Opportunity Title: Microwave Device Research for Satellite Communications
Opportunity Reference Code: 0011-NPP-NOV23-GRC-TechDev

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0011-NPP-NOV23-GRC-TechDev

Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description The research objective is to develop improved solid-state materials, devices, and circuits for use in microwave/millimeter-wave electronics and optical applications. Semiconductors, ferroelectrics, and insulators are investigated. Semiconductor research concentrates on materials and devices useful in high-speed and/or high-power and optical applications. Most important of these are Si_xGe_{1-x}, SiC, GaN, and III-V binary and ternary compounds, including multilayer heterostructures and III-N materials. Temperature dependency of materials, devices, and rf circuits to 600C are also of interest. Ferroelectric material work includes hybrids with semiconductors or superconductors for tunable microwave components. Insulating materials include silicon and oxide-based insulators. In addition, we are interested in nanomaterials for molecular electronic devices used in communications. Actual work includes characterization of materials, transmission media, devices, and circuits using electrical, optical, and structural methods. In some cases, preparation of materials and/or finished devices and/or circuits is performed. Furthermore, we are also interested in the development of wide bandgap semiconductor based high efficiency power amplifiers for millimeter-wave applications.

Several unique facilities are available. These include a computer-controlled, variable angle spectroscopic ellipsometer and an *in situ* spectroscopic ellipsometer, both with associated software for multilayer analysis; scanning electron microscope with x-ray energy dispersive capability; conventional 5-in furnaces; rapid thermal annealing capability; automatic C-V and I-V measurement systems; ultraviolet (UV)-visible-infrared absorption spectrometer; plasma and sputtering deposition systems; heating stage; closed cycle cryostat for rf measurements, and plasma and reactive ion etching systems.

General-purpose facilities include an electron beam evaporation system, optical lithography with deep-UV mask aligner, a 1,500 square-foot class 100 clean room, semiconductor cutting and polishing equipment, a computer-controlled X-Y cutter table for mask preparation, ribbon and wire bonding facilities, and microwave characterization capabilities from DC to 90 GHz.

Location:
Glenn Research Center
Cleveland, Ohio

Field of Science: Technology Development

Advisors:

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Eligibility Requirements

- **Citizenship:** LPR or U.S. Citizen
- **Degree:** Doctoral Degree.