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Resonant cavity enhanced (RCE) corrugated quantum well infrared photodetectors (C-QWIP) JANG PYO KIM, AZIZ MAHFOUD, ANDREW SARANGAN, University of Dayton — Corrugated quantum well infrared photodetector (C-QWIP) provides some advantages over the grating-coupled quantum well infrared photodetector (QWIP). Since it operates based on reflection rather than diffraction, the corrugated coupling scheme is both pixel-size and wavelength-independent. In the QWIP structure, however, only light with electric field component perpendicular to the QW layers can be absorbed due to the dipole selection rule. To alleviate this problem, C-QWIP uses the total internal reflection (TIR) to redirect the light into the QW detector. In this way, one can rotate the electric field component perpendicular to the layers for 50% of the incident unpolarized photons. Even though the quantum efficiency of C-QWIP is higher than grating couplers, it still lags behind competing technologies such as HgCdTe, which have nearly 100% efficiency because they do not suffer from the polarization selection rule. We considered an alternative design that utilizes a resonant cavity that allows for multiple passes of photons through the active region in order to increase the absorption probability and hence increase the QE and reduce the dark current. In this paper, we present the simulation result for the resonant cavity enhanced (RCE) C-QWIP structures using multi-layer Bragg stacks as reflecting elements.

Jang Pyo Kim

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