Method For The Removal Of Devices Using The Trench

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BACKGROUND

GaN substrates produce high quality III-nitride devices, but the substrate itself is expensive. Recycling the GaN layer would provide substantial cost-saving opportunities. Existing methods of removing devices from their substrates have demonstrated damage to the semiconductor layers or require an arduous etching process which dilutes the benefits of recycling the substrate at all.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a technique for removing III-nitride devices from their substrates with quick processing times and without significant damage to the devices. Before devices are grown on their substrate, the substrate is etched with another III-nitride layer to form trenches at the surface. A growth-restrict mask is deposited in the trenches so that the device layers do not coalesce with the substrate, and the substrate can be removed and recycled, reducing fabrication costs. This technique is applicable to multiple semiconductor device types.

ADVANTAGES

- Drastic cost reduction in GaN substrates via recycling
- Smooth cleaving surfaces
- Quick processing

APPLICATIONS

- Laser diodes
- LEDs
- Schottky barrier diodes
- MOSFETs

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,051,765	07/30/2024	2019-398

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OTHER INFORMATION

KEYWORDS

GaN, substrate, trench, III-nitride, laser diode, LED, MOSFET, Schottky barrier diode

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Energy**
  - Lighting
- **Semiconductors**
  - Design and Fabrication
  - Processing and Production

RELATED CASES

2019-398-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Epitaxial Light Control Features in Light Emitting Diodes
- High-Efficiency Vertical Cavity Surface Emitting Laser Fabrication

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