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Insitu X-ray analysis of misfit strain and curvature of bent polytypic InxGa1-xAs/GaAs core/shell nanowires

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Misfit strain in crystalline core-shell nanowires can be elastically released by nanowire curvature in case of inhomogeneous shell growth around the nanowires 1. In this work, we performed time-resolved in-situ XRD investigations of the evolution of GaAs nanowires bending during the asymmetric growth of InxGa1-xAs shell without substrate rotation. By means of micro X-ray beam at beamline P23 and P09 at PETRA-III at DESY and a portable molecular beam epitaxy chamber (pMBE)2, this study gives insight into the temporal development of the bending as well as the strain in the core-shell nanowire. In particular, different bending directions of nanowires grown on Si with native oxide and thermal oxide were observed and the demonstration of the nanowire curvature as function of shell thickness showed nonlinear dependency.

References

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