Table 2. Broadband Continuum Type-I Phase-Matching Parameters for the Four Birefringent Chalcopyrite Crystals Considered and OP-GaAs

Crystals	λ_p^{Opt} [μm]	θ^{Opt} [°]	d_{36}/d_{eff} [pm/V]	Γ [cm^{-1}]	$\beta_{s,i}$ [10^{-54} s/m]	$\Delta\nu^{Opt}$ [THz]	$L\Delta T$ [cm.°C]
$AgGaS_2$	2.04	30.9	13.1/6.7	2.402	9.7 [27,34]	42.5	66 [32]
$CdSiP_2$	2.43	42.8	84.1/57.2	12.04	18 [this work]	44.6	328 [this work]
$ZnGeP_2$	2.63	46.7	77.8/77.6	14.50	37 [12,29]	38.1	484 [29]
$AgGaSe_2$	2.86	40.0	31.0/19.9	4.493	6.5 [28,35]	50.9	>700 [33]
OP-GaAs	3.29	Λ = 173 μm	91/57.9	7.985	130 [31,36]	25.8	66 [31]

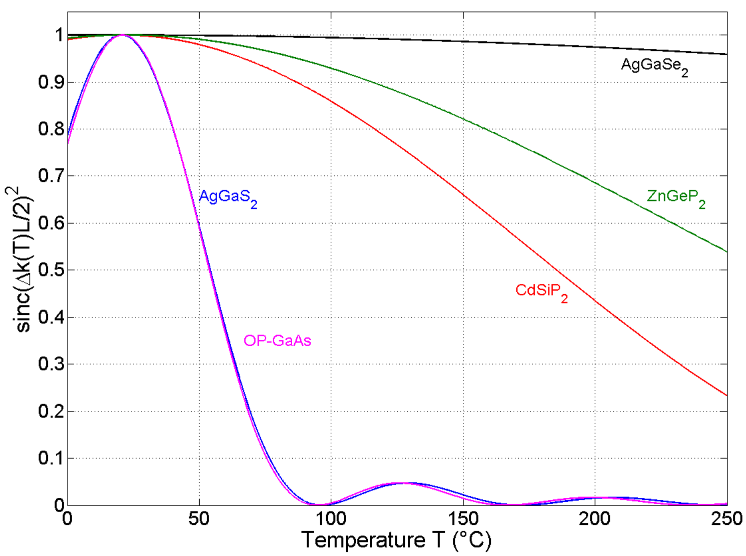

Fig. 4. Calculated temperature dependence of the DFG efficiency in the low conversion limit obtained by the four birefringent chalcopyrite crystals considered and OP-GaAs for the same parameters as in Table 2, assuming a crystal length of $L = 1$ cm.

The temperature acceptance of CSP is very large but lower than in ZGP. It is known that temperature tuning in ZGP is impractical, contrary to the case of CSP for which this still seems a feasible approach to tune the wavelength [17], also under non-critical phase-matching conditions [20].

5. Conclusion

In conclusion, we compared existing dispersion relations for the CSP nonlinear crystal and extended the most reliable of them with temperature dependence. With the measured nonlinear coefficient, it was possible to estimate the parametric gain bandwidth for the special phase-matching configuration ensuring ultra-broad parametric amplification bandwidth in an OPG pumped by ultrashort pulses. CSP can be pumped by Cr^{2+}:ZnSe ultrafast laser systems or tandem OPGs to generate super-continuum in the mid-infrared extending up to its upper transparency limit.

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