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Properties of constricted 2DEG/metal structures in microwave electric fields

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Abstract

Detection properties of asymmetrically constricted 2DEG/metal junctions were investigated at 10 GHz frequency at room and liquid nitrogen temperature. Operation of such detectors is based on non-uniform carrier heating in the constricted region. Different quality of the 2DEG channel was obtained for AlGaAs/GaAs modulation doped heterostructures with superlattice buffer structure and without it. Photoluminescence measurements exhibited effective charge accumulation in the AlGaAs/GaAs potential channel in the case of superlattice buffered structure, while in the non-buffered structure a substantial portion of excited carriers recombined in doped AlGaAs layer. The quality of the 2DEG channel was responsible for different polarity of the detected voltage as well as for different voltage sensitivity; in the case of the non-buffered structure the sensitivity reached almost 200 V/W value.



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