HWS系列硫系红外玻璃

CDGM HWS family infrared chalcogenide glasses

产 品 手 册
Product catalogue

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2018

成都光明HWS系列硫系红外玻璃，具有良好的红外透过率、较低的折射率温度系数和色散性能，可与其他红外光学材料配合使用，用于需要色差校正、消热差的红外光学系统中。应用波长范围为3–5μm和8–12μm。该系列玻璃可根据客户要求，提供用多种形式供货：如块料、片料、镜片毛坯和小球等。该系列玻璃可用于红外夜视、红外测温、红外制导、红外探测等用途。本公司目前可提供直径Φ150mm以内规格产品 。

CDGM HWS family infrared chalcogenide glasses have excellent transmission, extremely low temperature coefficient of refractive index as well as low dispersion performance. These glasses can be matched with other infrared materials for application in optical systems, such as color corrected optical system without thermal defocusing. These glasses contain the common IR transmission bands: 3-5μm and 8-12μm. Furthermore, if customers demand, the HWS family glasses can be supplied with series types, such as: strips, slice, lens blanks and spherule. The HWS series glasses can be used in the fields of Infrared night vision, Infrared guidance, Infrared reconnaissance, etc. CDGM as your reliable solution provider is offering you the chalcogenide material HWS1 to HWS7, and supplying maximum sizes up to Φ150mm of polished blanks.

优点：

（1）硫系红外玻璃的红外波段透过范围为1um—14um,在近红外及中远红外波长区域内具有良好的光学透过性能；

The transmission wavelength of the infrared chalcogenide glass ranges from 1um to 14um, which contributes to a good optical transmittance performance in the near infrared and mid infrared wavelength region.

（2）具有较低的Tg温度及较好的化学稳定性，可以用作精密模压材料；

Having lower Tg temperature and good chemical stability, the infrared transmission glass can be used as precision molding materials.

（3）具有较低的折射率温度系数和色散系数，可作为消色差及热相差红外材料使用。

Infrared transmission glass has a lower thermal refractive index coefficient and dispersion coefficient, which can be used as an infrared material for achromatism and athermalization.

HWS1 $Ge_{28}Sb_{12}Se_{60}$ $N_{10.6}$=2.6011 $\upsilon_{10.6}$=93.39 $n_{8000}-n_{12500}$=0.0170

Refractive Indices

	λ (nm)	
n	2000	2.6429
n	3000	2.6277
n	4000	2.6222
n	5000	2.6188
n	6000	2.6159
n	7000	2.6130
n	8000	2.6100
n	9000	2.6068
n	10000	2.6033
n	11000	2.5997
n	12000	2.5953
n	12500	2.5930
n	13000	2.5907
n	14000	2.5849

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K（20℃, 10^7Pa）	135
E（Gpa）	22.3
G（Gpa）	8.2

Thermal Properties

T_g（℃）	278
T_s（℃）	308
$\alpha_{20/120℃}$（10^{-7}/K）	144
$\alpha_{20/300℃}$（10^{-7}/K）	
Cp（J/gk）	0.33

Constants of Dispersion Formula

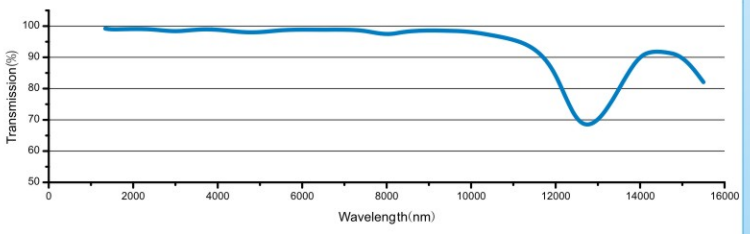
A	2. 6209608E+00
B	6. 5486281E-02
C	9.8915134E-02
D	-2.0505850E-04
E	3.4955962E-07
F	-1.2725532E-09

Temperature Coefficients of Refractive Index

Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	72
-40~80	8000	71
-40~80	14000	71

Other Properties

ρ（g/cm^3）	4.68



Internal Transmittance

λ（nm）	τ（2mm）
15500	0.821
15000	0.911
14500	0.918
14000	0.920
13500	0.797
13000	0.685
12500	0.673
12000	0.861
11500	0.933
11000	0.958
10500	0.971
10000	0.982
9500	0.986
9000	0.986
8500	0.985
8000	0.969
7500	0.987
7000	0.989
6500	0.988
6000	0.989
5500	0.988
5000	0.979
4500	0.980
4000	0.990
3500	0.990
3000	0.981
2500	0.990
2000	0.991
1500	0.988
1340	0.992

HWS2 $Ge_{20}Sb_{15}Se_{65}$ | $N_{10.6}$=2.5837 | $\upsilon_{10.6}$=86.65 | $n_{8000}-n_{12500}$=0.0183

