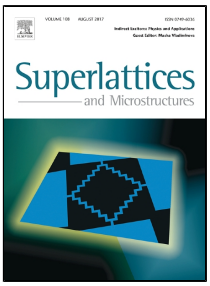
Accepted Manuscript



A method to determine electron mobility of the two-dimensional electron gas in AlGaN/GaN heterostructure field-effect transistors

Peng Cui, Zhaojun Lin, Chen Fu, Yan Liu, Yuanjie Lv

PII:	S0749-6036(17)31578-1
DOI:	10.1016/j.spmi.2017.08.030
Reference:	YSPMI 5205
To appear in:	*Superlattices and Microstructures*
Received Date:	30 June 2017
Revised Date:	11 August 2017
Accepted Date:	11 August 2017

Please cite this article as: Peng Cui, Zhaojun Lin, Chen Fu, Yan Liu, Yuanjie Lv, A method to determine electron mobility of the two-dimensional electron gas in AlGaN/GaN heterostructure field-effect transistors, *Superlattices and Microstructures* (2017), doi: 10.1016/j.spmi.2017.08.030

A method to determine electron mobility of the two-dimensional electron gas in AlGaN/GaN heterostructure field-effect transistors

Peng Cui [a], Zhaojun Lin [a,*], Chen Fu [a], Yan Liu [a], and Yuanjie Lv [b]

[a]School of Microelectronics, Shandong University, Jinan, 250100, China

[b]National Key Laboratory of Application Specific Integrated Circuit (ASIC), Hebei Semiconductor Research Institute, Shijiazhuang, 050051, China

Abstract

Taking into consideration the resistance variation in the free-contact area versus the gate bias, an applicable method to determine the electron mobility in AlGaN/GaN heterostructure field-effect transistors was presented. Based on the measured capacitance-voltage and current-voltage curves, the new method employed iteration calculation with different scattering mechanisms. Compared to the electron mobility calculated by the traditional method, the electron mobility calculated by the new method shows an apparent difference, especially for the device with a big gate length. This difference originates from the device with a big gate length that has a stronger polarization Coulomb field scattering. At last, the correctness and necessity of this method was demonstrated by the comparison between the experimental and calculated transconductance values.

***Keywords*:** AlGaN/GaN HFETs; electron mobility; transconductance; polarization Coulomb field scattering

* Corresponding author at: School of Microelectronics, Shandong University, Jinan 250100, China. Tel.: +86 0531 88363700; fax: +86 0531 88563700

E-mail address: linzj@sdu.edu.cn