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Novel Antenna Coupled 2D Plasmonic Terahertz Detection GREG DYER, UC Santa Barbara, GREG AIZIN, CUNY, ERIC SHANER, MKE WANKE, JOHN RENO, Sandia National Laboratories, S. JAMES ALLEN, UC Santa Barbara
— Resonant plasmonic detectors are potentially important for terahertz (THz) spectroscopic imaging. We have fabricated and characterized antenna coupled detectors that integrate a broad-band antenna, which improves coupling of THz radiation. The vertex of the antenna contains the tuning gates and the bolometric barrier gate.[1−3] Incident THz radiation may excite 2D plasmons with wave-vectors defined by either a periodic grating gate or a plasmonic cavity determined by ohmic contacts and gate terminals. The latter approach of exciting plasmons in a cavity defined by a short micron-scale channel appears most promising. With this short-channel geometry, we have observed multiple harmonics of THz plasmons. At 20 K with detector bias optimized we report responsivity on resonance of 2.5 kV/W and an NEP of 5 x 10^{-10} W/$Hz^{1/2}$. This work is supported through NSF NIRT Grant No. ECS0609146, and in collaboration with Sandia, a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. [1]E.A. Shaner, et al., Appl. Phys. Lett. **90**, 181127 (2007). [2]G. Dyer, et al., J. Phys. Con. Mat., **21,** 195803 (2009). [3]V. Ryzhii, et al., J. Appl. Phys. **103**, 014504 (2008).

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