

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

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