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Title:Greatly enhanced continuous-wave terahertz emission by nano-electrodes in a photoconductive photomixer

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Abstract:An efficient, room-temperature-operation continuous-wave terahertz source will greatly benefit compact terahertz system development for high-resolution terahertz spectroscopy and imaging applications. Here, we report highly efficient continuous-wave terahertz emission using nanogap electrodes in a photoconductive antenna-based photomixer. The tip-to-tip nanogap electrode structure provides strong terahertz field enhancement and acts as a nano-antenna to radiate the terahertz wave generated in the active region of the photomixer. In addition, it provides good impedance-matching to the terahertz planar antenna and exhibits a lower RC time constant, allowing more efficient radiation, especially at the higher part of the terahertz spectrum. As a result, the output power of the photomixer with the new nanogap electrode structure in the active region is two orders of magnitude higher than for a photomixer with typical interdigitated electrodes. The terahertz emission bandwidth also increases by a factor of more than two.

Number of references:38

Inspec controlled terms:electrodes - impedance matching - nanophotonics - photoconducting devices - terahertz spectroscopy - terahertz wave imaging

Uncontrolled terms:continuous-wave terahertz emission - nano-electrodes - photoconductive photomixer - continuous-wave terahertz source - high-resolution terahertz spectroscopy - high-resolution terahertz imaging - nanogap electrodes - photoconductive antenna-based photomixer - tip-to-tip nanogap electrode structure - terahertz field enhancement - nano-antenna - impedance-matching - terahertz planar antenna - RC time constant - interdigitated electrodes - terahertz emission bandwidth

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