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High Power Terahertz Fields Generated by an Arrayed Photoconductive Antenna Structure BENJAMIN GRABER, DONG HO WU, US Naval Research Laboratory, CHRISTOPHER KIM, Temple University — Terahertz spectroscopy has a wide array of scientific, commercial, and industrial applications. However, to date, terahertz signal strength of available commercial systems is limited to less than 100 uW in average terahertz power. It is expected that with enhanced terahertz power one may be able to obtain better terahertz spectral information, and enable more practical terahertz applications in real environments. In order to achieve this goal we experimentally constructed an arrayed photoconductive antenna structure, in which terahertz signals from a few photoconductive antennas are combined by adjusting every terahertz signals to be in phase. The collected signals from the multiple emitters are concentrated onto a small area so that the combined terahertz signal strength is over 1mW in average power and peak electric field over 16kV/m. The terahertz frequency spectrum of combined signals is unaltered and exactly the same as that of each individual photoconductive antenna, which spans from 100GHz to 3THz. Experimental details regarding power measurement, time domain signals, and frequency spectra analysis will be discussed. This prototype array structure appears to scale linearly with the addition of photoconductive antennas.

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