

Effect of the Ultra-Thin GaN Interlayer on the Electrical and Photoelectrical Parameters of Au|GaAs Schottky Barrier Diodes

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The aim of this work was to investigate the effect of the ultra-thin GaN interlayer on the electrical and photoelectrical parameters of Au|GaAs Schottky barrier diodes. An optimized fabrication process was employed to elaborate two types of Schottky diodes Au|GaAs and Au|GaN|GaAs with a GaN thickness of 2.2 nm. Electrical parameters were extracted from current–voltage measurements in dark and under illumination with a green laser of 532-nm wavelength. Surface photovoltage (SPV) method was employed to estimate the excess of concentration and the mean interface state density. The extracted parameters from the current–voltage measurements in the dark, under illumination, and using SPV method show an improvement after nitridation process. The creation of the ultra-thin GaN layer at the Au|GaAs interface reduces the density of the interface states leading to the improvement of the electrical quality by restructuring the metal–semiconductor interface under the effect of formation of the GaN interfacial layer. This restructuring of the metal–semiconductor interface results in the improvement of the photoelectrical response of these structures by allowing the creation of an additional excess of concentration.

Keywords: nitridation, SBDs, GaAs, SPV, characterization.

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