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Title: Dual-wavelength, two-crystal, continuous-wave optical parametric oscillator
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Abstract: We report a cw optical parametric oscillator (OPO) in a novel architecture comprising two nonlinear crystals in a single cavity, providing two independently tunable pairs of signal and idler wavelengths. Based on a singly resonant oscillator design, the device permits access to arbitrary signal and idler wavelength combinations within the parametric gain bandwidth and reflectivity of the OPO cavity mirrors. Using two identical 30 mm long MgO:sPPLT crystals in a compact four-mirror ring resonator pumped at 532 nm, we generate two pairs of signal and idler wavelengths with arbitrary tuning across 850-1430 nm, and demonstrate a frequency separation in the resonant signal waves down to 0.55 THz. Moreover, near wavelength-matched condition, coherent energy coupling between the resonant signal waves, results in reduced operation threshold and increased output power. A total output power >2.8 W with peak-to-peak power stability of 16% over 2 h is obtained.