Thermally Stable, Laser-Driven White Lighting Device
Tech ID: 24050 / UC Case 2013-951-0

BRIEF DESCRIPTION
A high power, laser driven white light source that maintains efficiency and color stability at high temperatures.

BACKGROUND
Light emitting diodes (LEDs) are advantageous over incandescent and fluorescent light sources due to their energy efficiency and longer lifetimes, and efforts are continually being made to increase the efficiency of LED devices. When operating, an LED’s temperature will inevitably increase and result in decreased efficiency of the light emitting phosphor particles, as well as color instability. These factors have made high powered, white lighting devices unattainable using current LEDs as the excitation source.

DESCRIPTION
Researchers at the University of California, Santa Barbara have developed a high power, laser driven white light source that maintains efficiency and color stability at high temperatures. By using a laser diode light source, as well as one or more phosphors deposited on a thermally conductive substrate that is either transparent or reflective and placed at a remote distance from the laser source, this technology works to eliminate the temperature dependence of the device. Depending on the final application this thermally conductive substrate can be transparent or reflective and is used remotely at a close range or at a relatively far distance. This technology offers a stable, energy efficient, high power solid state white light that eliminates many of the loss mechanisms that lead to decreased efficiency in LED-based white lighting devices.

ADVANTAGES
▶ Remote capabilities
▶ Improved efficiency and color stability
▶ High potential for new applications

APPLICATIONS
▶ Solid state lighting devices
▶ Laser diodes

PATENT STATUS

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OTHER INFORMATION
KEYWORDS
indssl, indLED, solid state lighting, white lighting, phosphors, cenIEE

CATEGORIZED AS
▶ Energy
▶ Lighting

RELATED CASES
2013-951-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS
▶ Method for Improved Surface of (Ga,Al,In,B)N Films on Nonpolar or Semipolar Substrates
Enhanced Optical Polarization of Nitride LEDs by Increased Indium Incorporation
- Vertical Cavity Surface-Emitting Lasers with Continuous Wave Operation
- Eliminating Misfit Dislocations with In-Situ Compliant Substrate Formation
- III-Nitride-Based Devices Growth With Relaxed Active Region
- 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
- Highly Efficient Blue-Violet III-Nitride Semipolar Laser Diodes
- Hybrid Growth Method for Improved III-Nitride Tunnel Junction Devices
- Low Temperature Deposition of Magnesium Doped Nitride Films
- Transparent Mirrorless (TML) LEDs
- Optimization of Laser Bar Orientation for Nonpolar Laser Diodes
- Stand-Alone Ceramic Phosphor Composites for Laser-Excited Solid-State White Lighting
- Size-Independent Forward Voltage Micro-LED with an Epitaxial Junction
- Method for Enhancing Growth of Semipolar Nitride Devices
- III-Nitride Tunnel Junction with Modified Interface
- Improved Fabrication of Nonpolar InGaN Thin Films, Heterostructures, and Devices
- Growth of High-Quality, Thick, Non-Polar M-Plane GaN Films
- Increased Light Extraction with Multistep Deposition of ZnO on GaN
- Selective-Area Mesoporous Semiconductors And Devices For Optoelectronic And Photonic Applications
- High-Efficiency, Mirrorless Non-Polar and Semi-Polar Light Emitting Devices
- 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
- MOCVD Growth of Planar Non-Polar M-Plane Gallium Nitride
- Reduced Dislocation Density of Non-Polar GaN Grown by Hydride Vapor Phase Epitaxy
- Highly Compact, High-Index Dielectric Nanostructures for Deep-Ultraviolet Devices
- Reduction in Leakage Current and Increase in Efficiency of III-Nitride MicroLEDs
- 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
- Photoelectrochemical Etching Of P-Type Semiconductor Heterostructures
- 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
- Improved Manufacturing of Solid State Lasers via Patterning of Photonic Crystals
- High Efficiency III-Nitride Devices with Smooth Relaxed InGaN Buffer and Strain Compliant Template
- 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
- Packaging Technique for the Fabrication of Polarized Light Emitting Diodes
- Improved Anisotropic Strain Control in Semipolar Nitride Devices
- High Light Extraction Efficiency III-Nitride LED
- III-V Nitride Device Structures on Patterned Substrates
- Activation of P-Type Layers of Tunnel Junctions in Micro-LEDs
- 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
- 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
- Nonpolar (Al, B, In, Ga)N Quantum Well Design
- UV Optoelectronic Devices Based on Nonpolar and Semi-polar AlInN and AlInGaAlN Alloys
Defect Reduction of Non-Polar and Semi-Polar III-Nitrides

Enhancing Growth of Semipolar (Al,In,Ga,B)N Films via MOCVD