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Title:Compact and high-power broadband terahertz source based on femtosecond photonic crystal fiber amplifier

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Abstract:We present a review of the development of a compact and high-power broadband terahertz (THz) source optically excited by a femtosecond photonic crystal fiber (PCF) amplifier. The large mode area of the PCF and the stretcher-free configuration make the pump source compact and very efficient. Broadband THz pulses of 150 uW extending from 0.1 to 3.5 THz are generated from a 3-mm-thick GaP crystal through optical rectification of 12-W pump pulses with duration of 66 fs and a repetition rate of 52 MHz. A strong saturation effect is observed, which is attributed to pump pulse absorption; a Z-scan measurement shows that three-photon absorption dominates the nonlinear absorption when the crystal is pumped by femtosecond pulses at 1040 nm. A further scale-up of the THz source power is expected to find important applications in THz nonlinear optics and nonlinear THz spectroscopy.

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