Refractive Indices

	λ (nm)	
n	2000	2.6260
n	3000	2.6118
n	4000	2.6061
n	5000	2.6024
n	6000	2.5993
n	7000	2.5963
n	8000	2.5933
n	9000	2.5898
n	10000	2.5862
n	11000	2.5820
n	12000	2.5775
n	12500	2.5749
n	13000	2.5723
n	14000	2.5665

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K(20℃, 10^7Pa)	140
E(Gpa)	
G(Gpa)	

Thermal Properties

T_g (℃)	270
T_s (℃)	300
$\alpha_{20/120℃}$ (10^{-7}/K)	140
$\alpha_{20/300℃}$ (10^{-7}/K)	247
Cp (J/gk)	

Constants of Dispersion Formula

A	2.60316263E+00
B	9.07167031E-02
C	1.11059065E-02
D	-1.76923849E-04
E	1.91256490E-08
F	-4.23816561E-10

Temperature Coefficients of Refractive Index

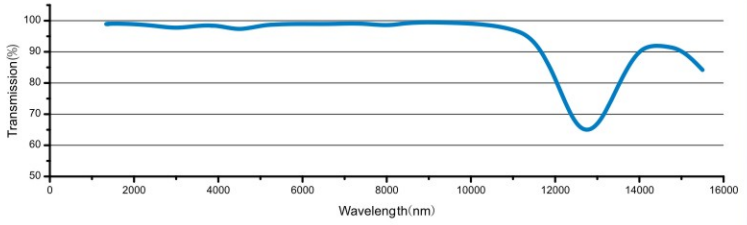
Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	39
-40~80	8000	37
-40~80	14000	37

Other Properties

ρ (g/cm^3)	4.71

Internal Transmittance

λ (nm)	τ (2mm)
15500	0.842
15000	0.912
14500	0.920
14000	0.919
13500	0.796
13000	0.644
12500	0.642
12000	0.823
11500	0.946
11000	0.973
10500	0.985
10000	0.991
9500	0.994
9000	0.995
8500	0.994
8000	0.983
7500	0.991
7000	0.991
6500	0.989
6000	0.990
5500	0.989
5000	0.986
4500	0.967
4000	0.986
3500	0.984
3000	0.974
2500	0.984
2000	0.989
1500	0.991
1340	0.989



HWS3 $Ge_{33}As_{12}Se_{55}$ | $N_{10.6}$=2.4947 | $\upsilon_{10.6}$=98.99 | $n_{8000}-n_{12500}$=0.0151

Refractive Indices

	λ (nm)	
n	2000	2.5296
n	3000	2.5184
n	4000	2.5132
n	5000	2.5103
n	6000	2.5077
n	7000	2.5053
n	8000	2.5030
n	9000	2.5000
n	10000	2.4967
n	11000	2.4933
n	12000	2.4896
n	12500	2.4879
n	13000	2.4863
n	14000	2.4837

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K(20℃, 10^7Pa)	140
E(Gpa)	21.6
G(Gpa)	8.7

Thermal Properties

T_g (℃)	367
T_s (℃)	412
$\alpha_{20/120℃}$ (10^{-7}/K)	129
$\alpha_{20/300℃}$ (10^{-7}/K)	131
Cp (J/gk)	0.33

Constants of Dispersion Formula

A	2.5075999E+00
B	1.1167289E-01
C	-9.3391576E-02
D	-4.4572533E-05
E	-1.1037133E-06
F	3.5414819E-09

Temperature Coefficients of Refractive Index

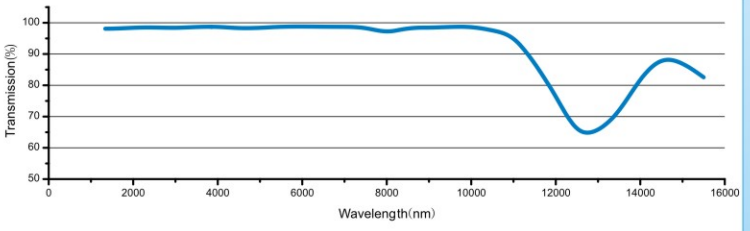
Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	67
-40~80	8000	66
-40~80	14000	63

Other Properties

ρ (g/cm^3)	4.42

Internal Transmittance

λ (nm)	τ (2mm)
15500	0.826
15000	0.874
14500	0.892
14000	0.825
13500	0.712
13000	0.650
12500	0.639
12000	0.768
11500	0.872
11000	0.961
10500	0.976
10000	0.988
9500	0.987
9000	0.984
8500	0.985
8000	0.966
7500	0.986
7000	0.987
6500	0.987
6000	0.988
5500	0.983
5000	0.983
4500	0.982
4000	0.988
3500	0.987
3000	0.983
2500	0.985
2000	0.984
1500	0.981
1340	0.981



