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Enhanced terahertz emission from a femtosecond-laser-ablated photoconductor[1] ATHANASIOS MARGIOLAKIS, Okinawa Inst of Sci & Tech, ZHEN-YU ZHAO, Department of Physics Shanghai Normal University, PETER HALE, JULIEN MADEO, MICHAEL MAN, Okinawa Inst of Sci & Tech, QUAN-ZHONG ZHAO, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, WEI PENG, Institute of Microsystem and Information Technology, Chinese Academy of Sciences, KESHAV DANI, Okinawa Inst of Sci & Tech — Terahertz (THz) emission properties from bow-tie antennas fabricated on a femtosecond-laser-ablated, semi-insulating gallium arsenide (SI-GaAs) photoconductor are investigated. The ablated material demonstrates increased photoabsorption resulting in increased photocurrent leading to a more efficient optical to THz efficiency. We use THz time-domain spectroscopy (THz-TDS) in order to compare the relative efficiency of the two fabricated devices. The influence of the excitation power and applied bias on the antennas electrodes for both ablated and non-ablated substrates is studied, highlighting the better performances of the ablated devices. A 60% enhancement in THz emission amplitude is observed in the frequency range 0.5 - 4 THz of the ablated SI-GaAs antenna, compared to untreated SI-GaAs. Our experimental results are in agreement with Drude-Lorentz numerical simulations using previously reported absorption and photocurrent properties of femtosecond laser ablated SI-GaAs based photoconductors. This material treatment provides a new way to achieve THz-TDS systems based on SI-GaAs antennas with an improved signal-to-noise ratio.

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