Abstract Submitted
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Microscopic modeling of nitride intersubband absorbance [1] INES MONTANO, A.A. ALLERMAN, Sandia Natl Labs, J.J. WIERER, Lehigh University, M. MOSELEY, E.J. SKOGEN, A. TAUKE-PEDRETTI, G.A. VAWTER, Sandia Natl Labs — III-nitride intersubband structures have recently attracted much interest because of their potential for a wide variety of applications ranging from electro-optical modulators to terahertz quantum cascade lasers. To overcome present simulation limitations we have developed a microscopic absorbance simulator for nitride intersubband devices. Our simulator calculates the band structure of nitride intersubband systems using a fully coupled 8x8 k.p Hamiltonian and determines the material response of a single period in a density-matrix-formalism by solving the Heisenberg equation including many-body and dephasing contributions. After calculating the polarization due to intersubband transitions in a single period, the resulting absorbance of a superlattice structure including radiative coupling between the different periods is determined using a non-local Green's-function formalism. As a result our simulator allows us to predict intersubband absorbance of superlattice structures with microscopically determined lineshapes and linewidths accounting for both many-body and correlation contributions.

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