High-Quality N-Face GaN, InN, AlN by MOCVD
Tech ID: 23651 / UC Case 2007-121-0

BACKGROUND

The use of group III nitride materials in optoelectronic devices is widespread. However, one of the major challenges of III-nitride based light emitters is the growth of high quality InGaN with high Indium composition. Devices using c-plane limit the temperature at which InGaN can be grown; this limits the types of devices that can be made. Traditional c-plane GaN suffers from inversion, while m-plane does not. Conversely, most m-plane GaN films grown by MOCVD, the most common growth method for large scale fabrication of GaN-based devices, are characterized by large hexagonal features that make the material unacceptable for device applications.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a novel method that allows for the growth of smooth, high quality m-plane films. The invention enables heteroepitaxial growth of smooth m-plane films by MOCVD onto any off-cut substrate, e.g., sapphire or silicon carbide. The different physical properties provided by m-plane allow for the design of new LEDs and laser diodes. M-plane also allows for the growth of InGaN at higher temperatures than traditional Ga-face. M-plane materials enable the growth of better quality, high Indium composition InGaN alloys which are currently needed to create high power devices in the green, yellow, and red parts of the color spectrum. Additionally, m-plane provides an electric field in the opposite direction of c-plane, which results in increased efficiency in light-emitting devices.

ADVANTAGES

- Growth of InGaN at higher temperatures
- Capable of using any off-cut substrate
- Lower turn-on voltage and increased efficiency

APPLICATIONS

- Light-emitting diodes (LEDs)

PATENT STATUS

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CONTACT

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OTHER INFORMATION

KEYWORDS
indssl, indbulk, MOCVD, cenIEE

CATEGORIZED AS
- Engineering
- Energy
- Lighting
- Other
- Optics and Photonics
- All Optics and Photonics
- Semiconductors
- Design and Fabrication

RELATED CASES
2007-121-0
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