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Supplementary

Elemental Distribution and Structural Characterization of GaN/InGaN Core-Shell Single Nanowires by Hard X-ray Synchrotron Nanoprobes

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Core-shell MQWs GaN/InGaN on GaN NWs were grown by MOCVD in an AIXTRON 3 × 2″ close-coupled showerhead reactor. The standard precursors were triethylgallium (TEGa) and trimethylindium (TMIn) for the metal species and ammonia (NH_3) for the nitrogen supply. N_2 was used as the carrier gas. The VLS Au catalyst initiated growth of GaN NWs was realised by utilising the sapphire substrate coated ex-situ with an Au film of 1 nm of nominal thickness. At the beginning of the growth process, after reaching the growth temperature of around 1020 °C, TEGa supply was applied for the first two minutes to allow Ga enrichment of the Au catalyst. This pre-deposition step was followed by the simultaneous introduction of both TEGa and ammonia supply. The V/III ratio was of around 3 and promoted the vertical growth of the NWs. Three layers of InGaN were deposited at a lower temperature of 730 °C and followed by three GaN layers.

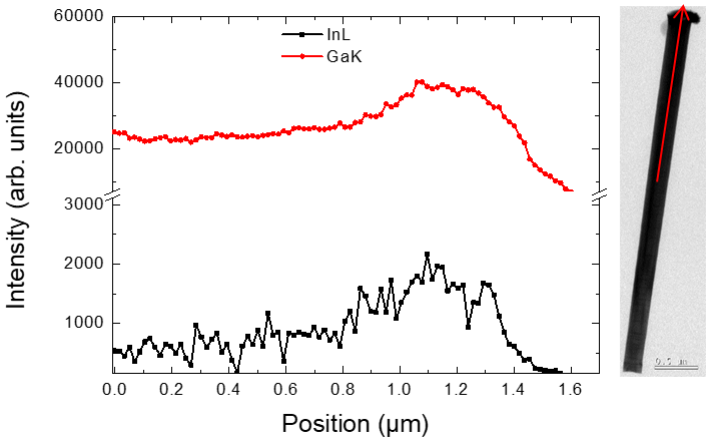


Figure S1. EDS integrated intensities linear profiles of the Lα-line of In and the Kα-line of Ga performed along the axial direction of the NW, as depicted in the HRTEM image.

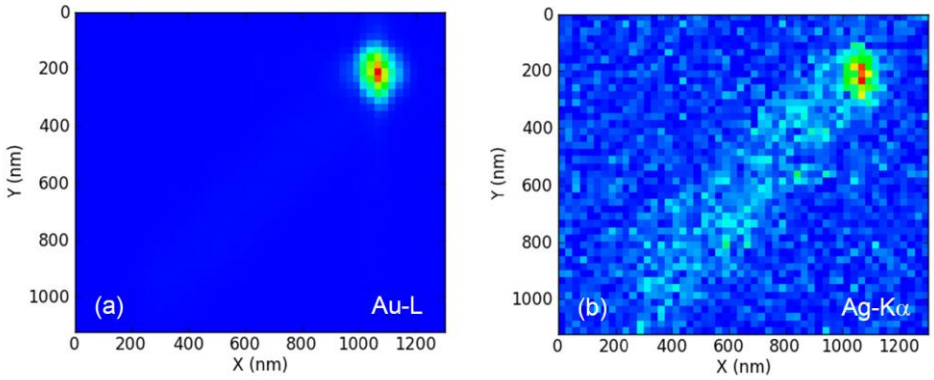


Figure S2. XRF colour map distribution of (**a**) Au and (**b**) Ag along a representative NW. The colour scale represents the XRF intensity in photon counts and ranges from 0 to 9000 (for Au) and from 0 to 25 (for Ag).

