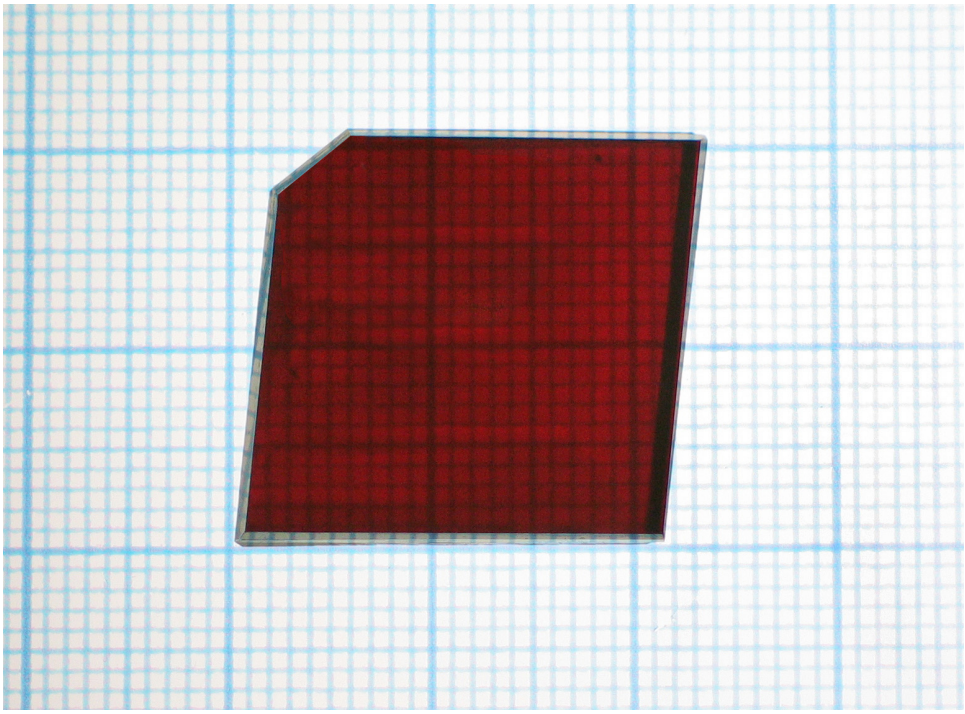
Rainbow Photonics

THz Generation

Electro-Optic DAST Crystals

DAST: 4'-dimethylamino-N-methyl-4-stilbazolium tosylate



Properties

- high quality crystals
- cut and polished for various applications
- large nonlinear optical susceptibilities (d_{11} > 1000pm/V)
- large electro-optic coefficients (r_{11}=92 pm/V)
- phase matching for THz-wave generation between 720 nm and 1650 nm

Applications

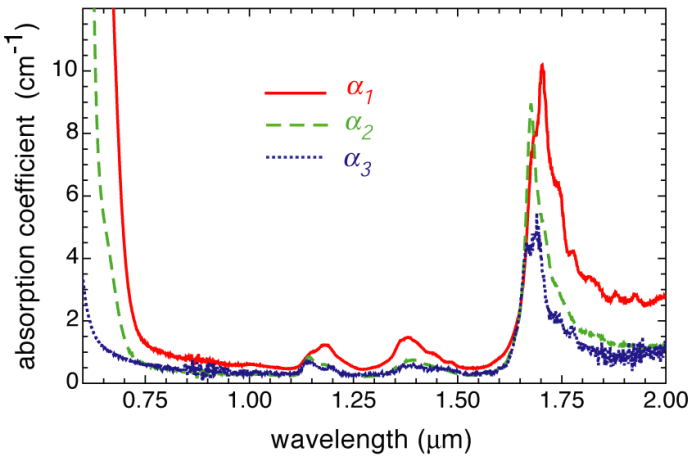
- efficient THz generation and detection from 0.3 to >16 THz
- fast electro-optic modulation
- optical parametric generation
- efficient frequency doubling of 1.55 μm radiation

