Research on the critical thickness of $Al_{0.2}Ga_{0.8}N$ template grown on AlN/sapphire substrate

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Supplementary Information:

As shown in Figure S1, the HRXRD results revealed that the FWHM values for the (0002) and ($10\bar{1}2$) planes of the regrown AlN layer were 45 arcsec and 830 arcsec, respectively. Based on these values, the threading dislocation densitiy was calculated to be 8.2×10^{9} cm^{-2}.

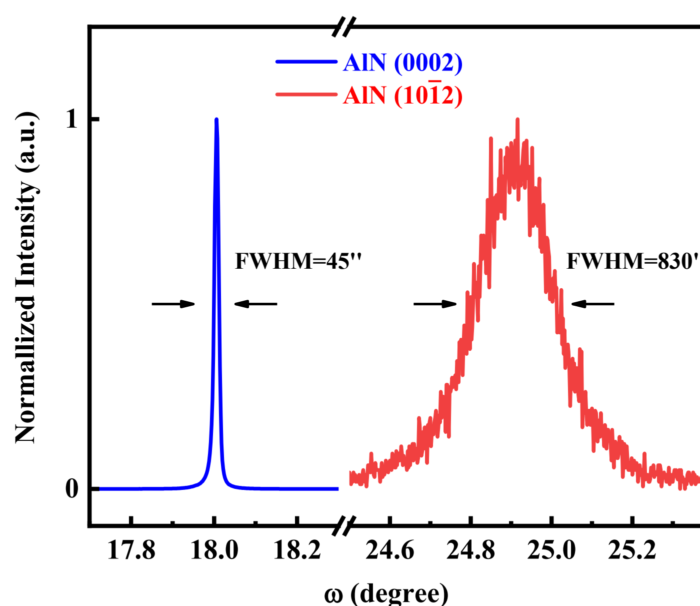

Fig. S1. (Color online) FWHM values of (0002) and ($10\bar{1}2$) measured by x-ray rocking curves for the regrown AlN layer

Figure S2 shows an AFM image of the regrown AlN layer on the sputtered-AlN/sapphire substrate. The surface exhibits a step-terrace feature with a root mean square (RMS) roughness of 0.14 nm.

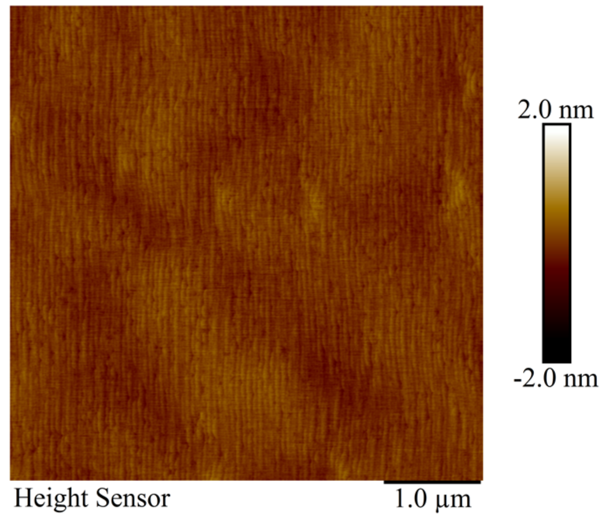

Fig. S2. (Color online) AFM image (5 × 5 μm^2) of the surface morphologie of the regrown AlN layer