



## Thermally Stable, Laser-Driven White Lighting Device

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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

## 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

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,927,076	03/27/2018	2013-951
United States Of America	Issued Patent	9,574,728	02/21/2017	2013-951

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Vertical Cavity Surface-Emitting Lasers with Continuous Wave Operation
- ▶ Eliminating Misfit Dislocations with In-Situ Compliant Substrate Formation
- ▶ 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 SiN<sub>x</sub> 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
- ▶ Optimization of Laser Bar Orientation for Nonpolar Laser Diodes
- ▶ Stand-Alone Ceramic Phosphor Composites for Laser-Excited Solid-State White Lighting
- ▶ Method for Enhancing Growth of Semipolar Nitride Devices
- ▶ Ultraviolet Laser Diode on Nano-Porous AlGa<sub>N</sub> template
- ▶ Improved Reliability & Enhanced Performance of III-Nitride Tunnel Junction Optoelectronic Devices
- ▶ Improved Fabrication of Nonpolar InGa<sub>N</sub> Thin Films, Heterostructures, and Devices
- ▶ Growth of High-Quality, Thick, Non-Polar M-Plane GaN Films
- ▶ 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)<sub>N</sub> Optoelectronic Devices with Thicker Active Layers for Improved Performance
- ▶ 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
- ▶ Packaging Technique for the Fabrication of Polarized Light Emitting Diodes
- ▶ Improved Anisotropic Strain Control in Semipolar Nitride 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
- ▶ UV Optoelectronic Devices Based on Nonpolar and Semi-polar AlIn<sub>N</sub> and AlInGa<sub>N</sub> Alloys
- ▶ Defect Reduction of Non-Polar and Semi-Polar III-Nitrides
- ▶ Enhancing Growth of Semipolar (Al,In,Ga,B)<sub>N</sub> Films via MOCVD

