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Many-Body Effect on Optical Gain of n+ Doping Tensile-Strained Ge/GeSiSn Quantum Wells

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Abstract : The many-body effect on band structure and optical gain of n+ doping tensile-strained Ge/GeSiSn quantum wells are investigated by using an 8-band $k \cdot p$ method. Phase diagram of Ge/GeSiSn quantum well is obtained. The E-k dispersion curves, band gap renormalization and optical gain spectra including many-body effect will be calculated and discussed. We find that the k.p method without many-body effect will overestimate the optical gain and transition energy.

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