

Supplementary information

High-performance nonpolar *a*-plane GaN-based metal-semiconductor-metal UV photo-detectors fabricated on LaAlO₃ substrates

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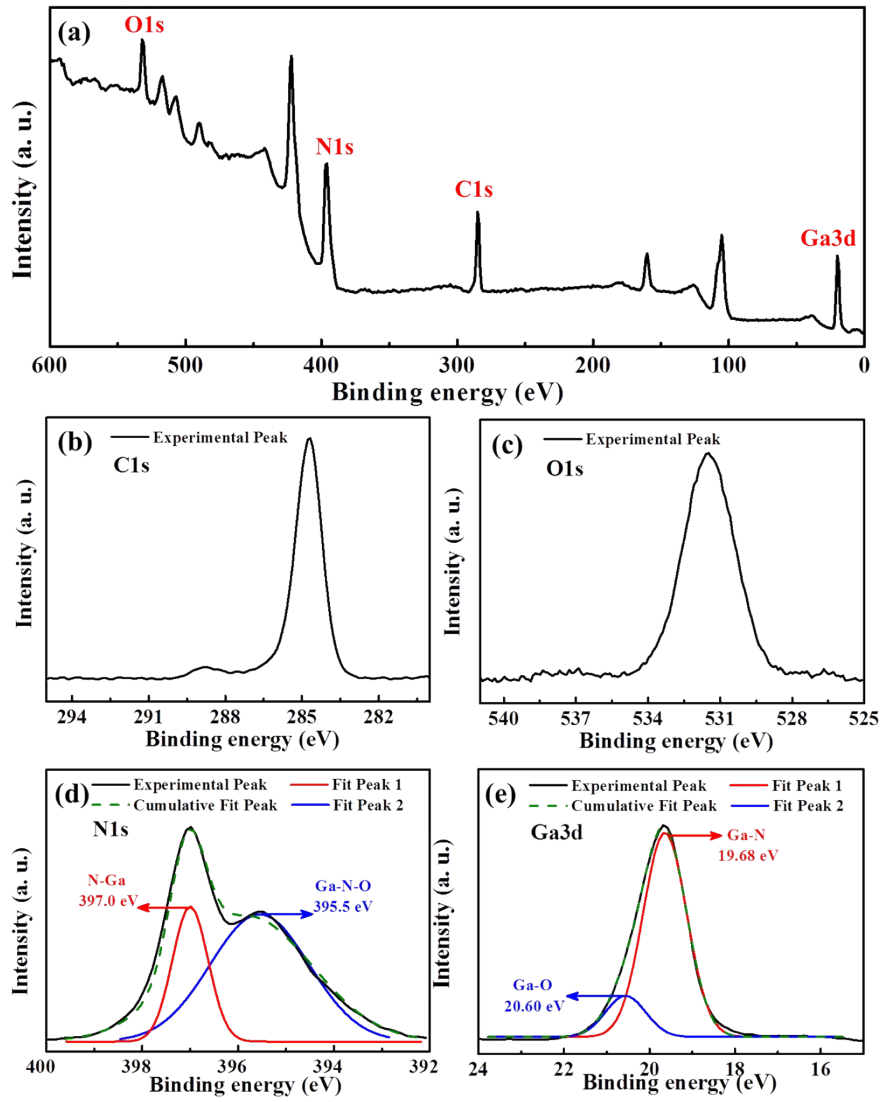


Fig. S1. The XPS spectra of the as-grown *a*-plane GaN epitaxial films grown on LaAlO₃(100) substrates, (a) general survey, (b) C1s spectra, (c) O1s spectra, (d) N1s spectra and (e) Ga3d spectra

