Capacitance per unit area of AlN/GaN heterostructure was calculated numerically and analytically. The thickness of AlN and GaN are 6 nm and 10 nm, respectively. The dielectric constants are 9.385 and 9.5, respectively.

First, in order to calculate the capacitance numerically, an electric field inside the heterostructure,

$$\triangle V = E \triangle x, \tag{1}$$

$$E = \sigma / (2\epsilon), \tag{2}$$

where V is the potential, E is the electric field, x is the distance, σ is surface charge density, and ϵ is the permittivity of the material. Then, capacitance per unit area can be calculated using eq.(2) by the capacitance definition,

$$C/area = \triangle \sigma / \triangle V. \tag{3}$$

The results are given in Table 1.

Table 1. Capacitance of the heterostructure.

Capacitance	Numerical calculation	Analytical calculation
C_{AlN} (μF/cm^2)	1.384	1.384
C_{GaN} (μF/cm^2)	0.8412	0.8412
C_{Total} (μF/cm^2)	0.5231	0.5231

The results suggest that the numerically calculated capacitances are exactly same as analytically calculated values.