

High performance GaN high electron mobility transistors and circuits on silicon substrate for 5G beyond wireless communications

PI: Yuping Zeng



Team



Dr. Yuping Zeng
Technical Lead



Dr. Peng Cui
Entrepreneurial Lead



Dr. Guangyang Lin
Entrepreneurial Lead



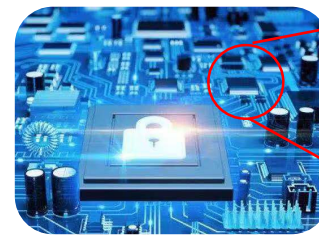
Ms. Christina Pellicane

- *Dr. Zeng will be the Principal Investigator in this task. She will oversee the entire course of the technology development and commercialization.*
- *Dr. Cui will be the Entrepreneurial lead in this task. He has extensive customer discovery experiences; he will develop the prototyping of the product including the device fabrication technology and commercialization strategies.*
- *Dr. Lin will be the Entrepreneurial lead in this task. He will develop the prototyping of the product including the material growths and characterizations.*
- *Ms. Pellicane has experience supporting high-tech entrepreneurs spin out of academia and has experience in industry as a research associate at a biotech startup and a business development specialist in a clinical research organization.*

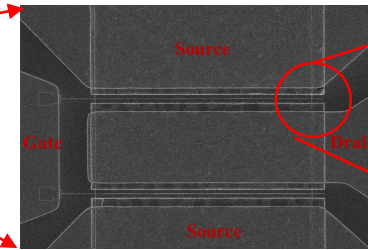
Amplus



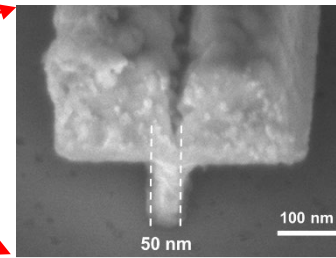
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Integrated Circuits



GaN transistors



T-shape gate

Technical Abstract: The next-generation of communication systems, including 5G and beyond, vehicles and internet of things needs devices operating at mm-Wave hands with low cost and high-efficiency. GaN power amplifier (PA) with a new material and device fabrication technology offers a 50% cost reduction and a larger bandwidth for directors of product management/product develop engineers in semiconductor companies who fabricate RF chips.

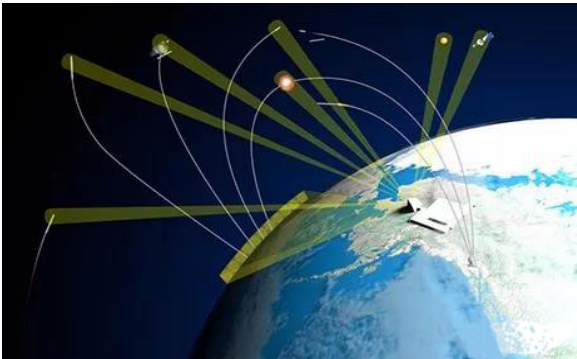
Overview: We will perform material characterizations and device simulations to understand the underlying physical and chemical properties of the material/interfaces with innovative material design and process techniques.

Technical Merit: We will utilize our recently demonstrated GaN high electron mobility transistors technology for record high performances and build power amplifiers on low cost silicon.

Team: PI Zeng and Dr. Peng Cui, Guangyang Lin have extensive experiences on high speed transistors with III-V materials.

Commercialization: PI Zeng is responsible for overseeing government R&D contract relating to defense applications of GaN high electron mobility transistors and circuits for monitoring process development and commercialization efforts.