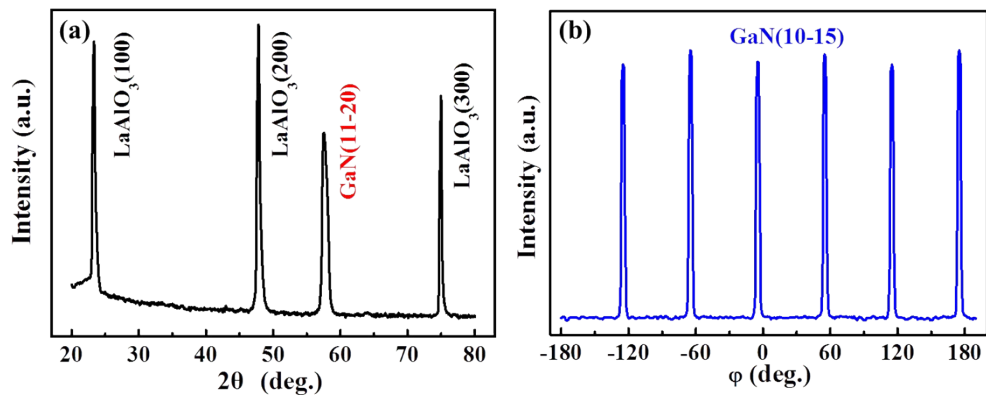


Fig. S2. (a) The 2θ - ω scan and (b) ϕ scan of GaN(10-15) for as-grown nonpolar *a*-plane GaN epitaxial films grown on LaAlO₃(100) substrates at 450 °C.

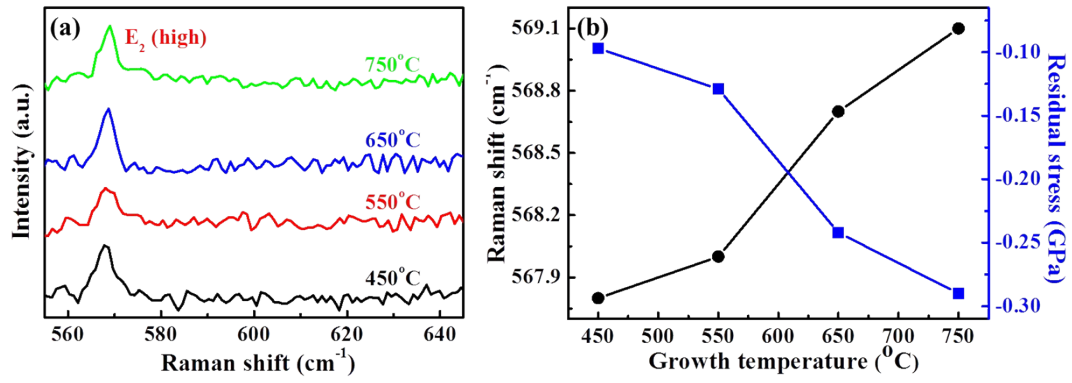


Fig. S3. (a) The Raman spectra of as-grown ~ 300 nm-thick a -plane GaN epitaxial films grown on $\text{LaAlO}_3(100)$ substrates at various temperature. (b) Raman shift and residual stress of GaN epitaxial films with growth temperature ranging from 450 to 750 °C

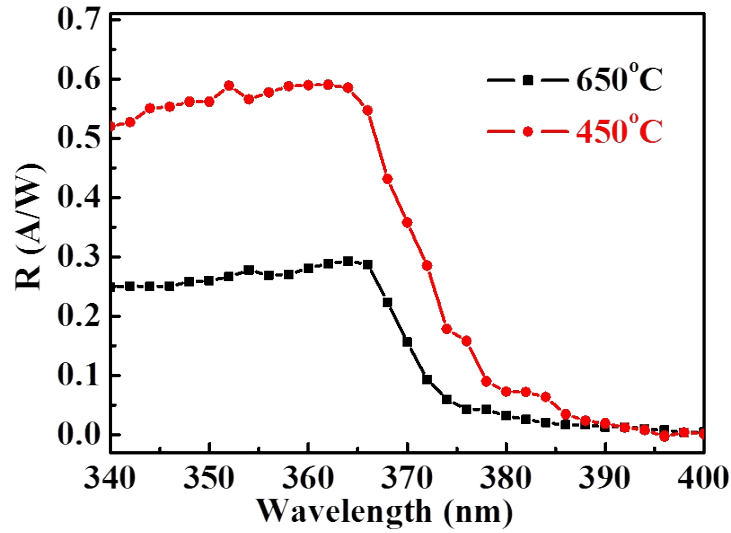


Fig. S4. The responsivity for nonpolar a -plane GaN-based MSM UV photo-detectors with the nonpolar a -plane GaN epitaxial films grown at temperature of 450 and 650 °C @ 2 V

Table S1. Interface energy (in $\text{eV}/\text{\AA}^2$) for eight interfacial layer models of GaN/ $\text{LaAlO}_3(100)$ interface.

Model types	Interface energy
<i>model-1</i>	-0.73
<i>model-2</i>	3.58
<i>model-3</i>	-7.45
<i>model-4</i>	1.33
<i>model-5</i>	-7.90
<i>model-6</i>	-5.86
<i>model-7</i>	-1.80
<i>model-8</i>	-6.37