

280. Title:Numerical Study of a Full-wavelength Dipole Antenna on a GaAs Membrane Structure at Terahertz Frequency

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Abstract:In this paper, a full-wavelength dipole antenna, supported by a GaAs membrane structure, is examined. The antenna was designed with both high input resistance and high radiation efficiency to improve the overall efficiency of a terahertz photomixer design. The geometrical effects of the GaAs membrane structure on the overall antenna performance were investigated through an optimization process. To supply DC bias to the antenna, a bias line with a photonic bandgap (PBG) structure was designed and optimized. The resulting antenna had a 2742- $\Omega$  input resistance and a 65% radiation efficiency, corresponding to an approximately 44% total efficiency at the 1.05-THz resonance frequency. The proposed antenna is expected to efficiently generate THz waves and be applicable to many practical applications where large coverage (detection area), easy alignment, and high scanning speed, rather than high-resolution, are preferred.