Integration And Mass Transfer Of Microleds
Tech ID: 32079 / UC Case 2019-420-0

BACKGROUND

Conventional methods for the integration and mass transfer of red, green, and blue μLEDs onto integrated circuit boards are challenged by low yield. Unlike current display technologies, μLEDs require a significant number of individual devices and a specific construction depending on the color of the μLED. There is a need for new μLED integration techniques that address the manufacturing obstacles that slow the adoption of μLED technology.

DESCRIPTION

Researchers at the University of California, Santa Barbara have resolved the complexities of creating μLED displays by combining AlInGaN red μLEDs with InGaN-based blue and green μLEDs on integrated circuit boards via wafer or flip-chip bonding. This method of integration involves fixing multiple μLEDs to a diced segment (tile) of the substrate which is the size of a single conventional LED. Transferring μLED arrays using tiles allows for parallel processing of μLEDs and integrated circuits, which is advantageous over serial processing in the conventional pick-and-place method. Thus, the invention offers advantages in rapid fabrication and integration times as well as eliminating the possibility of dead pixels by examining the μLED arrays separately on the diced substrate after bonding and using a procedure that leverages existing LED manufacturing processes.

ADVANTAGES

▶ Increases manufacturing efficiency
▶ Implementable with existing equipment and techniques
▶ Eliminates possibility of dead pixels

APPLICATIONS

▶ μLEDs
▶ LEDs
▶ Laser Diodes

PATENT STATUS

Patent Pending

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
▶ Etching Technique for the Fabrication of Thin (Al, In, Ga)N Layers
▶ Lateral Growth Method for Defect Reduction of Semipolar Nitride Films
▶ Flexible Arrays of MicroLEDs using the Photoelectrochemical (PEC) Lift-off Technique
▶ Vertical Cavity Surface-Emitting Lasers with Continuous Wave Operation
▶ Internal Heating for Ammonothermal Growth of Group-III Nitride Crystals
▶ 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
▶ Volumetric Hole Injection with Intentional V-Defects