Crystals Land

* Welcome To $AgGaS_2$ & $AgGaSe_2$ Crystal *

$AgGaS_2$ & $AgGaSe_2$

Silver Gallium Sulfide ($AgGaS_2$) and Silver Gallium Selenite ($AgGaSe_2$) crystals have attained special interest for the middle and deep infrared (IR) applications due to its large nonlinear optical (NLO) coefficients and high transmission in the IR region. The phase matching and transmission characteristics of $AgGaS_2$ allow 3-wave interactions in the mid and near IR.$AgGaS_2$ has been used as an efficient NLO crystal for 3 - 10 mm IR output, particularly for OPO devices pumped with Nd:YAG laser, frequency mixing of OPO outputs pumped by Ti:Sapphire or Nd:YAG laser, as well as frequency mixing Nd:YAG laser with dye and Ti:Sapphire or other laser sources. $AgGaS_2$ has also been demonstrated to be an efficient frequency doubling crystal for infrared radiation such as 10.6 mm output of CO_2 lasers.

Physical Properties:

	$AgGaS_2$	$AgGaSe_2$
Crystal Structure	Tetragonal	Tetragonal
Cell Parameters(A)	a=5.756, c=10.301	a=5.992, c=10.886
Melting Point(°C)	997	581
Density(g/cm^3)	4.702	5.700
Absorption Coefficient(cm-1) @ 1.064μm @ 10.6μm	 0.01 0.6	 < 0.05 < 0.02
Resistance	>10^{12}	
Relative Dielectric Constant $\varepsilon_{11}^S/\varepsilon_0$ @ 25 MHz $\varepsilon_{11}^S/\varepsilon_0$ @ 25 MHz	 10 14	 10.5 12.0
Thermal Expansion Coefficient (10^{-3}/ °C) ‖C ⊥C	 +12.5 -13.2	 +16.8 -7.8
Thermal Conductivity (W/cm/°C)	0.015	

Optical Properties:

	$AgGaS_2$	$AgGaSe_2$
Transparency Range(μm)	0.50-13.2	0.78-18.0
Phase-Matching SHG range(μm)	1.8-11.2	3.1-12.8
Thermo-Optic Coefficient $dn_o/dt(10^{-5}/°C)$ $dn_e/dt(10^{-5}/°C)$	 15.4 15.5	 ~15 ~15
Linear Electro-optic Coefficients		

$\gamma 41^T$ $\gamma 63^T$	4.0+/-0.2 3.0+/-0.1		4.5@1.15μm 3.9@1.15μm	
Relative Indices @ 1.064μm @ 5.300μm @ 10.60μm	n_o 2.4521 2.3945 2.3472	n_e 2.3990 2.3408 2.2934	n_o 2.7010 2.6134 2.5912	n_o 2.6792 2.5808 2.5579
NLO Susceptibilities d_{36}(pm/V) SHG @ 10.64 μm	18		58	
Relative Indices @ ~ 10ns, 1.064μm @ ~ 10ns, 10.6μm	25,surface >500 bulk		20-30,surface	
Wavelength @n_o=n_e(μm)	0.4974		0.811	
Sellmeier Equations(λ in μm)				
$AgGaS_2$	$n_o^2(\lambda) = 3.3970 + 2.3982/(1 - 0.09311/\lambda^2) + 2.1640/(1 - 950/\lambda^2)$ $n_e^2(\lambda) = 3.5873 + 1.9533/(1 - 0.11066/\lambda^2) + 2.3391/(1 - 1030.7/\lambda^2)$			
$AgGaSe_2$	$n_o^2(\lambda) = 4.6453 + 2.2057/(1 - 0.1879/\lambda^2) + 1.8577/(1 - 1600/\lambda^2)$ $n_e^2(\lambda) = 5.2912 + 1.3970/(1 - 0.2845/\lambda^2) + 1.9282/(1 - 16007/\lambda^2)$			

Specifications:

Dimension Tolerance	±0.1mm
Flatness	λ/8@633nm
S/D	10/5 to MIL-O-13830A
Parallelism	20"
Perpendicularity	5 arc minutes
Angle Tolerance	$\Delta\theta < 0.5°$ $\Delta\varphi > 0.5$