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Non-Confidential Description

GROUP III NITRIDE-BASED HIGH ELECTRON MOBILITY TRANSISTOR (HEMT) WITH BARRIER/SPACE LAYER

BACKGROUND: High electron mobility transistors (HEMTs) are usually fabricated from silicon or gallium arsenide. However, each presents particular drawbacks. Silicon has a low electron mobility, which produces a high source resistance that can degrade the HEMT's high-performance gain. GaAs-based HEMTs, which have become the standard for signal amplification in radar, cellular, and satellite communications, demonstrate higher electron mobility and lower source resistance than Si-based devices. Although this allows these devices to function at higher frequencies, the relatively small bandgap and breakdown voltage of GaAs prevents GaAs-based HEMTs from providing high power at high frequencies. DESCRIPTION: Scientists at the University of California have developed a new HEMT structure that contains a thin polarization induced dipole layer. By increasing barrier height and reducing penetration of the electron wave function into the barrier, this novel arrangement improves electron mobility, especially at low temperatures. APPLICATIONS:This newinvention has applications in high-frequency, high-temperature and/or high-power electronics. ADVANTAGES:The new UC technology provides the following benefits:

- Improves Group-III nitride-based HEMTs by enhancing two-dimensional electron gas (2DEG) mobility;
- Demonstrates a high piezoelectric charge;
- Reduces piezoelectric scattering at the interface between the two layers.

This technology is available for licensing on a non-exclusive basis.

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INQUIRIES TO: Oren Livne
Email: livne@research.ucsb.edu
Phone: 1-805-893-5138

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Technology Categories

- Subassemblies & Components > Semiconductors/devices