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Tunable Plasmonic Crystals Induced from a Two Dimensional Electron Gas GREGORY DYER, Sandia National Laboratories, GREGORY AIZIN, City University of New York, S. JAMES ALLEN, UC Santa Barbara, ALBERT GRINE, DON BETHKE, JOHN RENO, ERIC SHANER, Sandia National Laboratories — A two dimensional electron gas (2DEG) with periodic variation of its screening,[1] geometry,[2] or carrier density[3] provides an electromagnetic medium for the formation of a broadly tunable plasmonic crystal (PC). By using a periodic gate to control the 2DEG density in GaAs/AlGaAs heterostructures, we have induced terahertz (THz) PCs consisting of several bipartite crystal units cells. The PC band structure, Tamm states, and electromagnetically induced transparency phenomena are observed utilizing a gate-controlled defect adjacent to the PC to generate a plasmonic mixing photovoltage. These integrated PCs have potential applications in the areas of frequency selective THz detection, strong light-matter interaction, and planar metamaterials. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. The work at Sandia National Laboratories was supported by the DOE Office of Basic Energy Sciences. [1]U. Mackens, et. al., Phys. Rev. Lett. **53**, 1485 (1984). [2]V. M. Muravev, et. al., Phys. Rev. Lett. **101**, 216801 (2008). [3]G. C. Dyer, et. al., Phys. Rev. Lett. **109**, 126803 (2012).

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