# Extension of resonant cavity-enhanced photodetection into the MWIR and LWIR ranges using a Ga-free type-II strained-layer superlattice

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Proceedings Volume 11407, Infrared Technology and Applications XLVI; 114070N (2020)
https://doi.org/10.1117/12.2557508
Event: SPIE Defense + Commercial Sensing, 2020, Online Only



## Abstract

Resonant cavity-enhanced photodetectors (RCE PDs) present a compelling alternative to broadband detection techniques in the field of gas detection and environmental sensing, due to the distinctive narrow-band absorption fingerprints of gases such as $N_2O$ (at 4.5 μm) or CO (4.6 μm). This characteristic aligns well with the operational mode of an RCE PD, whose VCSEL-like architecture results in a tuneable narrow-band spectral response with a significantly enhanced quantum efficiency. Additionally, unlike broadband detectors, RCE PDs are not subject to the broadband BLIP limit due to their high spectral selectivity, while the substantially reduced absorber volume offers commensurately reduced Auger and generation-recombination dark current densities. In this work, we present efforts to extend the operability of these structures beyond 4.0 μm wavelength by employing the type-II InAs/InAsSb superlattice as the absorber material. The tuneable bandgap of this structure allows to achieve and