

1. Crystal quality and surface morphology of AlN nucleation layer on Si substrates

The crystal quality of AlN nucleation layer on Si substrates was characterized by HRXRD measurements. As shown in Fig.S1, the full width of half maximums (FWHMs) of (002) and (102) X-ray rocking curves are 1308 and 2427 arcsec, respectively. The surface morphology of AlN nucleation layer was characterized by atomic force microscope (AFM). The typical root-mean-square (RMS) roughness value over $10 \times 10 \mu\text{m}^2$ is 0.247nm.

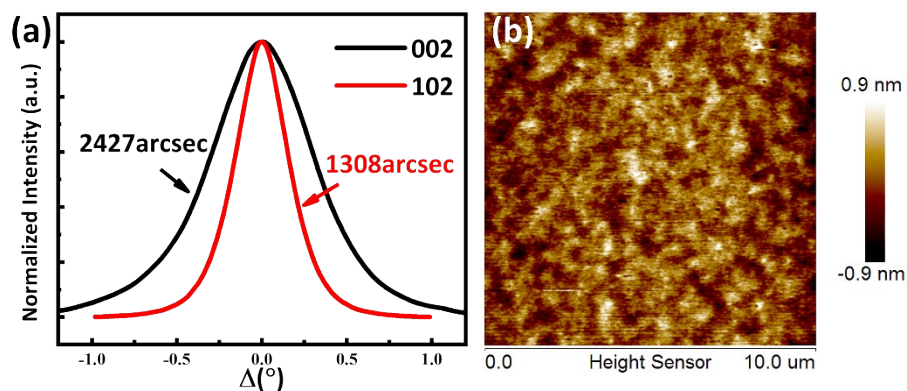


Fig.S1 (a) Symmetric (002) and asymmetric (102) rocking curves and (b) AFM image of the AlN nucleation layer on Si substrates.