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Title

Temperature dependence of electron transport on a bound-to-continuum terahertz quantum cascade laser

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Abstract

We investigate the temperature effects on electron transport in a bound-to-continuum terahertz quantum cascade laser using Monte Carlo simulation which includes electron-electron and electron-phonon scattering. The effects of carrier transport paths and mechanisms, especially for those related to laser levels, on the device's temperature performance are evaluated. The simulation shows that the parasitic leakage of carriers from the upper laser level and the thermal backfilling to the lower laser level is the main limiting factor for high-temperature operation. The calculations are in good agreement with experimental results. (32 References).