Novel Current-Blocking Layer in High-Power Current Aperture Vertical Electron Transistors (CAVETs)

Tech ID: 22364 / UC Case 2011-831-0

BRIEF DESCRIPTION
A process for creating a novel type of active current-blocking layer to allow the device current to only pass through the aperture.

BACKGROUND
A Current Aperture Vertical Electron Transistor (CAVET) is a vertical device consisting of an n-type doped drift region to hold voltage and a horizontal region to carry current flowing from the source to the drain through an aperture. A current blocking layer is employed in such devices to block the current from flowing through any other direction but the aperture.

DESCRIPTION
Researchers at the University of California, Santa Barbara have developed a process for creating a novel type of active current-blocking layer to allow the device current to only pass through the aperture. This current-blocking layer effectively restricts the movement of current to only one direction to improve device functionality and reliability. The careful confinement of the device current allows for highly reliable and smooth high-frequency switching as well as high-power switching.

ADVANTAGES
▶ Simple device manufacturing process
▶ Improved device reliability and performance
▶ Smooth high-frequency switching

APPLICATIONS
▶ High-power & high-frequency switching

PATENT STATUS

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<th>Type</th>
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<td>United States Of America</td>
<td>Issued Patent</td>
<td>9,590,088</td>
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<td>8,937,338</td>
<td>01/20/2015</td>
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ADDITIONAL TECHNOLOGIES BY THESE INVENTORS
▶ Achieving "Active P-Type Layer/Layers" In III-Nitride Epitaxial Or Device Structures Having Buried P-Type Layers
▶ High-Quality N-Face GaN, InN, AIN by MOCVD
▶ Defect Reduction in GaN films using in-situ SiNx Nanomask
▶ Laser Diode With Tunnel Junction Contact Surface Grating
▶ High Mobility Group-III Nitride Transistors with Strained Channels
▶ A Structure For Increasing Mobility In A High-Electron-Mobility Transistor
▶ Fabrication of Relaxed Semiconductor Films without Crystal Defects
▶ Improved Fabrication of Nonpolar InGaN Thin Films, Heterostructures, and Devices
▶ Methods for Locally Changing the Electric Field Distribution in Electron Devices

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OTHER INFORMATION

KEYWORDS
CAVET, indcircuit, indssl, indpowerelec, indaltenergy, indmicroelec, indfeat

CATEGORIZED AS
▶ Semiconductors
▶ Other

RELATED CASES
2011-831-0
 Technique for the Nitride Growth of Semipolar Thin Films, Heterostructures, and Semiconductor Devices

 Enabling Epitaxial Growth On Thin Substrates

 (In,Ga,Al)N Optoelectronic Devices with Thicker Active Layers for Improved Performance

 GaN-based Vertical Metal Oxide Semiconductor and Junction Field Effect Transistors

 II-N Transistor With Stepped Cap Layers

 Polarization-Doped Field Effect Transistors with Increased Performance

 Wafer Bonding for Embedding Active Regions with Relaxed Nanofeatures

 III-N Based Material Structures and Circuit Modules Based on Strain Management