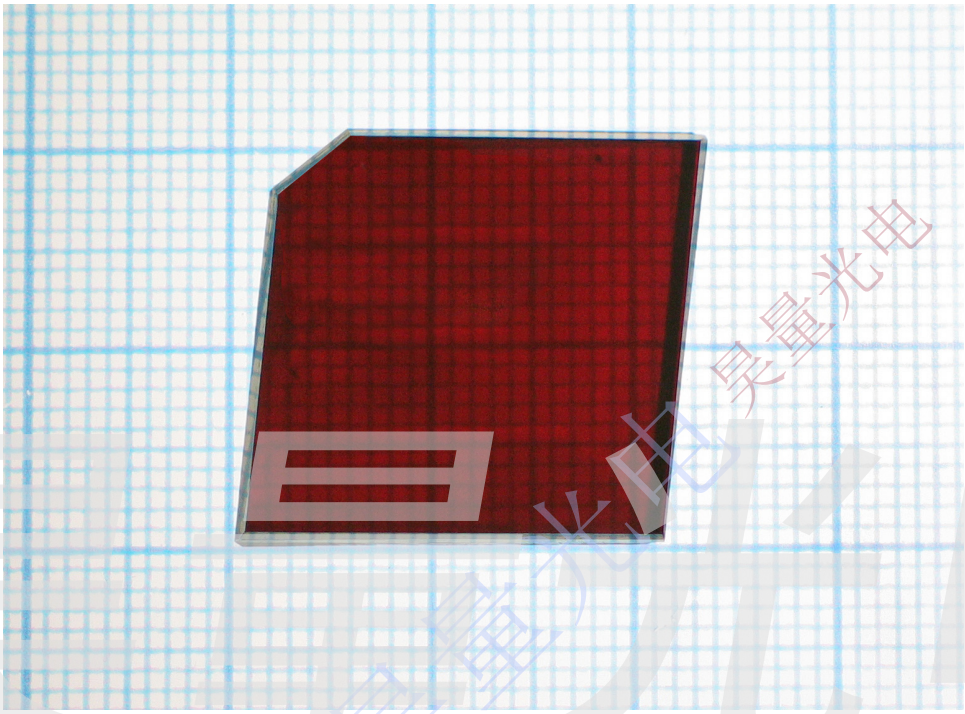
Rainbow Photonics

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

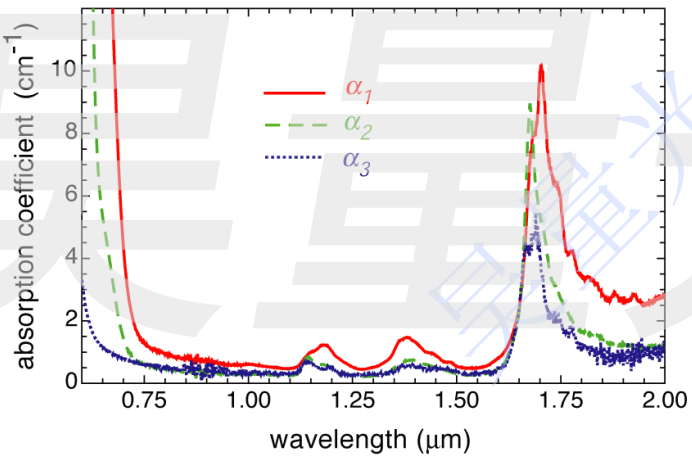
- efficient THz generation and detection from 0.3 to >16 THz
- fast electro-optic modulation
- optical parametric generation
- efficient frequency doubling of 1.55 μm radiation

## Physical Properties

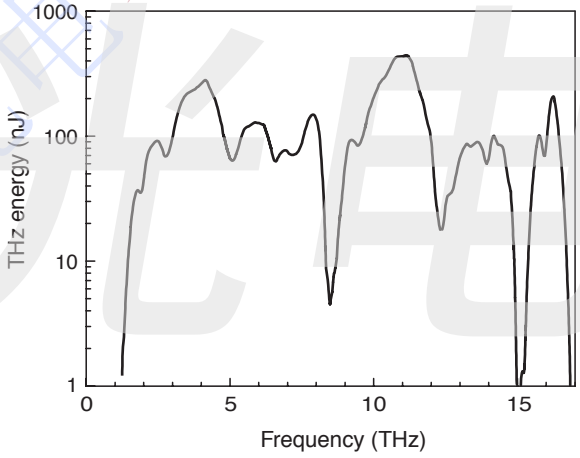
| | | | |
|---|---|---|---|
| melting point | 256 °C | | |
| refractive indices | $n_1$(720 nm ) = 2.519, $n_2$(720 nm ) = 1.720, $n_3$(720 nm ) = 1.635 | | |
| nonlinear optical coefficients* | $d_{11}$ (1318 nm ) | = | 1010 pm/V |
| | $d_{11}$ (1542 nm ) | = | 290 pm/V, $d_{26}$(1542nm ) = 39 pm/V |
| 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 | $\varepsilon_1$ (3kHz) = 5.2, $\varepsilon_2$ (3kHz) = 4.1, $\varepsilon_3$ (3kHz) = 3.0 | | |

*based on $d_{11}$ = 0.29 pm/V of $\alpha$-quartz

## Absorption Spectrum




## THz Generation





1) "Photonic applications with the organic nonlinear optical crystal DAST"; M. Jazbinsek, L. Mutter, P. Gunter, IEEE J. Sel. Top. Quantum Electron. 14,1298 (2008).
2) "Generation of terahertz pulses through optical rectification in organic DAST crystals: Theory and experiment"; A. Schneider, M. Neis, M. Stillhart, B. Ruiz, R. U. A. Khan, and P. Günter, J. Opt. Soc. Am. B 23, 1822 (2006).
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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