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A Tunable Terahertz Detector Based On Self Assembled Plasmonic Structure on a GaAs 2DEG CHE JIN BAE, DEEPU GEORGE, ROHIT SINGH, ANDREA MARKELZ, SUNY at Buffalo — Recently compact frequency sensitive THz detection has been achieved using gated gratings on 2DEG structure. The method is based on the resonant absorption of the 2D plasmon dependence on system dimension and the tunability of that dimension by depletion gating. Here we attempt to improve detector sensitivity, tunability and remove polarization dependence through the development of a gated grid design. The requirement for imaging applications of device dimensions on the order of < 1 micron over a detector area of 4 mm2, suggest that standard lithographic approaches will be too costly for large scale detector production. Here we realize the gated grid plasmonic structure on 2DEG material by using nanosphere self assembly lithography. This fabrication method has not been widely developed for III-V processing but allows us to achieve large area sensitive detectors with tunability in the 1-4 THz range. In this paper we will discuss the fabrication method and characterization of the devices as a function of gate bias and temperature using FTIR and THz time domain measurements.

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