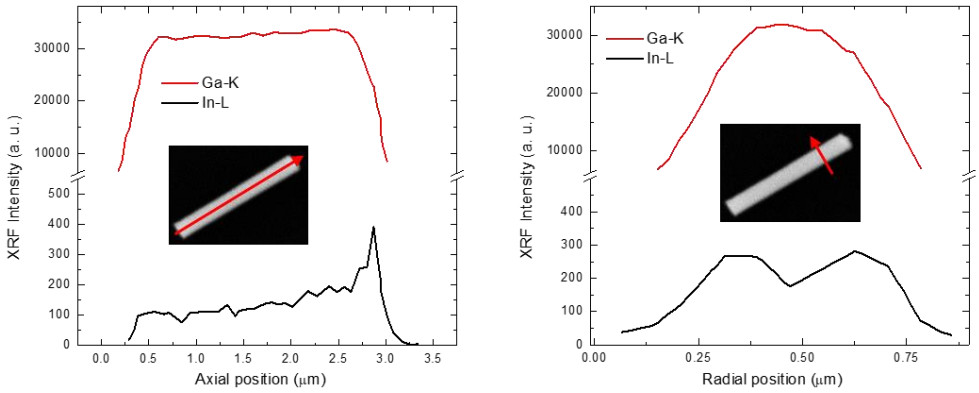


Figure S3. Integrated intensities linear profiles of In and Ga XRF peaks performed along the NW axis (left hand side figure) and NW diameter (right hand side figure).

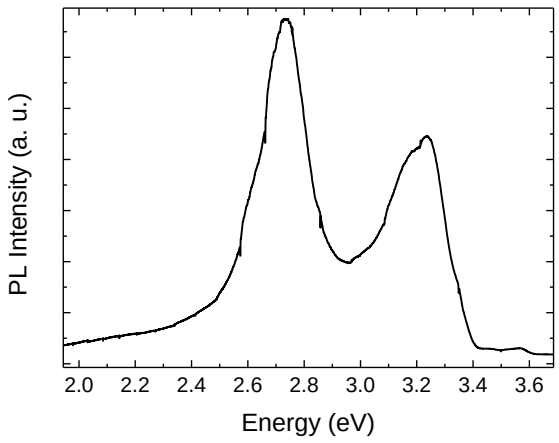


Figure S4. Macro-PL spectrum corresponding to an ensemble of GaN/InGaN NWs measured at liquid He temperature.

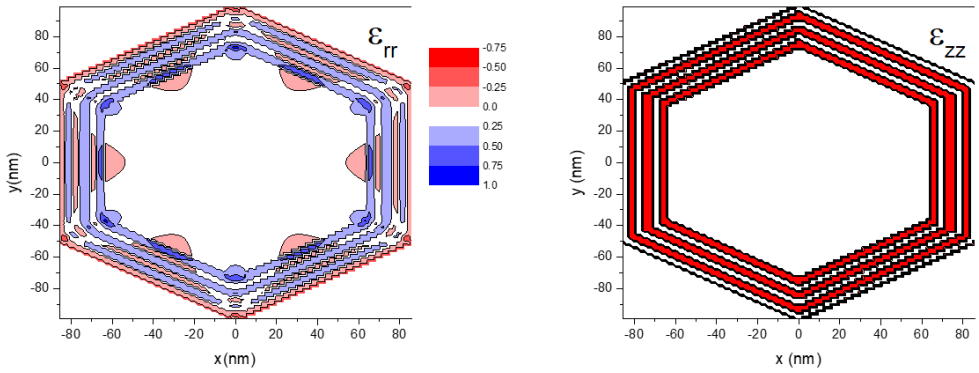


Figure S5. Strain field maps of the NW cross-section for InGaN MQWs with 10\% In concentration for strain components along radial (ε_{rr}) and axial (ε_{zz}) directions.

Supplementary Materials: The following are available online at www.mdpi.com/xxx/s1, detailed description of the NW growth, Figure S1: EDS linear scan along the NW axis, Figure S2: XRF maps of Au-L and Ag-Kα, Figure S3: Linear scans of In and Ga XRF peaks performed along the NW axis and NW diameter, Figure S4: PL spectrum of an ensemble of NWs, Figure S5: Contour plots of the strain components on the NW cross-section

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