

Supplementary Materials: Improving Transport Properties of GaN-Based HEMT on Si (111) by Controlling SiH₄ Flow Rate of the SiN_x Nano-Mask

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Figure S1 displays normalized X-ray diffraction (XRD) omega scans in the (a) GaN (002) symmetric and (b) GaN (102) asymmetric planes with varying SiH₄ flow rate. The full width at half maximum (FWHM) of the rocking curves are calculated by software (X'Pert Epitaxy). The FWHM as a function of SiH₄ flow rate of (002) and (102) planes is shown in Figure S1(c). This XRD measurement was carried out by PANalytical X'Pert PRO MRD equipment. The X'Pert Tube is ceramic X-ray tube with Cu anode ($\lambda = 1.540598 \text{ \AA}$, $K\alpha_1$) and the beam line was focused with length of about 12 mm and width of about 0.4 mm. The Goniometer has the minimum step size in omega (ω) and 2theta (2θ) of 0.001°.

The XRD measurement of continuous scan mode is as follows: Firstly, the divergence slit ~1 mm and receiving slit ~0.25 mm were chosen for rocking curve measurement. Secondly, the X-ray tube's voltage and current were switched on 45 kV and 40 mA, respectively. Finally, the scan range of (002) planes is 16.292°~18.312° with step size ~0.020° and counting time 0.50 s. The scan range of (102) planes is 22.303°~25.813° with step size ~0.030° and counting time 2.00 s.

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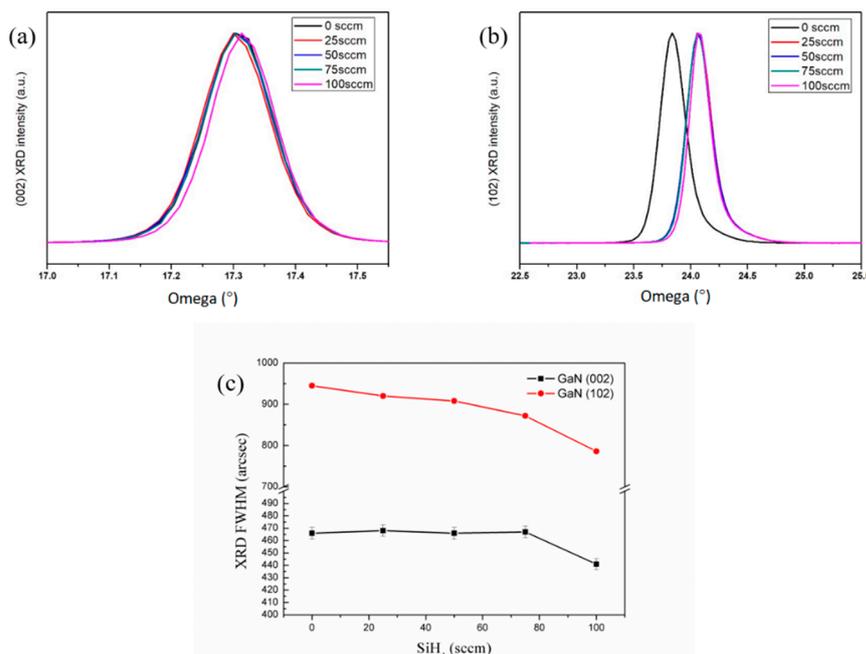


Figure S1. Normalized XRD rocking curves of GaN, (a) (002) and (b) (102) planes. (c) FWHM as a function of SiH₄ flow rate of (002) and (102) planes.