Chapter 5.Conclusions

1. The fabrication of a new ultra-violet (UV) detector with metal-semiconductor-metal (M-S-M) structure has been presented. Epitaxially grown GaN nanowires (NWs) are used as the photoconducting material.

2. The GaN layer on the M-S-M structure was patterned in patches with 10 μm gaps by standard photolithography and lift-off methods.

3. The freestanding catalyst-grown GaN NWs have average diameters 50±5 nm and lengths 10±2 μm and are connected between two side walls of GaN block electrodes.

4. I-V measurements show that the interface between the epi-GaN NWs and the electrodes exhibits the ohmic contact characteristics and the device can tolerate high voltage operation.

5. Photoconductivity spectra in the range from 2 to 4 eV showing an abrupt absorption observed at 3.4 eV indicates the high quality and defect-free of our as-grown GaN nanowires.

6. The PC measurements show that the NWs photodetector exhibits a super high responsivity R ~ 10^5 A/W, after bandgap absorption at 3.40 eV which is two order of magnitude higher than that of traditional epi-GaN film detector.

7. It found that the delta current (Δi) is proportional to the number of GaN NWs.

8. We attribute the excellent performance on the responsivity of GaN nanowires to the super high electron mobility resulting from the low scattering effect on the low-dimensional materials.