

Accepted Manuscript

Surface morphology of AlGa_N/Ga_N heterostructures grown on bulk Ga_N by MBE

R. Hentschel, J. Gärtner, A. Wachowiak, A. Großer, T. Mikolajick, S. Schmult

PII: S0022-0248(18)30334-8
DOI: <https://doi.org/10.1016/j.jcrysgr.2018.07.026>
Reference: CRYG 24680

To appear in: *Journal of Crystal Growth*

Received Date: 8 June 2018
Revised Date: 20 July 2018
Accepted Date: 25 July 2018

Please cite this article as: R. Hentschel, J. Gärtner, A. Wachowiak, A. Großer, T. Mikolajick, S. Schmult, Surface morphology of AlGa_N/Ga_N heterostructures grown on bulk Ga_N by MBE, *Journal of Crystal Growth* (2018), doi: <https://doi.org/10.1016/j.jcrysgr.2018.07.026>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Surface morphology of AlGa_N/Ga_N heterostructures grown on bulk Ga_N by MBE

Corresponding Author: Rico Hentschel

R. Hentschel¹, J. Gärtner¹, A. Wachowiak¹, A. Großer¹, T. Mikolajick^{1,2} and S. Schmult²

¹ Namlab gGmbH, Noethnitzer Str. 64, 01187 Dresden, Germany

² TU Dresden, Institute of Semiconductors and Microsystems, Noethnitzer Str. 64, 01187 Dresden, Germany

Electronic mail: Rico.Hentschel@namlab.com

Keywords: A3. Molecular Beam Epitaxy; B1. Gallium nitride; A1. Surface morphology; A1. Atomic force microscopy; B3. AlGa_N/Ga_N heterostructure

In this report the influence of the growth conditions on the surface morphology of AlGa_N/Ga_N heterostructures grown on sapphire-based and bulk Ga_N substrates is nondestructively investigated with focus on the decoration of defects and the surface roughness. Under Ga-rich conditions specific types of dislocations are unintentionally decorated with shallow hillocks. In contrast, under Ga-lean conditions deep pits are inherently formed at these defect sites. The structural data show that the dislocation density of the substrate sets the limit for the density of dislocation-mediated surface structures after MBE overgrowth and no noticeable amount of surface defects is introduced during the MBE procedure. Moreover, the transfer of crystallographic information, e.g. the miscut of the substrate to the overgrown structure, is confirmed. The combination of our MBE overgrowth with the employed surface morphology analysis by atomic force microscopy (AFM) provides a unique possibility for a nondestructive, retrospective analysis of the original substrate defect density prior to device processing.

Download English Version:

<https://daneshyari.com/en/article/8148339>

Download Persian Version:

<https://daneshyari.com/article/8148339>

[Daneshyari.com](https://daneshyari.com)