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Title:Searching for THz Gunn oscillations in GaN planar nanodiodes
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Abstract:A detailed study of GaN-based planar asymmetric nanodiodes, promising devices for the fabrication of room temperature THz Gunn oscillators, is reported. By using Monte Carlo simulations, an analysis of the static I-V curves and the time-domain evolution of the current obtained when varying some simulation parameters in the diodes has been made. Oscillation frequencies of hundreds of GHz are predicted by the simulations in diodes with micrometric channel lengths. Following simulation guidelines, a first batch of diodes was fabricated. It was found that surface charge depletion effects are stronger than expected and inhibit the onset of the oscillations. Indeed, a simple standard constant surface charge model is not able to reproduce experimental measurements and a self-consistent model must be included in the simulations. Using a self-consistent model, it was found that to achieve oscillations, wider channels and improved geometries are necessary. (C) 2012 American Institute of Physics. [http://dx.doi.org/10.1063/1.4724350]
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