

Barrier height enhancement of AlGaN Schottky diodes

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The investigation on the Schottky barrier characteristics on AlGaN is of great importance for the high power and high temperature electronic device design. Therefore, it is essential to develop metal contacts which are able to form high Schottky barrier height and superior metallurgical stability in order to produce reliable, efficient, and high performance devices. The application of thermal treatment of Schottky contacts is essential for the enhancement of the Schottky barrier height, which led to smaller leakage current and higher breakdown voltage, and hence the improvement of the the device's noise level and the high voltage performance of the device. Moreover, thermally stable metal-semiconductor contacts is of great importance for high quality devices. In this work, we report on the Schottky contact characteristics of Pd and Ni on unintentionally doped n-type AlGaN grown on sapphire substrate as a function of annealing temperatures (300 to 700°C) with and without the additional application of cryogenic cooling after heat treatment. The electrical and morphological properties of the Schottky contacts under different annealing environments are examined and compared by current-voltage (I-V) and scanning electron microscopy (SEM) measurements.

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