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标题: Technology and Applications of Ultrafast Fiber Lasers
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摘要: We briefly review the key technology of modern fiber based femtosecond laser sources summarizing advantages and disadvantages of different mode-locking solutions. A description of possible extensions of a FemtoFiber-type mode-locked Er-doped fiber laser oscillator (1560 nm) reveals the flexibility with respect to wavelength coverage (488 nm .. 2200 nm) and pulse duration (10 fs .. 10 ps). The resulting FemtoFiber family and its versions for instrument integration allow one to use these state-of-the-art light sources in many important applications, e. g. THz spectroscopy and microscopy. We show that, depending on the fiber laser model and the THz emitter, THz radiation can be produced with 4-10 THz bandwidth and detected with up to 60 dB signal-to-noise ratio (SNR). Electronically controlled optical scanning (ECOPS) - a unique method for fast, precise and comfortable sampling of the THz pulse or other pump-probe experiments - is described and recommended for efficient data acquisition. As examples for modern microscopy with ultrafast fiber lasers we present results of two-photon fluorescence, coherent microscopy techniques (SHG/THG/CARS) and fluorescence lifetime imaging (FLIM).
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