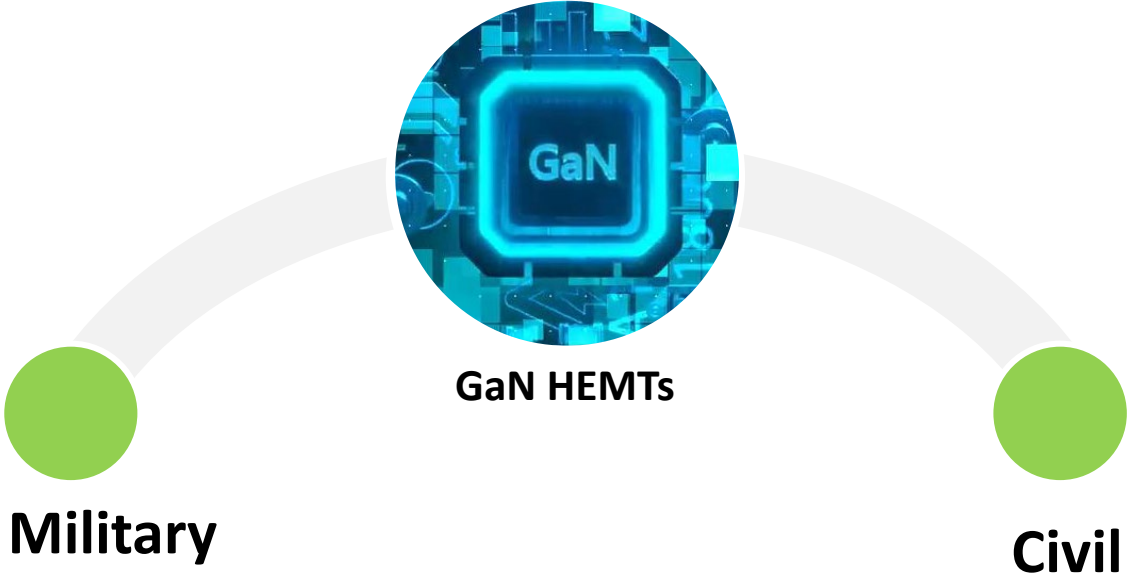
Market and Customers



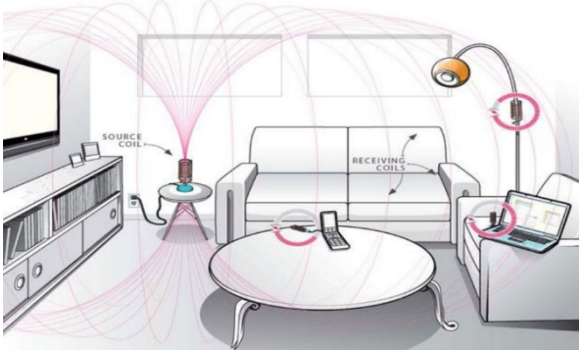
Radar



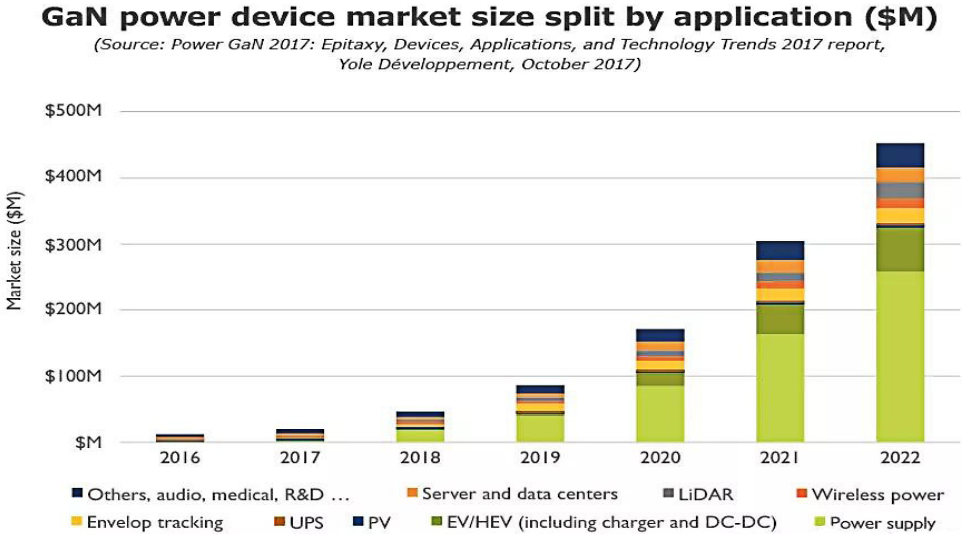
Space



6G Communication



Wireless Charge



Business Canvas

<u>Key Partners</u> • Wafer Manufacturer: Enkris Semiconductor Inc. • Semiconductor Foundry: TSMC, SMIC • Module maker: Qorvo, MACOM, Qualcomm, CREE	<u>Key Activities</u> • Scientific research and key technology development • Demonstration of proof of concept • Intellectual property development • Attend conference and exhibition • Customer Meeting <u>Key Resources</u> • Funding for the key technology development • UD Nanofabrication Facility (UDNF) • Intellectual property	<u>Value Propositions</u> • Low material cost (50%) due to the GaN on Si substrate • Higher speed and higher frequency (10×) due to the key core technology • Higher power (30%) power amplifier compared to the existing technology • Larger bandwidth (~50%) of the power amplifier	<u>Customer Relationship</u> • Get: Academic conference, Trade show, seminar, paper publish • Keep: Continuous updates and attend <u>Channels</u> • Direct sale • Professional relationships • Conferences • Trade shows	<u>Customer Segments</u> • Directors of Product Management (Decision maker) • Product develop Engineers (Main user) • Cell phone manufacturer: Samsung, Huawei, LG • Engineers , product develop manager in Semiconductor companies who fabricate RF chips
<u>Cost Structure</u> • Personnel salary • Customer connection • Basis scientific research and technology development	<u>Revenue Streams</u> • Develop the higher device performance for the military application to get the Initial revenue • Develop the civil communication application which owns a big market • Partly revenue was used for the basic key technology research			

Customer Ecosystem Map

