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标题: Terahertz generation using plasmonic photoconductive gratings
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摘要: A photoconductive terahertz emitter based on plasmonic contact electrode gratings is presented and experimentally demonstrated. The nanoscale grating enables ultrafast and high quantum efficiency operation simultaneously, by reducing the photo-generated carrier transport path to the photoconductor contact electrodes. The presented photoconductor eliminates the need for a short-carrier lifetime semiconductor, which limits the efficiency of conventional photoconductive terahertz emitters. Additionally, the photo-absorbing active area of the plasmonic photoconductive terahertz emitter can be increased without a significant increase in the capacitive loading to the terahertz radiating antenna, enabling high quantum-efficiency operation at high pump power levels by preventing the carrier screening effect and thermal breakdown. A plasmonic photoconductive terahertz emitter prototype based on the presented scheme is implemented and integrated with dipole antenna arrays on a semi-insulating In0.53Ga0.47As substrate. Emitted terahertz radiation is characterized in a terahertz time-domain spectroscopy setup, measuring a terahertz pulse width of 590 fs full-width at half maximum in response to 150 fs pump pulses at 925 nm.
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