

ChAMP

Chalcogenide Advanced Manufacturing Partnership

GLS Infrared Transmitting Glass

A radically new chalcogenide glass and long-awaited alternative to toxic arsenic-based glasses

- Optical transparency from the visible to infrared wavelengths and thermal stability up to 550°C
- Safer and more economical production; can be melted in a large-scale without the need for sealed ampoule processing
- Over 200 times greater performance and overall transmission in the 3-5 micron band as compared to early glasses of the same family; this is a result of substantially reduced impurity levels, in particular OH⁻ and SH⁻ absorption bands at around 3 and 4 microns
- A wide range of applications, e.g. IR and non-linear optics, high efficiency thin-film solar cells, high-capacity batteries and sensors with potential, as the choice semiconductor for developing beyond-CMOS electronics and all-optical processing technologies

Physical data and typical characteristics*

OPTICAL	
Refractive index @ 0.589 μm	2.493
Zero material dispersion	4 μm
Temperature dependence dN/dT	75 × 10 ⁻⁶ /°C
Bulk transmission at 50% (1cm thickness)	0.5-10 μm
Bulk absorption @ 4.8 μm	<0.001 cm ⁻¹
Damage threshold @ 1064 nm (coated)	>35 MW/cm ²
Damage threshold @ 1.54 μm (uncoated)	>250 kW/cm ²

THERMAL	
Glass transition	580 °C
Softening point	600 °C
Maximum use temperature	550 °C
Melting temperature	830 °C
Thermal expansion	10 °C ⁻¹ × 10 ⁻⁶
Specific heat capacity	0.54 J/g K
Thermal conductivity	0.43 W/K cm

MECHANICAL	
Density	4.04 g/cm ³
Poisson's ratio	0.24
Young's modulus	59 GPa
Knoop hardness (200g indenter)	206 kg/mm ²
Solubility in water	nil (after 10 years)
Total metallic impurity (Fe, Cr, Ni, Cu)	<2 ppm
Total water content	<1 ppm

*This glass is under development and specifications may be subject to minor variations.



Standard formats

Available as bulk glass or polished optical components, thin and thick films and emerging as an optical fibre; dimensions for discs, rods, windows, prisms on request
Raw glass ingots (up to 500 grams) can be provided for your own in-house glass processing.

Bespoke specifications

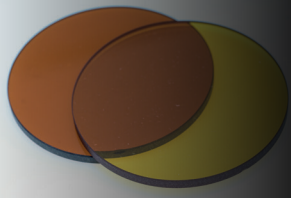
Specifications beyond the typical formats outlined here may be available, including:

- Raw glass ingots cut and polished to your specification
- Other glass compositions, which we can provide under standard material transfer agreement for rapid evaluation by industry and academia

Please contact us to discuss your specific requirements.

Contact us

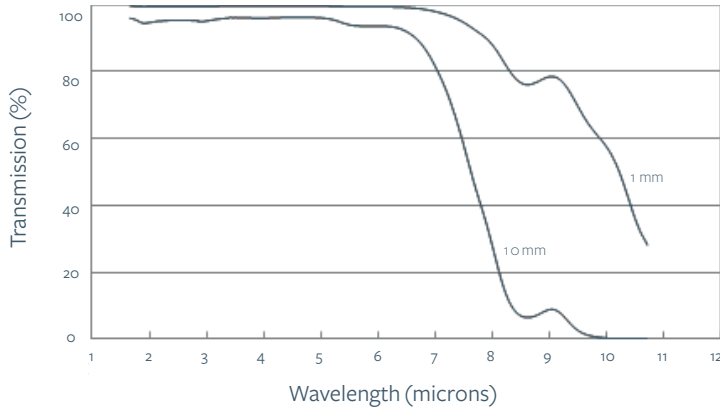
Professor Dan Hewak
 Optoelectronics Research Centre
 University of Southampton
 Southampton, UK
 SO17 1BJ
 Email: champ@orc.soton.ac.uk
 Phone: +44 (0)2380 593164



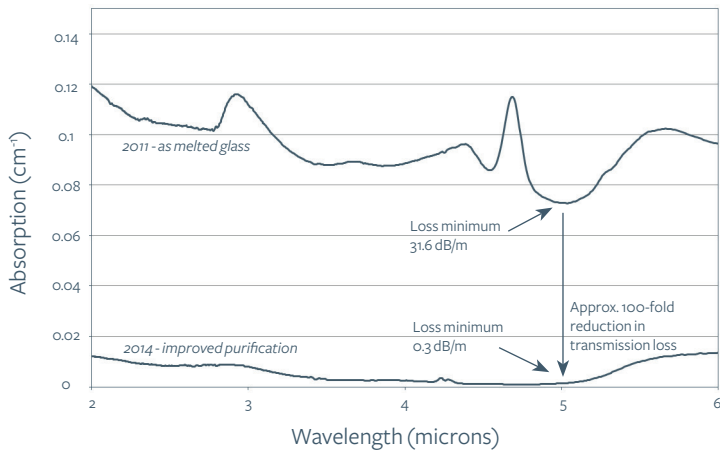
ChAMP

Chalcogenide Advanced Manufacturing Partnership

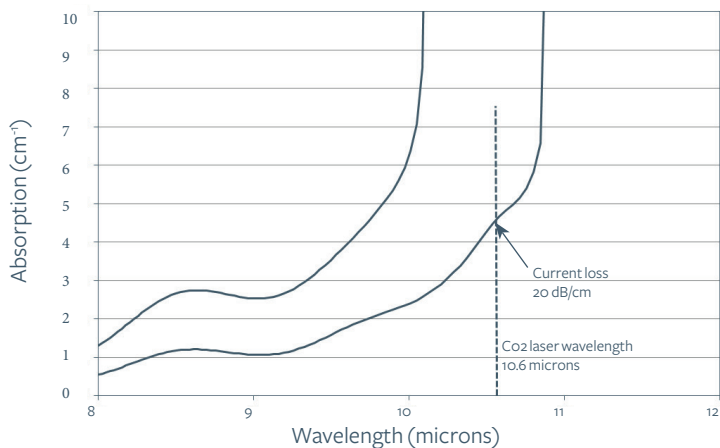
Infrared transmission



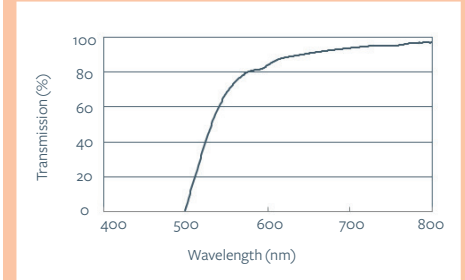
Glass purification progress



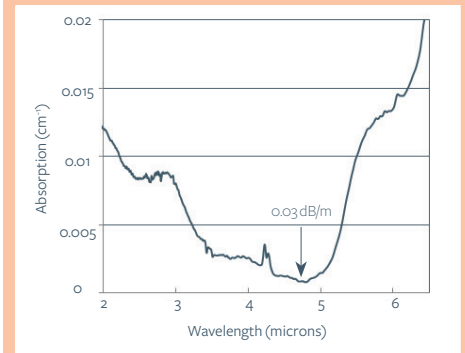
Extending infrared transmission



Visible transmission



Loss minimum



Refractive index

Wavelength (μm)	Index
1.70	2.2641 +/- 0.009
2.00	2.3163
3.00	2.2880
4.00	2.2832
5.00	2.2756
6.00	2.2633
7.00	2.2524
8.00	2.2437
9.00	2.2394
10.0	2.2041

Funded under EPSRC Grant: EP/M015130/1