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Abstract:We report the terahertz frequency radiation detection using photoconductive antennas fabricated from molecular-beam-epitaxy-grown GaAsBi. We have estimated that the detector has the highest sensitivity when illuminated with 1.1- to 1.3-μm-wavelength femtosecond pulses. Electron scattering to higher conduction valleys takes place at shorter wavelengths; thus, we have determined the intervalley separation in the conduction band (0.26-0.29 eV). Though the sensitivity of GaAsBi detector at 1.55 μm decreases by about 40% compared with its maximum value, we have demonstrated a terahertz time domain spectroscopy system based on the femtosecond Er-doped fiber laser using this detector.
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Inspec controlled terms:antennas - conduction bands - gallium arsenide - III-V semiconductors - molecular beam epitaxial growth - photoconducting devices - semiconductor growth - terahertz wave detectors - terahertz wave spectra
Uncontrolled terms:GaAsBi photoconductive terahertz detector sensitivity - long excitation wavelengths - terahertz frequency radiation detection - photoconductive antennas - molecular-beam-epitaxy-grown GaAsBi - femtosecond pulses - electron scattering - conduction valleys - intervalley separation - conduction band - terahertz time domain spectroscopy system - femtosecond Er-doped fiber laser - wavelength 1.1 mum to 1.3 mum - wavelength 1.55 mum - GaAsBi
Inspec classification codes:B7310N Microwave measurement techniques - B7230 Sensing devices and transducers - B5270 Antennas - B4250 Photoelectric devices - B0520D Vacuum deposition
Numerical data indexing:wavelength 1.1E-06 1.3E-06 m;wavelength 1.55E-06 m
Chemical indexing:GaAsBi/int As/int Bi/int Ga/int GaAsBi/ss As/ss Bi/ss Ga/ss
Treatment:Practical (PRA); Experimental (EXP)
Discipline:Electrical/Electronic engineering (B)
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