The Study of Ge Schottky photodetector with a-Si:H capping layer

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ABSTRACT

In this study, reduction of dark current characteristics in the Ge-based Metal-Semiconductor-Metal photodetectors (MSM-PD) with and without hydrogenated amorphous silicon (a-Si:H) and/or with silicon dioxide (SiO2) passivation layer will be discussed. The a-Si:H and SiO2 layer were deposited by using plasma-enhanced chemical vapor deposition (PECVD) system.

At 6V applied voltage, the measured dark current were 1.27×10-8 A, 2.14×10-3 A and 2.5×10-3 A, respectively, for the samples with a-Si:H passivation, without a-Si:H passivation, and with SiO2 passivation layer, respectively. Compared to the sample without a-Si:H layer, the dark current with a-Si:H passivated one was reduced about five orders. Such a result demonstrates that the a-Si:H exhibits passivation function on Ge surface.

Additionally, we used above result to fabrication four structures of a-si:H capping leayer. The 850nm and 1310nm infrared laser light source with fixed power was used to irradiate these samples. It was found that four structures of optoelectronics characteristic by using 850nm and 1310nm infrared laser light source.

Keywords : Metal-Semiconductor-Metal(MSM)、Photodetector、Phototransistor、dark current、Ge、a-Si:H

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