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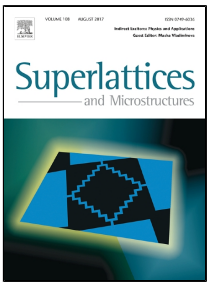

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Influence of gate width on gate-channel carrier mobility in AlGaN/GaN heterostructure field-effect transistors

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Abstract

For the fabricated AlGaN/GaN heterostructure field-effect transistors (HFETs) with different gate widths, the gate-channel carrier mobility is experimentally obtained from the measured current-voltage and capacitance-voltage curves. Under each gate voltage, the mobility gets lower with gate width increasing. Analysis shows that the phenomenon results from the polarization Coulomb field (PCF) scattering, which originates from the irregularly distributed polarization charges at the AlGaN/GaN interface. The device with a larger gate width is with a larger PCF scattering potential and a stronger PCF scattering intensity. As a function of gate width, PCF scattering potential shows a same trend with the mobility variation. And the theoretically calculated mobility values fits well with the experimentally obtained values. Varying gate widths will be a new perspective for the improvement of device characteristics by modulating the gate-channel carrier mobility.

***Key words*—**AlGaN/GaN HFETs; gate width; carrier mobility

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