Accepted Manuscript

Structural characterization of InGaN multi-quantum-wells grown on high indium content InGaN template with {10-1m} faceted surface

Junjun Xue, Qing Cai, Baohua Zhang, Mei Ge, Dunjun Chen, Jiangwei Chen, Ting Zhi, Lianhui Wang, Rong Zhang, Youdou Zheng

PII:	S0167-577X(17)30793-0
DOI:	http://dx.doi.org/10.1016/j.matlet.2017.05.059
Reference:	MLBLUE 22634
To appear in:	Materials Letters
Received Date:	25 March 2017
Revised Date:	10 May 2017
Accepted Date:	11 May 2017



Please cite this article as: J. Xue, Q. Cai, B. Zhang, M. Ge, D. Chen, J. Chen, T. Zhi, L. Wang, R. Zhang, Y. Zheng, Structural characterization of InGaN multi-quantum-wells grown on high indium content InGaN template with {10-1m} faceted surface, *Materials Letters* (2017), doi: http://dx.doi.org/10.1016/j.matlet.2017.05.059

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.

ACCEPTED MANUSCRIPT

Structural characterization of InGaN multi-quantum-wells grown on high indium content InGaN template with {10-1m}

faceted surface

Junjun Xue^{1, 3}, Qing Cai², Baohua Zhang², Mei Ge², Dunjun Chen^{*, 2}, Jiangwei Chen¹, Ting Zhi², Lianhui

Wang³, Rong Zhang², Youdou Zheng²

¹ School of Electronic Science and Engineering, Nanjing University of Posts and Telecommunications

Nanjing, China

² School of Electronic Science and Engineering, Nanjing University, Nanjing, China

³ Institute of Advanced Materials, Nanjing University of Posts and Telecommunications, Nanjing, China

Key words: InGaN; Electron microscopy; Multilayer structure; X-ray diffraction; Epitaxial growth

* Corresponding author: Email djchen@nju.edu.cn

Abstract:

X-ray diffraction (XRD) reciprocal space mappings (RSMs) and transmission electron microscopy (TEM) were applied to structurally characterize InGaN multi-quantum-well (MQW) alloys with a novel structure which were epi-grown successively on a rough thick n-InGaN layer with $\{10\bar{1}m\}$ (2<m<6) faceted surface, by plasma assisted molecular beam epitaxy (MBE) on c-plane sapphire. In spite of the rugged surface of n-InGaN, the morphology of MQWs derives from the underlying InGaN layer with a special profile of V shape (named as V-MQWs). The direction of stacking for growing V-MQWs remains in [0001] direction. The process of growth was governed in the regime of Frank-van der Merwe. Spontaneous composition modulation of InGaN, with $<10\bar{1}m>$ modulation direction, was observed by TEM and unconventional shift of satellite peaks in reciprocal space took place in XRD ($10\bar{1}5$) RSM. The two scarce phenomena are attributed to the special morphology of V-MQWs.

1 Introduction

InGaN and GaN have some irreplaceable advantages in photoelectronic devices because of their excellent optical properties [1-3]. However, barriers make it very difficult to obtain high-quality crystalline InGaN layers, including the large lattice Download English Version:

https://daneshyari.com/en/article/5462681

Download Persian Version:

https://daneshyari.com/article/5462681

Daneshyari.com