

**Three-Dimensional Hierarchical Semi-polar GaN/InGaN MQW Coaxial Nanowires on a
Patterned Si Nanowire Template**

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SUPPORTING INFORMATION

SI-1. Optimization of the number of QWs and their thickness

The emission profile was optimized by adopting the variation in the InGaN QW thickness and the number of pairs of the GaN/InGaN MQW shells around the GaN core NW.

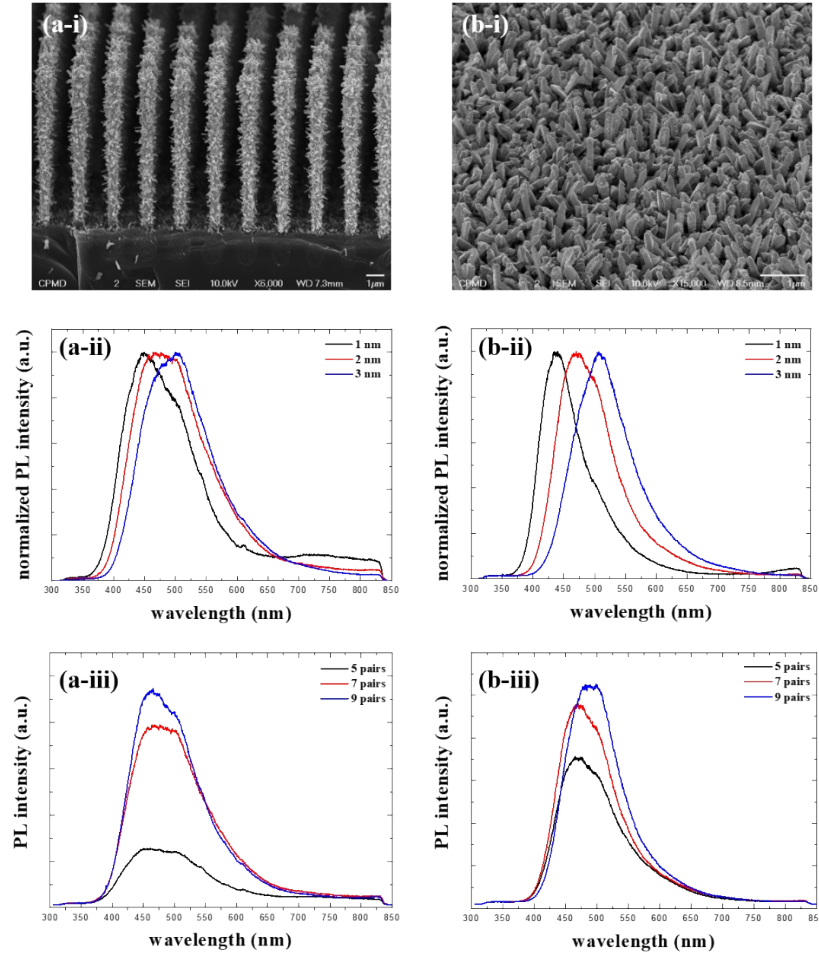


Figure SI-1 Scanning electron micrographs of the GaN/InGaN MQW NWs grown on (a-i) Si NW-template and (b-i) planar Si substrate. Room temperature PL measurement of the GaN/InGaN MQW NWs grown on the Si NW-template (a-ii) as a function on the InGaN QW thickness and (a-iii) as a function of the number of pairs of GaN/InGaN QB/QW. Room temperature PL

measurement of the GaN/InGaN MQW NWs grown on the Si substrate (b-ii) as a function on the InGaN QW thickness and (b-iii) as function of the number of pairs of GaN/InGaN QB/QW.

The GaN/InGaN MQW NWs were grown on the Si NW-template and the Si planar substrate as shown in **Figures SI-1(a-i) and SI-1(b-i)**, respectively. The emission was measured at room temperature as a function of the QW thickness and the number of GaN/InGaN quantum-barrier/QW pairs. The InGaN QW thickness was increased from 0.8 nm to 1.6 nm and 2.4 nm for the samples grown on the Si NW-template and the Si planar substrate as shown in **Figures SI-2(a-ii) and SI-2(b-ii)**, respectively. Due to the quantum confinement effect, the emission wavelength increased by the InGaN QW thickness. Furthermore, the integrated intensity was measured for the samples with the increased number of pairs of GaN/InGaN QB/QW as shown in **Figures SI-2(a-ii) and SI-2(b-ii)** for the respective samples grown on the Si NW-template and the Si planar substrate. The samples with a high number of pairs exhibited a higher integrated intensity.