Physical Properties

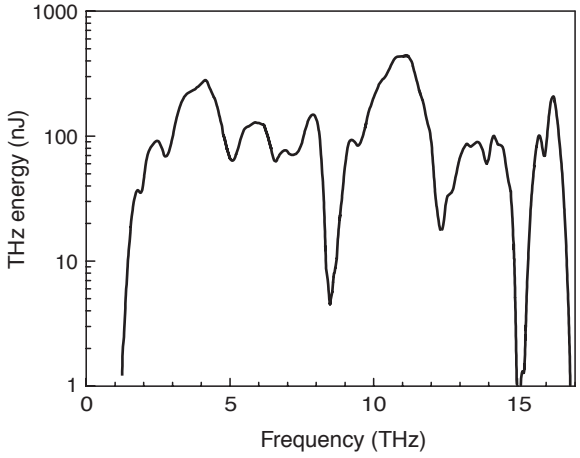
melting point	256 °C		
refractive indices	n_1(720 nm) = 2.519, n_2(720 nm) = 1.720, n_3(720 nm) = 1.635		
nonlinear optical coefficients*	d_{11} (1318 nm)	=	1010 pm/V
	d_{11} (1542 nm)	=	290 pm/V, d_{26}(1542nm) = 39 pm/V
electro optic coefficients	r_{11} (720 nm)	=	92 pm/V
	r_{11} (1313 nm)	=	53 pm/V
	r_{11} (1535 nm)	=	47 pm/V
dielectric constants	ε_1 (3kHz) = 5.2, ε_2 (3kHz) = 4.1, ε_3 (3kHz) = 3.0		

*based on d_{11} = 0.29 pm/V of α-quartz

Absorption Spectrum



THz Generation



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3) "High Efficiency Generation and Detection of Terahertz Pulses Using Laser Pulses at Telecommunication Wavelengths"; A. Schneider, M. Stillhart and P. Günter, Opt. Express 14, 5376 (2006).
4) "Strong-field single-cycle THz pulses generated in an organic crystal"; C. P. Hauri, C. Ruchert, C. Vicario, F. Ardana, Appl. Phys. Lett. 99, 161116 (2011).

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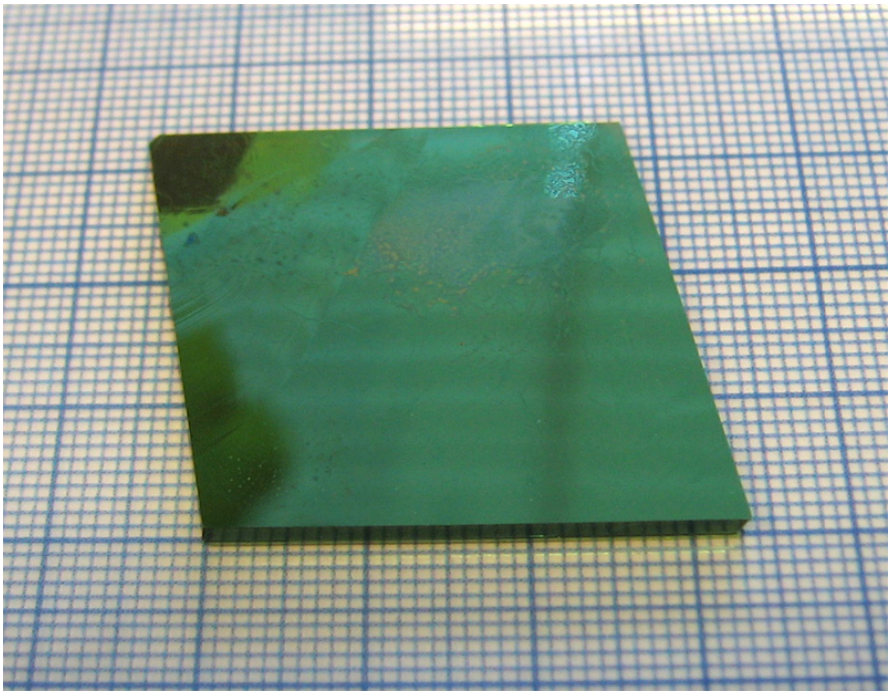
THz Generation

