

Title: Development of Junction Field Effect Transistors (JFETs) on 4H-SiC

Abstract:

Power devices are an important part of power electronics, as they are used in systems to deliver power to a multitude of applications. An ideal power device is a switch that can block large amounts of voltages with no leakage current in its “off-state” and conduct current with no resistance during its “on-state”. Due to superior intrinsic material properties, Silicon Carbide (SiC) has become a popular substrate choice for medium to high voltage power devices (>600V). Compared to its Silicon counterpart, SiC allows for the voltage supporting drift regions of power devices to be designed thinner and more highly doped, reducing the on-resistance at a specific blocking voltage. Of the SiC power devices, the most common are the diode, Metal-Oxide-Semiconductor Field Effect Transistor (MOSFET) and the Junction Field Effect Transistor (JFET).

In this talk, a general background of SiC power devices will be provided, followed by a in depth look at the 1.2kV SiC JFET. Device architecture, novel design approaches, and electrical characterization of 1.2kV SiC JFETs will be presented.