SI-2. Temperature dependent temporal decay maps

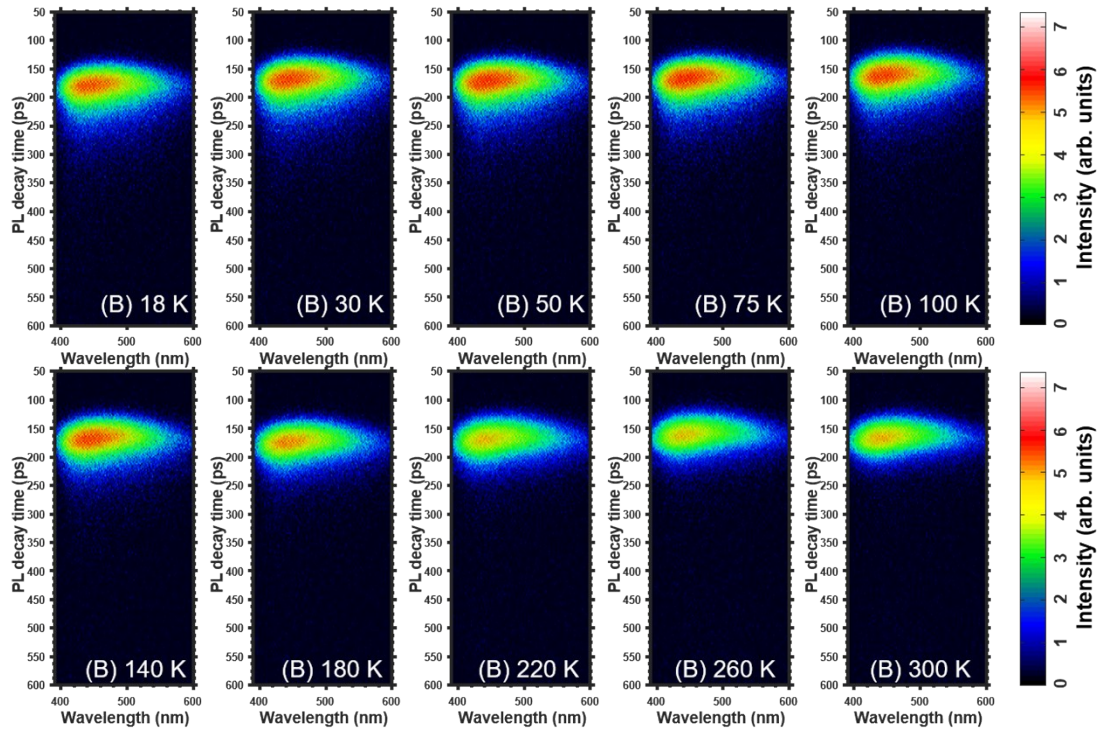


Figure SI-2 Temperature-dependent temporal decay maps of sample (B).

The temporal decay maps deduced from the temperature-dependent time-resolved PL spectroscopy are shown in **Figures SI-2 and SI-3** for samples (B) and (C), respectively. The temporal decay maps differentiate the particular carriers exhibiting a long lifetime.

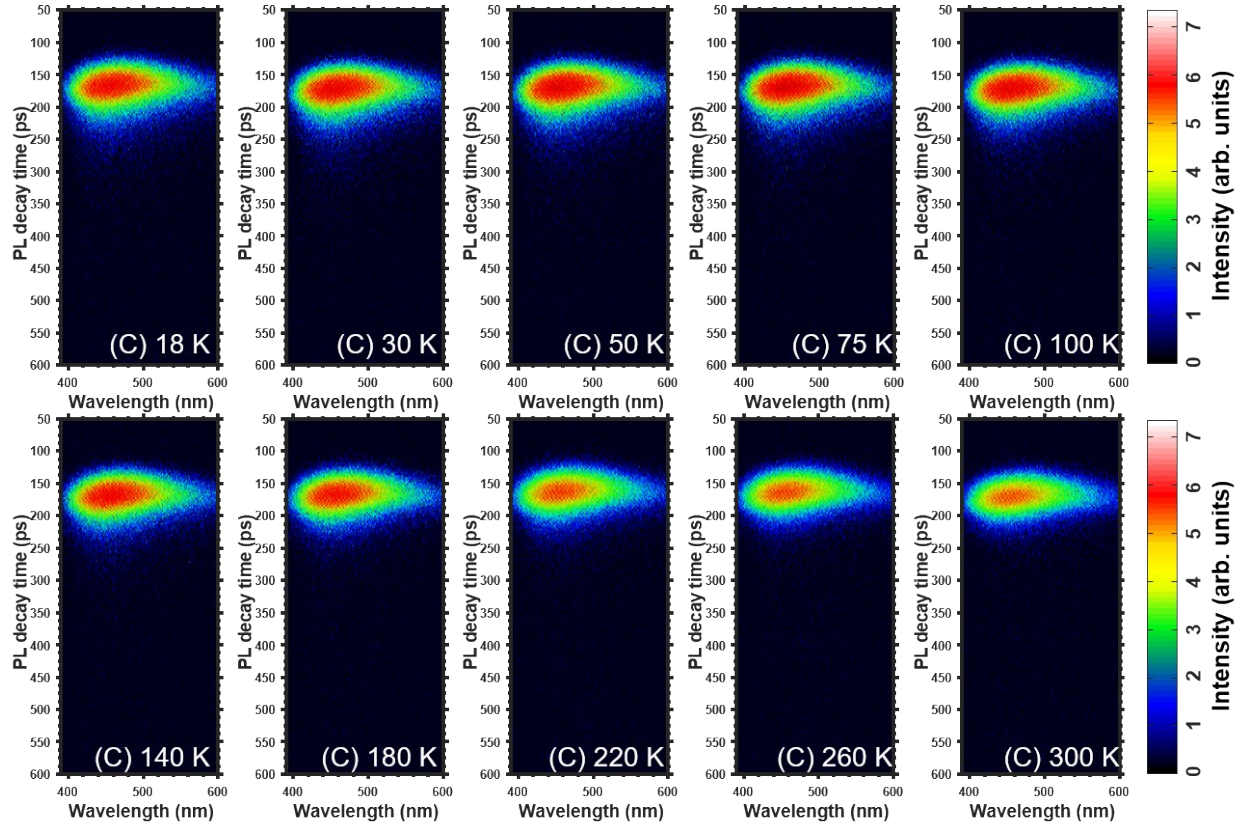


Figure SI-3 Temperature-dependent temporal decay maps of sample (C).