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Abstract:A novel slow-wave structure called sine waveguide has been proposed to develop a wideband high-power terahertz radiation source. The sine waveguide evolves from a rectangular waveguide oscillating with sinusoid along its longitudinal direction. This letter reports the electromagnetic characteristics of the sine waveguide and its effective surface plasmon amplification mechanism. From our calculation, this circuit structure possesses low ohmic losses and reflection and can be applied to produce terahertz waves ranging from 0.2 to 0.25 THz with several hundreds of watts. Moreover, the maximum gain and interaction efficiency may reach 37.7 dB and 9.6%, respectively.
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