

ABSTRACT:

III-N HEMTs with Compositionally-Graded Heterostructures for RF Applications

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Achieving ubiquitous, high-performance wireless communications (e.g. 6G and beyond) requires significant advancements in device performance, to exceed what is readily attainable with existing technologies. To obtain the high bandwidths required on a mobile platform, devices offering high levels of millimeter-wave performance (i.e. low noise figure, high linearity, and high power efficiency) with low power consumption are essential. The unique properties of the III-N material system (e.g. polarization, LO phonon mediated electron transport) enable new approaches for designing millimeter-wave transistors for power and low-noise amplifiers. The use of compositionally-graded HEMT heterostructures provides additional degrees of device design freedom that can be used to directly manipulate the spontaneous and piezoelectric components of polarization within the devices. In this talk, device designs exploiting this concept will be discussed, highlighting the potential of this approach for future-generation communication systems.