Lawrence Berkeley National Laboratory
Recent Work

Title
Dislocations in GaN grown by different methods

Permalink
https://escholarship.org/uc/item/6jb9p63r

Authors
Liliental-Weber, Zuzanna
Jasinski, Jacek
Zakharov, Dmitri
et al.

Publication Date
2003-09-09

eScholarship.org
Powered by the California Digital Library
University of California

DISLOCATIONS IN GaN GROWN BY DIFFERENT METHODS

Z. Liliental-Weber, J. Jasinski, D. Zakharov and M.A.O'Keefe
Lawrence Berkeley National Laboratory 62/R0100-8255, Berkeley, CA 94720

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, no The Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or The Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or The Regents of the University of California.

Ernest Orlando Lawrence Berkeley National Laboratory is an equal opportunity employer.

Ernest Orlando Lawrence Berkeley National Laboratory – LBNL-53911 Abs.

DISLOCATIONS IN GaN GROWN BY DIFFERENT METHODS

Z. Liliental-Weber, J. Jasinski, D. Zakharov and M.A.O'Keefe
Lawrence Berkeley National Laboratory 62/R0100-8255, Berkeley, CA 94720

Abstract

Thin film heteroepitaxy of polar materials such as GaN grown by MOCVD, MBE or HVPE Molecular Beam Epitaxy (MBE), and grown on SiC or Al_2O_3 is frequently hampered by the formation of structural defects – mostly dislocations, nanotubes and pinholes. The nanotubes and pinholes are empty areas either extending along the growth direction (tubes) or forming v-shape defects on $\{10\bar{1}1\}$ planes. In most cases they are associated with dislocations, but in some cases these defects are formed in dislocation-free areas.

In this presentation it will be shown that the screw dislocations present in HVPE samples are decorated by pinholes arranged on top of each other ("bamboo" structure), but these defects are not found in MBE samples grown on the top of HVPE samples. These might suggest either different core structure of a screw dislocation in HVPE and MBE grown material or suggest a different purity of these two materials. By applying a direct reconstruction of the phase and amplitude of the scattered electron wave from a focal series of high resolution images, the core structures of screw dislocations in both materials have been studied in order to see if the core structure in HVPE template layer and the MBE overlayer is different. This will be discussed in detail during the presentation.

Work supported by the Director, Office of Science through the Office of Basic Energy Sciences, Material Sciences Division, U.S. Department of Energy, under contract No. DE-AC03-76SF00098.