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Abstract:Using an ensemble Monte-Carlo analysis, it is found that relaxing the constraint of identical barrier heights can result in an improved temperature performance. Exploiting this additional design degree of freedom, modified structures with non-uniform barrier heights are developed based on the current record temperature design. For an optimized structure with reduced diagonality, we predict an increase of 31 K for the maximum operating temperature. Furthermore, we develop improved designs with the same oscillator strength as for the reference design. Using a genetic algorithm for optimization, an improvement of the maximum operating temperature by 38K is obtained. These results aim to show the potential of varying the barrier heigths for the design of high temperature performance terahertz quantum cascade lasers. (C) 2012 American Institute of Physics. [http://dx.doi.org/10.1063/1.4719071]
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