Electro-Optic DSTMS Crystals

4-N,N-dimethylamino-4'-N'-methyl-stilbazolium 2,4,6-trimethylbenzenesulfonate



Properties

- high quality crystals
- cut and polished for various applications
- large nonlinear optical susceptibilities
- large electro-optic coefficients
- phase matching for THz-wave generation between 720 nm and 1650 nm

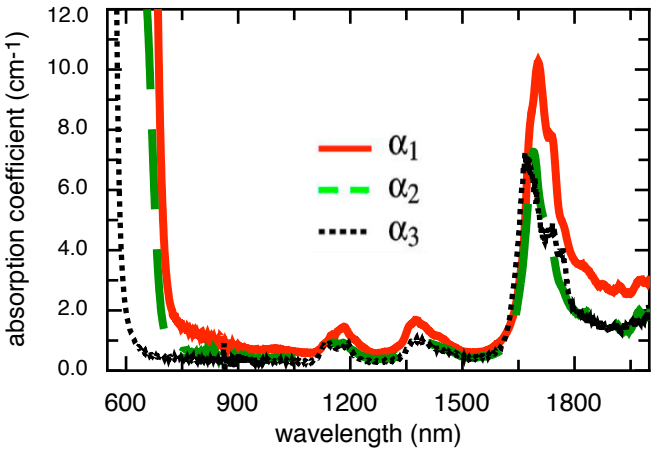
Applications

- efficient THz generation and detection from 0.3 to >16 THz
- fast electro-optic modulation
- optical parametric generation
- efficient frequency doubling of 1.55 μm radiation

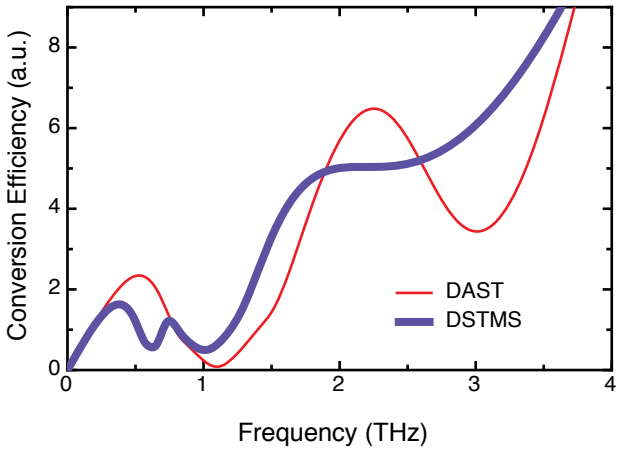
Physical Properties

melting temperature	250 °C		
point group symmetry	m		
refractive indices @ 1550 nm	n_1	=	2.07, n_2 = 1.64
nonlinear optical coefficients @ 1900 nm	d_{111}	=	214 ± 20 pm/V
	d_{122}	=	31 ± 4 pm/V
	d_{212}	=	35 ± 4 pm/V
electro optic coefficient @ 1900 nm	r_{111}	=	37 ± 3 pm/V

Absorption Spectrum



THz Conversion Efficiency



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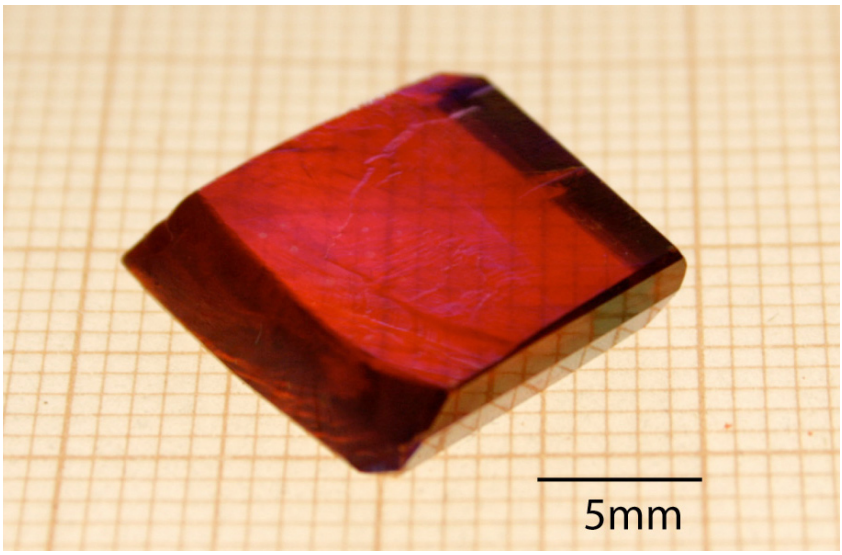
THz Generation

