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Author

Kawase K. Ichino S. Suizu K. Shibuya T.

Title

Half Cycle Terahertz Pulse Generation by Prism-Coupled Cherenkov Phase-Matching Method

Source

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Abstract

Nonlinear optical terahertz wave generation is a promising method for realizing a practical source with wide frequency range and high peak power. Unfortunately, many nonlinear crystals have a strong absorption in the terahertz frequency region. This limits efficient and widely tunable terahertz wave generation. The Cherenkov phase-matching method is one of the most promising techniques for overcoming these problems. We propose a prism-coupled Cherenkov phase-matching method, in which a prism with a suitable refractive index at terahertz frequencies is coupled to a nonlinear crystal. We demonstrate prism-coupled Cherenkov phase-matching terahertz generation using the DAST and LiNbO(3) crystals. With a DAST crystal, we obtain a spectral flat tunability up to 10 THz by difference frequency generation. With a LiNbO(3) crystal, we observe a spectral flat broadband terahertz pulse generation up to 5 THz pumped by a femto second fiber laser. The obtained temporal waveform is an ideal half cycle pulse suitable for reflection terahertz tomography.