

Accepted Manuscript

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PII: S0167-577X(17)31101-1
DOI: <http://dx.doi.org/10.1016/j.matlet.2017.07.065>
Reference: MLBLUE 22907

To appear in: *Materials Letters*

Received Date: 17 June 2017
Revised Date: 11 July 2017
Accepted Date: 12 July 2017

Please cite this article as: Y. Li, W. Wang, Y. Lin, X. Li, L. Huang, Y. Zheng, Z. Zhang, G. Li, Growth of high-quality AlGaIn epitaxial films on Si substrates, *Materials Letters* (2017), doi: <http://dx.doi.org/10.1016/j.matlet.2017.07.065>

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Growth of high-quality AlGa_N epitaxial films on Si substrates

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Abstract: High-quality AlGa_N epitaxial films have been grown on Si(111) substrates by metal-organic chemical vapor deposition through introducing an AlN layer followed by a high Al composition AlGa_N buffer layer, together with optimizing the growth temperature to promote the dislocations reduction. The as-grown ~400 nm-thick AlGa_N epitaxial films with optimized growth temperature of 980 °C reveal high crystalline quality with a full-width at half-maximum for AlGa_N(0002) of 0.29° and smooth surface with a root-mean-square surface roughness of 0.76 nm. This work provides an effective approach for the growth of high-quality AlGa_N epitaxial films in the application of ultraviolet lasers and detectors.

Keywords: epitaxial growth; morphology; X-ray technique; hetero-interface

1. Introduction

Recently, group-III nitrides have received much attention because of their superior properties, such as direct band gap, high electron mobility, high thermal conductivity, *etc* [1-3]. Among them, AlGa_N is one of the most promising group-III nitrides to fabricate laser diodes, ultraviolet detectors, gas sensitive sensors, *etc* [4]. To grow

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