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Abstract
The wide bandgap II-VI compound semiconductor materials are applied generally to blue/ultraviolet photodiode. In this study, the ZnSSeTe/GaAs PIN structure was grown on P type GaAs substrate by Molecular Beam epitaxy (MBE). Then, aluminum was evaporated on n-ZnSSeTe layer to form ohmic contact and using the electrode pattern was transferred by conventional photolithography, following which the lift-off technique was used to reveal the electrode. Finally, doing the device was isolated. Using the device mesa pattern was transferred by the same photolithography. Then the device was etched down to the GaAs substrate by a solution of K2Cr2O7:H2SO4:H2O =1g:10ml:20ml.
After finished the etching process, the current-voltage (I-V) characteristics of the ZnSSeTe/GaAs PIN photodetector were carried out an HP-4155B semiconductor analyzer. The noise characteristics of the PIN photodiode was measured by using a low noise current preamplifier and a fast Fourier transform spectrum analyzer. The noise floor was 1×10-24 (A2/Hz) at the room temperature. For a given bandwidth of 500Hz, the corresponding normalized detectivities (D*) were 1.4×1010, 5.7× 109, and 3.2×109 cmHz1/2W-1.
In addition, we also found that the responsivity has a sharp cut off located at 870nm corresponding to the band edge of GaAs and that the maximum photo responsivity at 870 nm was found to be 0.288A/W.
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