Fabrication and Characterization of Fe-doped InP/InGaAs HEMTs

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ABSTRACT

The performance of the InP-based FETs is limited due to the quality of the Schottky contact that results in high gate leakage current. In order to enhance the quality of Schottky contact, a wide bandgap material InAlAs was adopted to increase Schottky barrier height and reduce the gate leakage current. However, the InAlAs always suffers the oxidation of aluminum. The process to form the gate metal on the InAlAs surface will become very tough for obtaining a good quality of Schottky contact. As the Fe-doped InP material shows very high resistivity, in this study we will deposit the gate metal on the Fe-doped InP to form a Schottky contact. We expect the gate leakage current should be reduced and the performance of InP-based FETs could be enhanced. Au was selected to be Schottky metal on Fe-doped InP, and Schottky barrier height is as hight as 0.75eV. The saturation drain curent for FETs with gate length of 5 was about 110 mA/mm at VDS=2.5. The pinch-off voltage was around -1.75 V. A maximum intrinsic transconductance of 60 mS/mm was measured at VGS=+0.1 V and VDS=2.5 V.The breakdown voltage between gate to drain was larger than -4.5V.

Keywords : InP/InGaAs FETs ; Schottky contact

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