HWS4 $Ge_{22}As_{20}Se_{58}$ | $N_{10.6}$=2.4925 | $\upsilon_{10.6}$=105.11 | $n_{8000}-n_{12500}$=0.0142

Refractive Indices

	λ (nm)	
n	2000	2.5265
n	3000	2.5145
n	4000	2.5100
n	5000	2.5071
n	6000	2.5047
n	7000	2.5024
n	8000	2.4999
n	9000	2.4973
n	10000	2.4944
n	11000	2.4912
n	12000	2.4876
n	12500	2.4857
n	13000	2.4836
n	14000	2.4789

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K(20℃, 10^7Pa)	152
E(Gpa)	17.89
G(Gpa)	6.98

Thermal Properties

T_g (℃)	287
T_s (℃)	352
$\alpha_{20/120℃}$ (10^{-7}/K)	164
$\alpha_{20/300℃}$ (10^{-7}/K)	214
Cp (J/gk)	0.36

Constants of Dispersion Formula

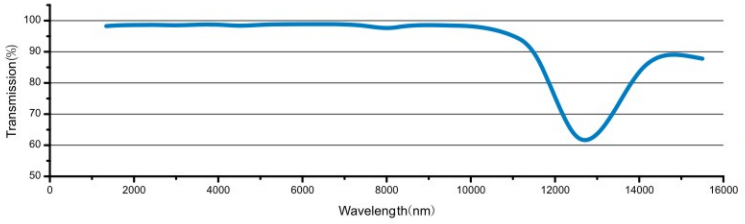
A	2.5081812E+00
B	6.3736371E-02
C	4.5285398E-02
D	-1.5008478E-04
E	1.2429335E-07
F	-6.5821537E-10

Temperature Coefficients of Refractive Index

Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	57
-40~80	8000	56
-40~80	14000	56

Other Properties

ρ (g/cm^3)	4.41



Internal Transmittance

λ (nm)	τ (2mm)
15500	0.878
15000	0.891
14500	0.892
14000	0.847
13500	0.729
13000	0.622
12500	0.601
12000	0.752
11500	0.918
11000	0.954
10500	0.974
10000	0.983
9500	0.984
9000	0.986
8500	0.985
8000	0.972
7500	0.984
7000	0.988
6500	0.989
6000	0.989
5500	0.988
5000	0.987
4500	0.982
4000	0.988
3500	0.987
3000	0.984
2500	0.987
2000	0.986
1500	0.985
1340	0.983

HWS5 $Ge_{10}As_{40}Se_{50}$ | $N_{10.6}$=2.6073 | $\upsilon_{10.6}$=153.08 | $n_{8000}-n_{12500}$=0.0105

Refractive Indices

	λ (nm)	
n	2000	2.6410
n	3000	2.6272
n	4000	2.6219
n	5000	2.6190
n	6000	2.6168
n	7000	2.6148
n	8000	2.6129
n	9000	2.6109
n	10000	2.6087
n	11000	2.6064
n	12000	2.6038
n	12500	2.6024
n	13000	2.6010
n	14000	2.5979

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K(20℃, 10^7Pa)	140
E(Gpa)	20.5
G(Gpa)	8.5

Thermal Properties

T_g (℃)	217
T_s (℃)	270
$\alpha_{20/120℃}$ (10^{-7}/K)	211
$\alpha_{20/300℃}$ (10^{-7}/K)	
Cp (J/gk)	0.18

Constants of Dispersion Formula

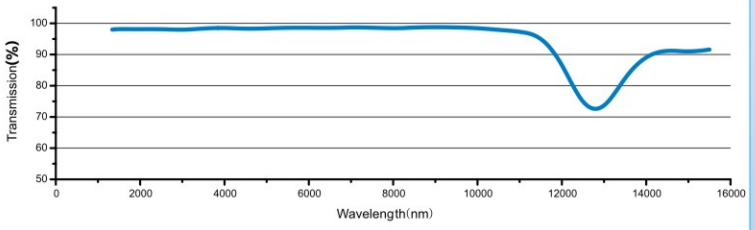
A	2.61759567E+00
B	9.28696439E-02
C	6.24100744E-03
D	-9.26026669E-05
E	-5.57225808E-08
F	1.88062676E-11

Temperature Coefficients of Refractive Index

Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	20
-40~80	8000	20
-40~80	14000	18

Other Properties

ρ (g/cm^3)	4.47



Internal Transmittance

λ (nm)	τ (2mm)
15500	0.916
15000	0.907
14500	0.916
14000	0.899
13500	0.832
13000	0.716
12500	0.726
12000	0.877
11500	0.962
11000	0.974
10500	0.979
10000	0.985
9500	0.987
9000	0.988
8500	0.987
8000	0.983
7500	0.987
7000	0.987
6500	0.985
6000	0.986
5500	0.986
5000	0.984
4500	0.982
4000	0.986
3500	0.984
3000	0.978
2500	0.982
2000	0.981
1500	0.982
1340	0.980