Electro-Optic OH1 Crystals

OH1: (2-(3-(4-Hydroxystyryl)-5,5-dimethylcyclohex-2-enylidene)malononitrile)



Properties

- high quality crystals
- cut and polished for various applications
- large nonlinear optical susceptibilities
- large electro-optic coefficients
- phase matching for THz-wave generation between 1200 nm and 1460 nm

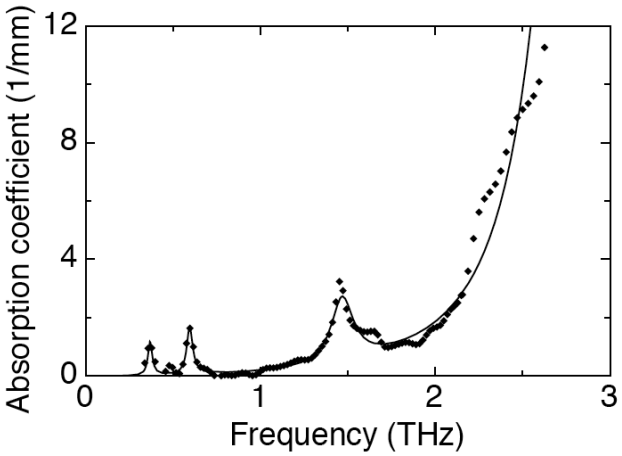
Applications

- efficient THz generation and detection from 0.1 to >10 THz
- fast electro-optic modulation
- optical parametric generation
- efficient frequency doubling of 1.55 μm radiation

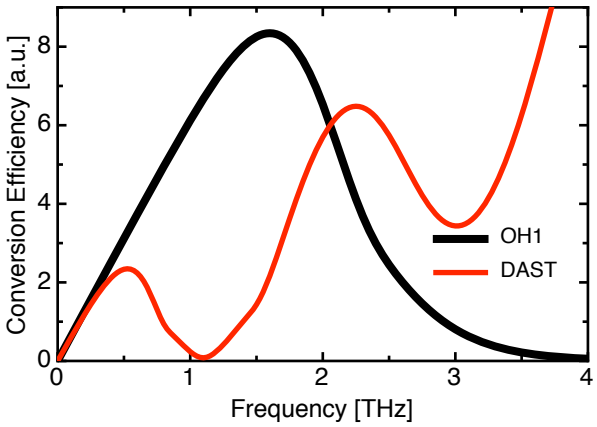
Physical Properties

melting point	212 °C		
point group symmetry	mm2		
refractive indices	n_2 = 1.58, n_3 = 2.15		
nonlinear coefficients (λ = 1.9 μm)	d_{333}	=	120 ± 10 pm/V
	d_{223}	=	13 ± 2 pm/V
	d_{322}	=	8.5 ± 2 pm/V
electro optic coefficients	r_{333} (633 nm)	=	109 ± 4 pm/V
	r_{333} (785 nm)	=	75 ± 7 pm/V
	r_{333} (1064 nm)	=	56 ± 2 pm/V
	r_{333} (1319 nm)	=	52 ± 7 pm/V

