Abstract Submitted
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Resonant RF Photodetectors for Microwave and Infrared Applications[1] JEFFERY ALLEN, MONICA ALLEN, Air Force Research Laboratory, Munitions Directorate, BRETT WENNER, Air Force Research Laboratory, Sensors Directorate, RUNYU LIU, University of Illinois at Urbana Champaign, SUKRITH DEV, DANIEL WASSERMAN, University of Texas Austin — Room-temperature semiconductor-based photodetectors consisting of resonant RF circuits coupled to microstrip buslines, fabricated on an active substrate are demonstrated. The RF resonant circuits are characterized at RF frequencies as a function of resonator geometry, as well as for their response to incident IR radiation. The detectors are modeled analytically and using finite element method based commercial simulation software. Theoretical results from both methods show with good agreement the measured experimental results. We demonstrate that detector response can be improved by choice of photoconductive material, and further for a given material, by optimizing the position of the optical signal to overlap the RF field enhancement. The RF circuits with strong field enhancement are demonstrated to validate improve detector response. Such resonant detectors can easily be multiplexed on a single readout line and thus offers opportunities for applications in RF photonics, materials metrology, or single read-out multiplexed detector arrays and signal processing.

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