

Ultrabroad Band Collinear Mid-Infrared Optical Parametric Amplifier Driven by a Millijoule Femtosecond Tm:YAP Regenerative Amplifier

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In this study, we demonstrate an ultrabroad band collinear mid-infrared (MIR) optical parametric amplifier driven by a millijoule 265-fs Tm:YAP regenerative amplifier. The amplification chain for the regenerative amplifier comprises a thulium-doped fluoride (Tm:ZBLAN) fiber oscillator, a two-stage Tm:ZBLAN fiber preamplifier, and a regenerative amplifier with a thermoelectrically cooled thulium-doped yttrium aluminium perovskite crystal. This newly developed light source serves as a pump for an ultra-broadband MIR optical parametric amplifier, utilizing a gallium selenide crystal. The MIR seed is obtained from a polarization-maintaining ZBLAN fiber, generating a supercontinuum spanning the 2.5–4 μm range. By combining the amplified signal with the corresponding idler pulses, we achieve a spectrum spread from 2.5 to 10 μm .