

MAXIMIZING TERAHERTZ PULSE AMPLITUDE FROM LOW TEMPERATURE GALLIUM ARSENIDE PHOTO CONDUCTIVE SEMICONDUCTOR SWITCH

Sampad Ray

Dr. Naz E. Islam, Dissertation Supervisor

ABSTRACT

A signal is produced by the photoconductive action in a PCSS, which travels through the bulk to the metallic contacts and is radiated through the electrodes of the PCSS. The simulation analysis was done for the semiconductor device characteristics and then for antenna analysis in two separate software.

Results show that the 50 X 50 μm PCSS material produces a central frequency of 1.75 Terahertz, and a pulse amplitude of approximately 0.22 A at an optimum bias voltage of 1100 Volts. The PCSS was illuminated for 350 fs with a 0.78 μm beam, 50 Mw/cm^2 in intensity.

In the antenna analysis, results show that the rectangular patch antenna had a maximum return loss (S11) of approximately -30 dB at 5.6845 THz and had multiple resonant frequencies. The directivity of the main lobe was found out to be 6.2 dB with an angular width of 36.9 degrees and directed at 148 degrees. The side lobes were found out to be -6.8 dB.