power conversion efficiency. Free-standing III-V NW heterostructures are therefore attracting continued research interest worldwide. Here, three case studies are presented: (i) GaAs-AlGaAs core-shell NWs [5]; (ii) GaAs-AlGaAs quantum well tube (QWT) NWs [6]; and (iii) GaAs-GaNAs-AlGaAs core-multishell NWs [7].

All NW structures studied were self-assembled by Au-catalyst assisted metalorganic vapor phase epitaxy (MOVPE). Assessing the inner structural, functional and electronic parameters of such core-multishell NW heterostructures as function of growth parameters appears challenging [8, 9]. To this end we apply a combination of high spatial resolution scanning electron microscopy, electron tomographic microscopy and optical spectroscopic characterization methods, supported by a

predictive modelling of the shell radial growth recently developed and validated by our group.

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