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标题: Energy conversion efficiency calculation model for direct-bonding planar-waveguide THz emitters based on optical rectification effects in GaAs
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摘要: The generation of terahertz (THz) pulses based on optical rectification effects in GaAs has become more and more attractive and practical due to advances in high power ultrashort pulse fiber lasers. Normally coherence length is a parameter introduced for judging how the phases match by comparing the group velocity of optical pulses with the phase velocity of one of frequency components, like, for example, a component at 2 THz, of THz pulses. It is shown in this paper that the coherence length can not characterize the THz pulse generating process well because it can not count the contribution of all components in the spectrum band of the THz pulses. An energy conversion efficiency calculation model is proposed in this paper by integrating the energy of all THz components generated in the optical rectification process in a planar waveguide device. Based on the calculation model, the evolution of a THz pulse along the longitudinal direction of the waveguide is simulated and the results are used for design of the optimal waveguide structure for which the highest energy conversion efficiency could be reached to 1.5 x 10(-3).
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