Study of GaN Schottky contact and its Application in Metal－Semiconductor－Metal Photodetectors

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ABSTRACT

Since GaN-based material shows very good optoelectronic properties, it has been widely applied to fabricate optoelectronic devices. Schottky contact plays an important role in the fabrication of GaN-based devices. It is necessary to develop the Schottky contacts with high barrier height and good thermal stability for the applica-tion of optoelectronic devices to operate at high temperature. In this study, Ni/Au Schottky contacts on n-GaN were fabricated and character-ized. The barrier height and ideality factor were extracted from the measurement of I-V curves. In order to enhance the barrier height and evaluate the thermal stability, the Schottky diodes were treated with different of thermal annealing processes. The thermal treatments were conducted under nitrogen ambient in a furnace tube. The temperature and time used for thermal treatment were from 300°C to 550°C and from 5min to 60min, respectively. From the results, we found that thermal treatments at 300°C and 400°C can be used to enhance about 0.19eV of barrier height. However thermal treatments at 500°C and 550°C for a long time will make barrier height de-grade. By the way, the dark current of MSM photodetectors can be significantly re-duced from 201 μ A to 0.125 μ A by thermal annealing at 400°C for 30min.

Keywords : GaN ; Schottky contact ; Ni/Au ; Schottky barrier height

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