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Preparation of GaN by reactive RF Magnetron Sputterting

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Until now, A GaN thin film has been grown on various substrate mainly by MOCVD, MBE, HVPE. In this study, RF Magnetron Sputtering was employed for growth of GaN thin film. This method has advantages such as more simple process and higher growth rates compared to other methods. After AlN thin film on Si substrate was deposited by RF Magnetron Sputtering as a buffer layer, GaN thin film was fabricated by the same process as the one for AlN buffer layer. The growth conditions of the AlN buffer layer were following.; 100 W of RF power was supplied. During the growth temperature of the substrate was 400℃ and the pressure of the vacuum chamber was maintained at 3mTorr. The RMS (Root mean square) roughness of the film was observed by AFM(Atomic force microscopy) was below 5Å and found to be much smoother than those of films fabricated by other methods. And then using the buffer layer made by the above method, we fabricated GaN thin film with various conditions. At first, PL(photoluminescence) analysis confirmed the various optical properties of GaN thin film. And then electrical properties were investigated by Hall measurement. XRD(X-ray diffraction) was used for structure and orientation of GaN thin film. The morphology and chemical composition of the film fabricated by various growth conditions were studied using AFM and XPS(X-ray photoemission electron spectroscopy), respectively