HWS6 $As_{40}Se_{60}$ | $N_{10.6}$=2.7759 | $\upsilon_{10.6}$=146.77 | $n_{8000}-n_{12500}$=0.0121

Refractive Indices

	λ (nm)	
n	2000	2.8198
n	3000	2.8014
n	4000	2.7944
n	5000	2.7907
n	6000	2.7879
n	7000	2.7855
n	8000	2.7831
n	9000	2.7804
n	10000	2.7776
n	11000	2.7747
n	12000	2.7720
n	12500	2.7710
n	13000	2.7701
n	14000	2.7694

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K(20℃, 10^7Pa)	113
E(Gpa)	18.6
G(Gpa)	8.0

Thermal Properties

T_g (℃)	183
T_s (℃)	221
$\alpha_{20/120℃}$ (10^{-7}/K)	209
$\alpha_{20/300℃}$ (10^{-7}/K)	
Cp (J/gk)	0.36

Constants of Dispersion Formula

A	2.7866880E+00
B	1.3889746E-01
C	-2.6613300E-02
D	-3.8587030E-05
E	-1.0687515E-06
F	4.0663850E-09

Temperature Coefficients of Refractive Index

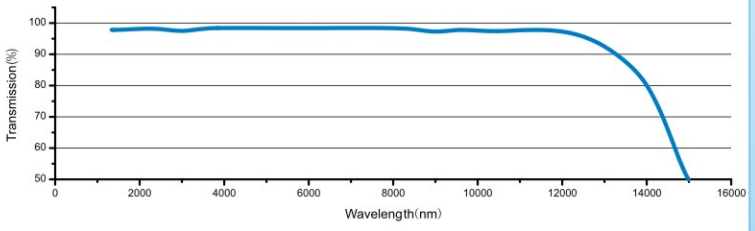
Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	32
-40~80	8000	30
-40~80	14000	30

Other Properties

ρ (g/cm^3)	4.63

Internal Transmittance

λ (nm)	τ (2mm)
15500	0.445
15000	0.467
14500	0.669
14000	0.814
13500	0.879
13000	0.928
12500	0.959
12000	0.975
11500	0.979
11000	0.978
10500	0.973
10000	0.976
9500	0.980
9000	0.969
8500	0.981
8000	0.984
7500	0.984
7000	0.984
6500	0.984
6000	0.984
5500	0.984
5000	0.984
4500	0.984
4000	0.984
3500	0.984
3000	0.971
2500	0.982
2000	0.982
1500	0.978
1340	0.978



HWS7 $Ge_{30}As_{13}Se_{32}Te_{25}$ | $N_{10.6}$=2.7851 | $\upsilon_{10.6}$=145.13 | $n_{8000}-n_{12500}$=0.0123

Refractive Indices

	λ (nm)	
n	2000	2.8320
n	3000	2.8109
n	4000	2.8032
n	5000	2.7991
n	6000	2.7963
n	7000	2.7939
n	8000	2.7916
n	9000	2.7892
n	10000	2.7867
n	11000	2.7840
n	12000	2.7809
n	12500	2.7793
n	13000	2.7775
n	14000	2.7738

Chemical Properties(grade)

RC(S)	1
RA(S)	1
D_W	1
D_A	1

Mechanical Properties

H_K(20℃, 10^7Pa)	164
E(Gpa)	22
G(Gpa)	8.9

Thermal Properties

T_g (℃)	269
T_s (℃)	314
$\alpha_{20/120℃}$ (10^{-7}/K)	136
$\alpha_{20/300℃}$ (10^{-7}/K)	225
Cp (J/gk)	0.32

Constants of Dispersion Formula

A	2.79590361E+00
B	1.39916349E-01
C	1.96809637E-02
D	-9.34455880E-05
E	-1.32878073E-07
F	8.37248455E-11

Temperature Coefficients of Refractive Index

Temperature (℃)	λ (nm)	dn/dt relative (10^{-6}/℃)
-40~80	5000	103
-40~80	8000	103
-40~80	14000	102

Other Properties

ρ (g/cm^3)	4.84

Internal Transmittance

	τ (2mm)
15500	0.894
15000	0.902
14500	0.915
14000	0.851
13500	0.663
13000	0.518
12500	0.589
12000	0.832
11500	0.956
11000	0.973
10500	0.982
10000	0.989
9500	0.990
9000	0.990
8500	0.988
8000	0.971
7500	0.989
7000	0.991
6500	0.990
6000	0.990
5500	0.988
5000	0.982
4500	0.984
4000	0.986
3500	0.985
3000	0.978
2500	0.981
2000	0.978
1500	0.976
1340	0.976