Photoelectrochemical Etching Of P-Type Semiconductor Heterostructures
Tech ID: 23783 / UC Case 2008-533-0

BRIEF DESCRIPTION
A novel process to achieve PEC etching of p-type semiconductors simply and efficiently.

BACKGROUND
Photoelectrochemical (PEC) wet etching is applied to a variety of semiconductors including GaAs, InP, and GaN. PEC etching of GaN is of great interest due to the limited alternatives for room temperature, wet etching. This process consists of a light source and an electrochemical cell with the semiconductor being the anode and metal patterned directly onto it to act as the cathode. Typically, this etching is confined to the surface of n-type materials while electrons are confined to the surface in p-type materials. The electrons at p-type surfaces constrain etching and make PEC etching of p-type semiconductors difficult.

DESCRIPTION
Researchers at the University of California, Santa Barbara have developed a novel process to achieve PEC etching of p-type semiconductors simply and efficiently. This method utilizes heterostructures to open up the possibility for a wide range of device fabrication processes requiring etching of p-type materials. The wet etch nature of the process provides the capability for rapid, low-damage etching compared to the traditional ion-assisted plasma etching techniques.

ADVANTAGES
▶ Ability to wet etch p-type materials
▶ Form deep, anisotropic trenches
▶ Bandgap selectivity
▶ Defect selectivity

APPLICATIONS
▶ Semiconductors

PATENT STATUS

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OTHER INFORMATION
KEYWORDS
PEC, cenIEE, indssl

CATEGORIZED AS
▶ Engineering
▶ Energy
▶ Lighting
▶ Other
▶ Semiconductors
▶ Design and Fabrication

RELATED CASES
2008-533-0

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