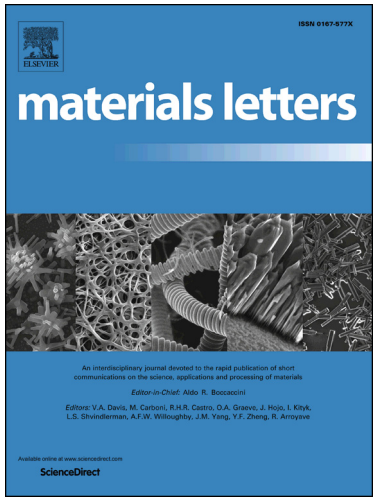

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Nonpolar p-contact layer based on AlGaN/GaN distributed Bragg reflector

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Abstract

The nonpolar *a*-plane Mg-doped p-type AlGaN/GaN distributed Bragg reflectors (DBRs) were grown for the first time with metal organic chemical vapor deposition technology. The structural, optical, and electrical properties of the nonpolar p-DBRs were characterized with various kinds of technical tools. The measurement results demonstrate that a stopband centered at 390 nm with a peak reflectivity of 55% were achieved. Meanwhile, a relatively high reflectivity (>35%) could also be obtained within the wavelength range of 270-320 nm for the nonpolar p-DBR which was intended to be a reflector with a working wavelength at 280 nm. Additionally, a hole concentration higher than 2×10^{17} cm^{-3} was obtained with the nonpolar p-DBRs.

Keywords: Epitaxial growth; interfaces; nonpolar; distributed Bragg reflectors; semiconductors.

1. Introduction

Currently the external quantum efficiency (EQE) for the conventional polar *c*-plane AlGaN-based deep ultraviolet light-emitting diodes (DUV-LEDs) is generally below 8% [1, 2]. The low EQE for the UV-LEDs on one hand, can be attributed to the quantum confined Stark effect (QCSE) along the growth direction, which limits the internal quantum efficiency (IQE) and thus the EQE for the polar *c*-plane LEDs [3]. On the other hand, the strong absorption of the UV light with a wavelength shorter than 365 nm by the GaN-based p-type region results in a very poor light-extraction efficiency (LEE), which should also be