

1.7. NONLINEAR OPTICAL PROPERTIES

Table 1.7.5.2 (cont.)

Crystal	Nonlinear coefficients SHG (d_{ij}) and EO (r_{ij})	OPO/OPA	References†
DAST	d_{11} (1318 nm) = 1010 pm V ⁻¹ d_{11} (1542 nm) = 290 pm V ⁻¹ d_{26} (1542 nm) = 39 pm V ⁻¹ r_{11} (720 nm) = 92 pm V ⁻¹ r_{11} (1313 nm) = 53 pm V ⁻¹ r_{11} (1535 nm) = 47 pm V ⁻¹	Terahertz generation (difference frequency mixing)	(v), (w)
2A5NPCI	d_{11} = 9 ± 4 pm V ⁻¹ d_{12} = 8 ± 3 pm V ⁻¹ d_{13} = 11 ± 4 pm V ⁻¹ d_{eff} = 5.1 pm V ⁻¹ or 9.7 pm V ⁻¹		(x)

† References: (a) Halbout *et al.*, 1979; (b) Morrell *et al.*, 1979; (c) Donaldson & Tang, 1984; (d) Rosker *et al.*, 1985; (e) Puccetti *et al.*, 1993; (f) Oudar & Hierle, 1977; (g) Levine *et al.*, 1979; (h) Lipscomb *et al.*, 1981; (i) Morita *et al.*, 1988; (j) Zyss *et al.*, 1981; (k) Sigelle & Hierle, 1981; (l) Zyss *et al.*, 1985; (m) Ledoux *et al.*, 1987; (n) Josse *et al.*, 1988; (o) Ledoux *et al.*, 1990; (p) Josse *et al.*, 1992; (q) Khodja *et al.*, 1995(b); (r) Khodja, 1995; (s) Zyss *et al.*, 1984; (t) Kotler *et al.*, 1992; (u) Fève *et al.*, 1999; (v) Bosshard, 2000; (w) Kawase *et al.*, 2000; (x) Horiuchi *et al.*, 2002.

conversion occur simultaneously inside the same crystal. An overview of these attractive materials is given in Brenier (2000).

1.7.6. Glossary

- μ_0 vacuum magnetic permeability
- ϵ_0 permittivity of free space
- c velocity of light in a vacuum
- P** electronic polarization
- Pⁿ** *n*th order electronic polarization
- P^{NL}** nonlinear polarization
- $\chi^{(n)}$ *n*th order dielectric susceptibility tensor
- ϵ dielectric tensor
- n refractive index
- n_x, n_y, n_z principal refractive indices
- (x, y, z) principal axes of the index surface (optical frame)
- n_o, n_e refractive indices of the ordinary and extraordinary eigen modes
- T transmission coefficient
- V half of the angle between optic axes
- ω laser circular frequency
- λ laser wavelength
- φ laser phase
- v_g laser group velocity
- k** wavevector
- u** unit wavevector
- (θ, φ) spherical coordinates of the wavevector in the optical frame
- Π neutral vibration plane
- E** electric field vector
- (**e**, E) unit vector and amplitude of the electric field
- D** dielectric displacement vector
- d** unit dielectric displacement vector
- H** magnetic field vector
- S** Poynting vector
- s** unit Poynting vector
- W work done per unit time
- (X, Y, Z) orthonormal wave frame where Z is along the wavevector
- ρ double refraction angle (walk-off angle)
- ∇ nabla operator
- \otimes tensorial product
- \cdot tensorial contraction
- \times vectorial product
- Q^* complex conjugate of Q
- w_0 laser beam waist radius
- Z_R Rayleigh length of the laser beam
- τ laser pulse half duration
- f repetition rate of the pulsed laser
- $P, P(t)$ laser instantaneous power

- I instantaneous laser intensity
- \tilde{E} total energy per laser pulse
- \tilde{P} average laser power
- P_c laser peak power
- L crystal length
- $\chi_{\text{eff}}, d_{\text{eff}}$ effective coefficient
- F⁽ⁿ⁾** *n*th order field tensor
- Δk phase mismatch
- η_{SHG} conversion efficiency of second harmonic generation
- G, h spatial walk-off attenuation functions

We thank Dr J. P. Fève for his valuable assistance and critical reading of the manuscript.

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