Absorption Spectrum



THz Conversion Efficiency



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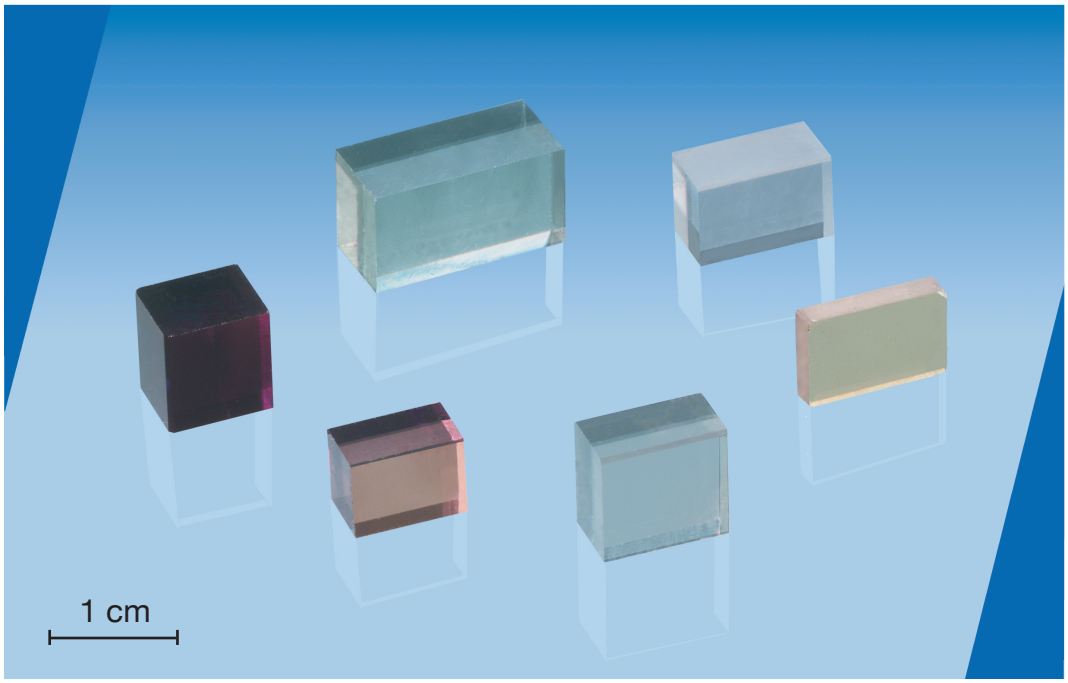
Photorefractive $KNbO_3$



Standard Features

- high quality crystals doped with Rh, Fe, Mn, and Ni for photorefractive applications in the infrared
- very low scattering losses

Optional Features

- high photosensitivity up to 1000 nm wavelength
- milliseconds response time

Applications

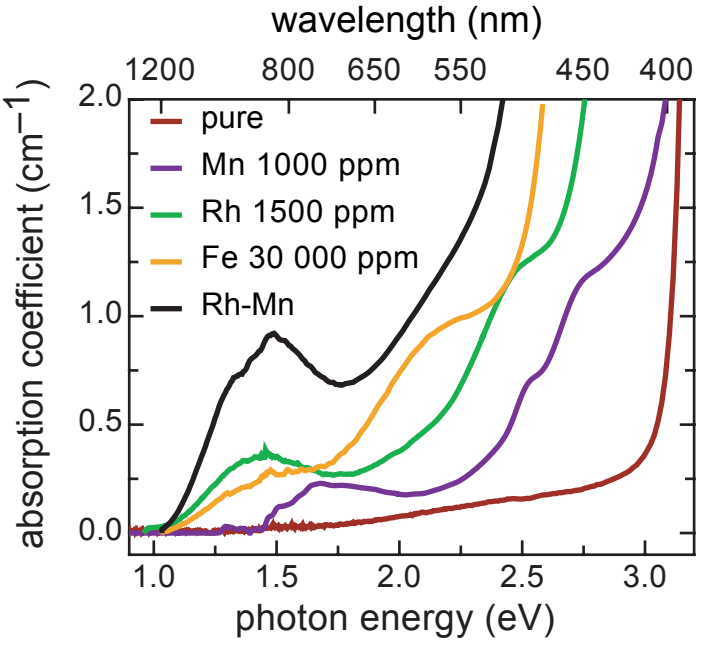
- photorefractive applications with laser diodes
- dynamic holography and optical phase conjugation in the visible and near infrared

Photorefractive grating recording times

(selected $KNbO_3$ crystals at different wavelengths for I = 1 W/cm ^{2})

Crystal	Wavelength [nm]	Recording time (typical) [s]
$KNbO_3$:Fe	488	1
$KNbO_3$:Mn	515 860	1 3
$KNbO_3$:Fe reduced	488 515	0.01 0.01
$KNbO_3$:Rh reduced	860 1064	0.5 50

Absorption Spectra



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