Packaging Technique for the Fabrication of Polarized Light Emitting Diodes

Tech ID: 22792 / UC Case 2005-614-0

BRIEF DESCRIPTION

A polarized LED and a method of fabricating and packaging the device.

BACKGROUND

It has recently become possible to prepare AlInGaN LEDs on a-planes and m-planes. These LEDs exhibit linearly polarized light emission. The polarization field is in a particular direction (c-direction) in the plane, and the stress in the QW is anisotropic due to different degrees of lattice mismatch between the substrate and QW in the two perpendicular directions in the plane. Linearly polarized light is an electromagnetic wave that has its electric field only in one plane perpendicular to its propagation. Non-polarized light has its electric field evenly distributed in directions in planes perpendicular to its propagation. A principle application for polarized light is backlighting for liquid crystal displays (LCDs), in which LEDs are beneficial due to their compactness and energy efficiency compared to conventional cold cathode fluorescent tubes. Nitride-based LEDs prepared on a semi-polar plane have also been confirmed to emit polarized light. What is needed is a simplified method of fabricating polarized LEDs and packaging such LEDs.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a polarized LED and a method of fabricating and packaging the device. The LED may be attached in a favorable orientation with respect to a package, so that the light polarization direction of emitted light from the package is apparent. The package may include at least one additional marker indicating the light polarization direction. Regardless, if a LCD is large (as for a television screen) or small (as for a cell phone screen), multiple LEDs are used to obtain sufficient brightness. To use an LED array as a linearly polarized light source, the orientation of each die must match. To fabricate these LED arrays as polarized light sources, the marker technique of this technology will make the whole production process simple and reliable, from die attachment into a package to final display unit assembling.

ADVANTAGES

- Simple and reliable process

APPLICATIONS

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OTHER INFORMATION

KEYWORDS

LED, polarized LED, indssl, indled, cenIEE, indfeat

CATEGORIZED AS

- **Engineering**
- **Optics and Photonics**
  - All Optics and Photonics
- **Semiconductors**
  - Design and Fabrication

RELATED CASES

2005-614-0

- Polarized LEDs (manufacturing and packaging)

This technology is available for licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,723,746	05/25/2010	2005-614

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Lateral Growth Method for Defect Reduction of Semipolar Nitride Films
- Vertical Cavity Surface-Emitting Lasers with Continuous Wave Operation
- Eliminating Misfit Dislocations with In-Situ Compliant Substrate Formation
- III-Nitride-Based Vertical Cavity Surface Emitting Laser (VCSEL) with a Dielectric P-Side Lens
- Aluminum-cladding-free Nonpolar III-Nitride LEDs and LDs
- Low-Cost Zinc Oxide for High-Power-Output, GaN-Based LEDs (UC Case 2010-183)
- Defect Reduction in GaN films using in-situ SiNx Nanomask
- Enhanced Light Extraction LED with a Tunnel Junction Contact Wafer Bonded to a Conductive Oxide
- Low Temperature Deposition of Magnesium Doped Nitride Films
- Transparent Mirrorless (TML) LEDs
- Improved GaN Substrates Prepared with Ammonothermal Growth
- Optimization of Laser Bar Orientation for Nonpolar Laser Diodes
- Method for Enhancing Growth of Semipolar Nitride Devices
- Ultraviolet Laser Diode on Nano-Porous AlGaN template
- Improved Reliability & Enhanced Performance of III-Nitride Tunnel Junction Optoelectronic Devices
- Growth of Polyhedron-Shaped Gallium Nitride Bulk Crystals
- Nonpolar III-Nitride LEDs With Long Wavelength Emission
- Improved Fabrication of Nonpolar InGaN Thin Films, Heterostructures, and Devices
- Growth of High-Quality, Thick, Non-Polar M-Plane GaN Films
- Method for Growing High-Quality Group III-Nitride Crystals
- Controlled Photoelectrochemical (PEC) Etching by Modification of Local Electrochemical Potential of Semiconductor Structure
- Oxyfluoride Phosphors for Use in White Light LEDs
- Technique for the Nitride Growth of Semipolar Thin Films, Heterostructures, and Semiconductor Devices
- (In,Ga,Al)N Optoelectronic Devices with Thicker Active Layers for Improved Performance
- Thermally Stable, Laser-Driven White Lighting Device
- MOCVD Growth of Planar Non-Polar M-Plane Gallium Nitride
- Methods for Fabricating III-Nitride Tunnel Junction Devices
- Low-Droop LED Structure on GaN Semi-polar Substrates
- Contact Architectures for Tunnel Junction Devices
- Semi-polar LED/LD Devices on Relaxed Template with Misfit Dislocation at Hetero-interface
- Semipolar-Based Yellow, Green, Blue LEDs with Improved Performance
- III-Nitride-Based Devices Grown On Thin Template On Thermally Decomposed Material
- Growth of Semipolar III-V Nitride Films with Lower Defect Density
- III-Nitride Tunnel Junction LED with High Wall Plug Efficiency

- Tunable White Light Based on Polarization-Sensitive LEDs
- Cleaved Facet Edge-Emitting Laser Diodes Grown on Semipolar GaN
- Growth of High-Performance M-plane GaN Optical Devices
- Improved Anisotropic Strain Control in Semipolar Nitride Devices
- Novel Multilayer Structure for High-Efficiency UV and Far-UV Light-Emitting Devices
- III-V Nitride Device Structures on Patterned Substrates
- Method for Increasing GaN Substrate Area in Nitride Devices
- High-Intensity Solid State White Laser Diode
- Nitride Based Ultraviolet LED with an Ultraviolet Transparent Contact
- GaN-Based Thermoelectric Device for Micro-Power Generation
- Limiting Strain-Relaxation in III-Nitride Heterostructures by Substrate Patterning
- LED Device Structures with Minimized Light Re-Absorption
- Growth of Planar Semi-Polar Gallium Nitride
- High-Efficiency and High-Power III-Nitride Devices Grown on or Above a Strain Relaxed Template
- 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
- Enhancing Growth of Semipolar (Al,In,Ga,B)N Films via MOCVD

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