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Formation of Ohmic Contact to AlGaN/GaN Heterostructure on Sapphire

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Wide band gap semiconductors, such as III-nitrides (GaN, AlN, InN, and their alloys), SiC, and diamond are expected to play an important role in the next-generation electronic devices. Specifically, GaN-based high electron mobility transistors (HEMTs) have been targeted for high power, high frequency, and high temperature operation electronic devices for mobile communication systems, radars, and power electronics because of their high critical breakdown fields, high saturation velocities, and high thermal conductivities. For the stable operation, high power, high frequency and high breakdown voltage and high current density, the fabrication methods have to be optimized with considerable attention. In this study, low ohmic contact resistance and smooth surface morphology to AlGaN/GaN on 2 inch c-plane sapphire substrate has been obtained with stepwise annealing at three different temperatures. The metallization was performed under deposition of a composite metal layer of Ti/Al/Ni/Au with thickness. After multi-layer metal stacking, rapid thermal annealing (RTA) process was applied with stepwise annealing temperature program profile. As results, we obtained a minimum specific contact resistance of $1.6\times10^{-7}\Omega$ cm2.

Keywords: ohmic contact, AlGaN/GaN, specific contact resistance, RTA

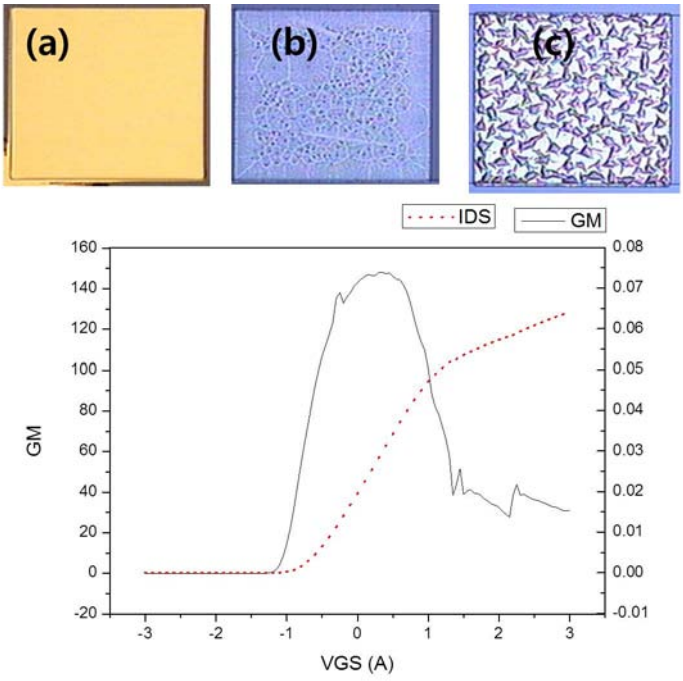

Fig. 1. Ohmic Contact on AlGaN/GaN-on-sapphire and its electrical data.