

Substrate-dependent wetting layer formation during GaN growth: Impact on the morphology of the films

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Abstract

We have compared epitaxial growth of GaN films on 6H-SiC(0001)-($\sqrt{3}\times\sqrt{3}$)R30°-Ga and on (0001)-sapphire. Predeposited Ga layers were nitrided by ion beam assisted molecular beam epitaxy. Whereas on SiC the initially deposited Ga covers the substrate surface completely, on sapphire only Ga droplets are present. The different distribution of the predeposited Ga affects the morphology of GaN significantly. Scanning electron microscopy and atomic force microscopy analysis of the grown films show that the complete wetting of the SiC substrate with Ga enhances finally the size and the flatness of GaN terraces and thus the quality of the film. X-ray photoelectron spectroscopy measurements reveal that metallic Ga resides also on top of the GaN films during the growth.