



Electrical characterization and cathodoluminescence microanalysis of AlN/GaN heterostructures

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Abstract

Low-pressure MOCVD is used to grow AlN/GaN MIS-type heterostructures with AlN thickness between 3 and 35 nm. The two-dimensional electron gas (2DEG) Hall mobility was found to decrease with AlN thickness. The measured room temperature and 20 K mobilities for a sample with 15 nm thick AlN were $465 \text{ cm}^2\text{V}^{-1}\text{s}^{-1}$ ($n_s=1.72\times 10^{13} \text{ cm}^{-2}$) and $877 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$ ($n_s=1.57\times 10^{13} \text{ cm}^{-2}$), respectively. Cathodoluminescence (CL) spectra consist of two GaN-related bands with the maxima at 3.4 and 1.9–2.3 eV. Under surface excitation the intensity of the red–yellow CL relative to the intensity of the UV emission was found to increase with AlN film thickness. This increase was found to correlate with the decrease in 2DEG Hall mobility.