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Title:Effect of injection coupling strength on terahertz quantum-cascade lasers

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Abstract: The authors investigate the effect of injection coupling strength on the performance of a set of three-well diagonal transition terahertz quantum-cascade lasers using a Monte Carlo method. Device structures with different injection coupling strengths, i.e. from 1.6 to 10 meV, are considered. For an accurate comparison, the level separation between the lasing states is kept the same (around 3.7 THz) across all designs. The simulation results show that the current density corresponding to the negative differential resistance region (JNDR) can be largely increased by increasing the injection coupling. In the range of the injection coupling strength investigated here, an optimal injection coupling of 7.5 meV is found.

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