

# CVD-ZnSe for pyrometry

TYDEX provides a wide range of CVD-ZnSe optics for pyrometry: windows, lenses and beamsplitters. For these items various coatings (BBAR and PR) are available.



ZnSe, germanium, and silicon are all used in pyrometric applications. However, Zinc Selenide has several advantages over the other two materials. It has a wider transmission spectrum from 0.5 mm to 19 mm (see Fig. 1) and a lower absorption coefficient.

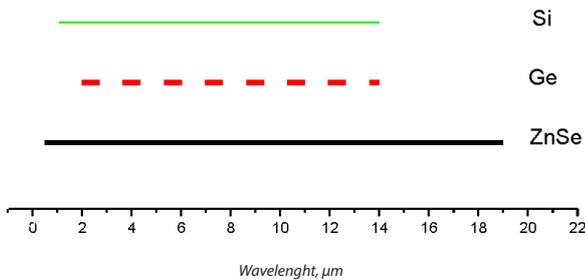


Fig.1 Transmission range of Ge, Si, and ZnSe

Materials for pyrometry should have great hardness so that thin lenses can be used. The perfect material for lenses should have refractive index that does not depend on temperature and wavelength (i.e. zero dispersion), in order to minimise chromatic aberration and the number of lenses for its compensation.

	$dn/dT @ 300\text{ K}, 10^{-6} / \text{C}$	Dispersion index	Absorption coefficient $1/\text{cm}$
<b>ZnSe</b>	100	82.91@ 8-11 $\mu\text{m}$	$(5 - 8) \times 10^{-4} @ 10.6 \mu\text{m}$
<b>Ge</b>	280-300	1112.59@ 8-11 $\mu\text{m}$	$2 \times 10^{-2} @ 10.6 \mu\text{m}$
<b>Si</b>	162-168	3454.36@ 3-5 $\mu\text{m}$	$1 \times 10^{-2} @ 3-5 \mu\text{m}$

Using various anti-reflection coatings one can achieve good optical transmission of elements in the wide range, which is a very important parameter for pyrometry. Unlike Ge and Si, ZnSe is transparent in visible range, and that can be useful (e.g. for «red» laser tuning).

The thermal runaway problem with germanium and silicon starts at 500C, however, for ZnSe it starts only at 2000C. With the low bulk losses stipulated by scattering and absorption, this problem is avoided. That makes Zinc Selenide the first choice for high power laser optics and multispectral applications.

The material is non-hygroscopic and stable to practically all used environments (excluding treatment with strong acids).

Spectroscopic measurements are made before and after coating run to provide the best quality of the material and the coating. Transmission curve of ZnSe BBAR coated window is shown at Figure 2.

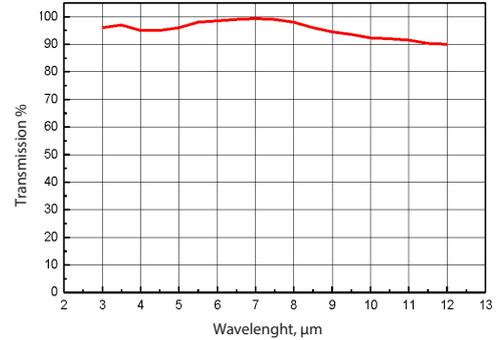


Fig. 2 Transmission spectrum of CVD-ZnSe window D 120 x 10 mm BBAR coated @ 3 - 12  $\mu\text{m}$