Supplementary Information

Facile growth of density- and diameter-controlled GaN nanobridges and their photodetector application

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1. Optical characterization of GaN NB

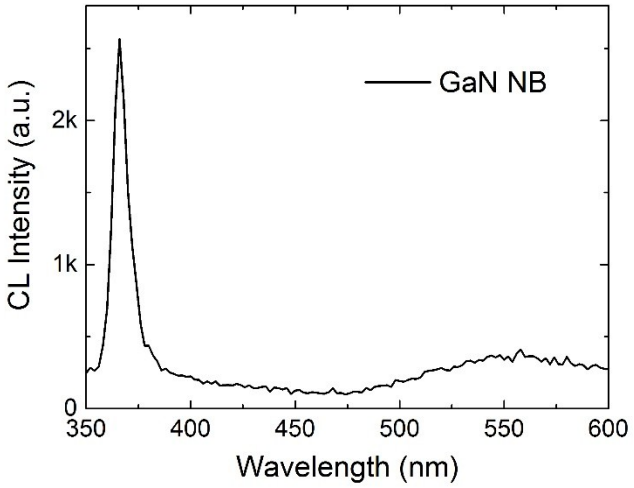

Fig. S1. Cathodoluminescence spectrum of GaN NB

2. Calculation of the responsivity of NB photodetector

The responsivity of NB photodetector was calculated from the photocurrent (I_{ph}) generated per light power incident on NBs (P) as

$$Responsivity = \frac{I_{ph}}{P}$$

and the light power P was obtained from light intensity (I) of the illumination source and total area of illuminated NBs. So,

$$Responsivity = \frac{I_{ph}}{I \times n \times d \times s}$$

where n is the NB density, d is the diameter, and s is the length of the NB.

For the GaN NB photodetector, I_{ph} was 95 μA at 4 V, I was 14 mW/cm^2 for 325 nm illumination source, d was 40 nm, and s was 5 μm. The n was obtained to be 30 from the density of NB (~1×10^9/cm^2),

width (1.5 μm) and depth (2 μm) of a mesa used for the growth of NBs. Therefore, responsivity of GaN NB photodetector at 325 nm was 1.1×10^5 A/W.

For the InGaN/GaN MQW-CS NB photodetector, I_{ph} was 105 μA at 4 V, I was 100 mW/cm^2 for 405 nm illumination source, d was 100 nm, and s was 5 μm. The n was the same as that of GaN NB because InGaN/GaN CS MQW was grown radially on GaN NBs. Therefore, responsivity of InGaN/GaN MQW-CS NB photodetector at 405 nm was 7.0×10^3 A/W.