Fabrication and Analysis of the Current Transport Mechanism of Ni/n-GaN Schottky Barrier Diodes through Different Models

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The current transport mechanism of indigenously fabricated Ni/n-GaN Schottky barrier diodes (SBDs) has been analysed using the current–voltage ($I-V$) and capacitance-voltage ($C-V$) measurements. Various models like Rhoderick's method, Cheung's method, Norde's method, modified Norde's method, Hernandez's method, and Chattopadhyay's method have been used to extract the different electric parameters from the $I-V$ curve. A comparison has been made between the various electrical parameters such as ideality factor, barrier height, and series resistance, which are extracted from the forward bias $I-V$ curve of Ni/n-GaN SBDs. The carrier concentration of the substrate and the barrier height is obtained from $C-V$ characteristics of Ni/n-GaN SBDs. We observe from the reverse current characteristics that the Ni/n-GaN SBDs show the dominance of Schottky emission in intermediate and higher voltages.

Keywords: Schottky contacts, GaN, electrical properties, Rhoderick's method, Cheung's method, Norde's method, Modified Norde's method, Hernandez's method, Chattopadhyay's method, current transport mechanism.

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