Enhancing Growth of Semipolar (Al,In,Ga,B)N Films via MOCVD
Tech ID: 21821 / UC Case 2006-178-0

BRIEF DESCRIPTION


BACKGROUND

Existing methods of producing semipolar nitride films are extremely cumbersome and yield areas too small for device fabrication, thus there is a need for a new method that overcomes these obstacles in order to take advantage of the performance benefits of using semipolar nitride films.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a method for enhancing growth of semipolar (Al,In,Ga,B)N films via metalorganic chemical vapor deposition (MOCVD). This method involves growth of nitride films on the semipolar \{11 22\} plane to overcome performance limitations associated with the polar c-plane, thus increasing device efficiencies. It yields samples grown on 2-inch diameter substrates, compared with areas of a few micrometers accomplished using existing methods. This method also results in a planar film surface, few surface undulations, and a reduced number of crystallographic defects, all necessary features to support application to state-of-the-art nitride semipolar electronic devices.

ADVANTAGES

- Large available surface area (samples grown on 2-inch diameter substrates, compared to areas on the order of a few micrometers achieved by prior art)
- Increased device efficiencies compared to c-plane devices
- Planar film surface
- Minimized surface undulations and crystallographic defects

APPLICATIONS

- High-Performance Nitride-Based Optoelectronics and Semiconductor Devices

This technology is available for licensing. See below for a selection of the patents and patent applications related to this invention.

Please inquire for full patent portfolio status.

PATENT STATUS

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<th>Country</th>
<th>Type</th>
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<td>United States Of America</td>
<td>Issued Patent</td>
<td>8,405,128</td>
<td>03/26/2013</td>
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<td>7,687,293</td>
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OTHER INFORMATION

KEYWORDS
GaN, Gallium Nitride, indssl, indled, ceniIEE

CATEGORIZED AS
- Semiconductors
- Design and Fabrication

RELATED CASES
2006-178-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method for Improved Surface of (Ga,Al,In,B)N Films on Nonpolar or Semipolar Substrates
- High Efficiency LED with Optimized Photonic Crystal Extractor
- Enhanced Optical Polarization of Nitride LEDs by Increased Indium Incorporation
Activation of P-Type Layers of Tunnel Junctions in Micro-LEDs
- Hexagonal Wurtzite Type Epitaxial Layer with a Low Alkali-Metal Concentration
- Method for Increasing GaN Substrate Area in Nitride Devices
- Nitride Based Ultraviolet LED with an Ultraviolet Transparent Contact
- Growth of Planar, Non-Polar, A-Plane GaN by Hydride Vapor Phase Epitaxy
- Single or Multi-Color High Efficiency LED by Growth Over a Patterned Substrate
- GaN-Based Thermoelectric Device for Micro-Power Generation
- Limiting Strain-Relaxation in III-Nitride Heterostructures by Substrate Patterning
- Improved Manufacturing of Semiconductor Lasers
- LED Device Structures with Minimized Light Re-Absorption
- Growth of Planar Semi-Polar Gallium Nitride
- Nonpolar (Al, B, In, Ga)N Quantum Well Design
- UV Optoelectronic Devices Based on Nonpolar and Semi-polar AlInN and AlInGaN Alloys
- Defect Reduction of Non-Polar and Semi-Polar III-Nitrides
- III-Nitride Based VCSEL with Curved Mirror on P-Side of the Aperture
- Low-Cost Zinc Oxide for High-Power-Output, GaN-Based LEDs (UC Case 2010-150)
- Suppression of Defect Formation and Increase in Critical Thickness by Silicon Doping
- Wafer Bonding for Embedding Active Regions with Relaxed Nanofeatures