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Title:A comparative investigation on sub-micrometer InN and GaN Gunn diodes working at terahertz frequency

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Abstract: We report on a simulation for wurtzite-InN and GaN Gunn diodes with notch-doping and uniform-doping structural transit regions. Results show that 0.3-1.0 mu m Gunn diodes with a diode area of 500 mu m(2) can generate fundamental frequencies of around 0.2-0.8 THz and rf currents of several hundred mA. InN diodes exhibit more stable oscillations, whereas GaN diodes generate higher oscillation frequencies at both dipole-domain mode and accumulation-domain mode due to different negative differential resistance (NDR) characteristics of high-field transport. The sharp NDR region of InN makes it more suitable for short transit region Gunn diode. Higher I-rf/I-av and lower bias voltage in InN Gunn diode imply its conversion efficiency significantly higher than GaN diode. (C) 2012 American Institute of Physics. [http://dx.doi.org/10.1063/1.4721667]

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