

成都迪恩光电科技有限公司 CHENGDU DIEN PHOTOELECTRIC TECHNOLOGY CO.,LTD



AGS is transparent from 0.50 to 13.2 μ m. Although its nonlinear optical coefficient is the lowest among the mentioned infrared crystals, high short wavelength transparency edging at 550 nm is made use of in OPOs pumped by Nd:YAG laser; in numerous difference frequency mixing experiments with diode, Ti:Sapphire, Nd:YAG and IR dye lasers covering 3–12 μ m range; in direct infrared countermeasure systems, and for SHG of CO2 laser. Thin AgGaS2 (AGS) crystal plates are popular for ultrashort pulse generation in mid IR range by difference frequency generation employing NIR wavelength pulses.

Applications:

- Generation second harmonics on CO and CO₂ lasers
- Optical parametric oscilator
- Different frequency generator to middle infrared regions up to 12 mkm.
- Frequency mixing in the middle IR region from 4.0 to 18.3 µm
- Tuneable solid state lasers (OPO pumped by Nd: YAG and others lasers operating in 1200 to
- 10000 nm region with efficiency 0.1 to 10 %)
- Optical narrow-band filters in the region near isotropic point (0.4974 m at 300 °K), transmission band being tuned at temperature variation
- Up-conversion of CO_2 laser radiation image into near-IR or visible region by using/ or use of Nd:YAG, ruby or dye lasers with efficiency up to 30 %

Dimensions:

Standard cross sections are 8x 8mm, 5 x 5mm, Crystal length range from 1 to 30 mm. Custom sizes are also available on request.

Basic Properties		
Lattice parameters	a = 5.757, c = 10.311 Å	
Non-linear coefficient at 10.6 um	$d_{36} = 12.5 \text{ pm/V}$	
Optical damage threshold at 10.6 um, 150 ns	10 - 20 MW/cm ²	
parallel to c-axis	12.5 x 10 ⁻⁶ x °C ⁻¹	
perpendicular to c-axis	-13.2 x 10 ⁻⁶ x °C ⁻¹	
Crystal Structure	Tetragonal	
Cell Parameters	a=5.756 Å, c=10.301 Å	
Melting Point	997 °С	
Density	4.702 g/cm3	
Mohs Hardness	3-3.5	
Absorption Coefficient	0.6 cm-1 @ 10.6 μm	
Relative Dielectric Constant @ 25 MHz	ε11s=10 ε11t=14	
Thermal Expansion Coefficient	C: -13.2 x 10-6 /°C ⊥C: +12.5 x 10-6 /°C	
Thermal Conductivity	1.5 W/M/°C	





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Linear Optical Properties			
Transparency Range	0.50-1.	0.50-13.2 um	
Refractive Indices	no	ne	
@ 1.064 um	2.4521	2.3990	
@ 5.300 um	2.3945	2.3408	
@ 10.60um	2.3472	2.2934	
Thermo-Optic Coefficients	dno/dt=15.4 dne/dt=15.4	dno/dt=15.4 x 10-5/°C dne/dt=15.5 x 10-5/°C	
Sellmeier Equations $(\Lambda \text{ in um})$	no2=3.3970+2.3982/(1-0.09311/\lambda2)+2.16 ne2=3.5873+1.9533/(1-0.11066/\lambda2)+2.33	$no2=3.3970+2.3982/(1-0.09311/\lambda^2)+2.1640/(1-950/\lambda^2)$ $ne2=3.5873+1.9533/(1-0.11066/\lambda^2)+2.3391/(1-1030.7/\lambda^2)$	

Nonlinear Optical Properties	
Phase-Matching SHG Range	1.8-11.2 um
NLO Coefficients @ 1.064 um	d36=d24=d15=23.6 pm/V
Linear Electro-optic Coefficients	Y41T=4.0 pm/V Y63T=3.0 pm/V
Damage threshold @ ~ 10 ns, 1.064 um	25 MW/cm2(surface), 500 MW/cm2(bulk)

Technical Parameters	
Wavefront distortion	less than $\lambda/6$ @ 633 nm
Dimension tolerance	(W +/-0.1 mm) x (H +/-0.1 mm) x (L +0.2 mm/-0.1 mm)
Clear aperture	> 90% central area
Flatness	$\lambda/6 @ 633 \text{ nm for T>=1.0mm}$
Surface Quality	Scratch/dig 20/10 per MIL-O-13830A
Parallelism	better than 1 arc min
Perpendicularity	5 arc minutes
Angle tolerance	$\Delta \theta < +/-0.25^{\circ}, \Delta \phi < +/-0.25^{\circ}$



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AGS (AgGaS2) crystal Transmission Spectra(After rough polishing) Test thickness=20.8mm(Final thickness=20mm)



AgGaS2 (AGS) crystal displays excellent bulk quality across the transmission range, expect for residual a ray absorption centered near 1.8um.Surface absorption may increase with time, but the behavior is now greatly improved over that earlier crystals. The phase matching and nonlinear optical properties of AGS allow various SFM/DFM interactions from the visible to Middle infrared. Transmission spectra of Type II uncoated AgGaS2 crystal. OPO pumped by 1030nm laser.



AGS (AgGaS2) crystal Transmission spectra(Uncoated) Test thickness=1.60mm:

