

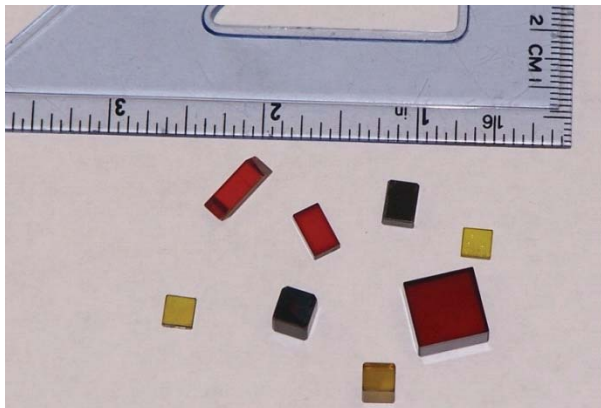
## Co<sup>2+</sup>:ZnS, Cr<sup>2+</sup>:ZnS and Cr<sup>2+</sup>:ZnSe PASSIVE Q-SWITCHES

Co<sup>2+</sup>:ZnS, Cr<sup>2+</sup>:ZnS and Cr<sup>2+</sup>:ZnSe saturable absorbers (SA) are ideal materials for passive Q-switches of eye-safe fiber and solid-state lasers operating in the spectral range of 1.5-2.1  $\mu\text{m}$ .

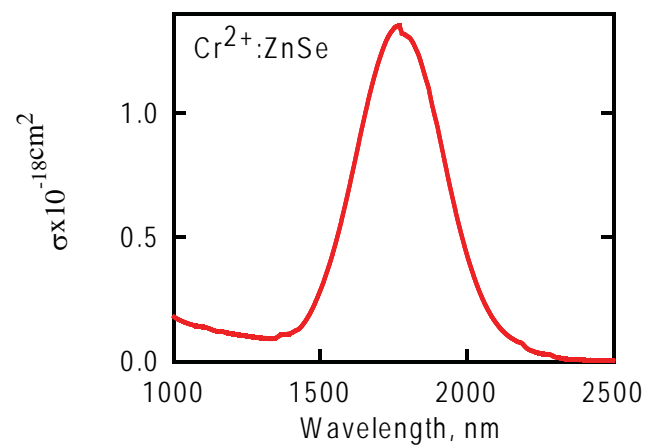
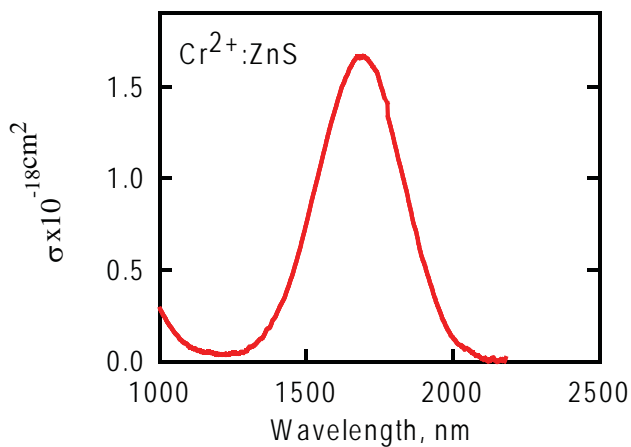
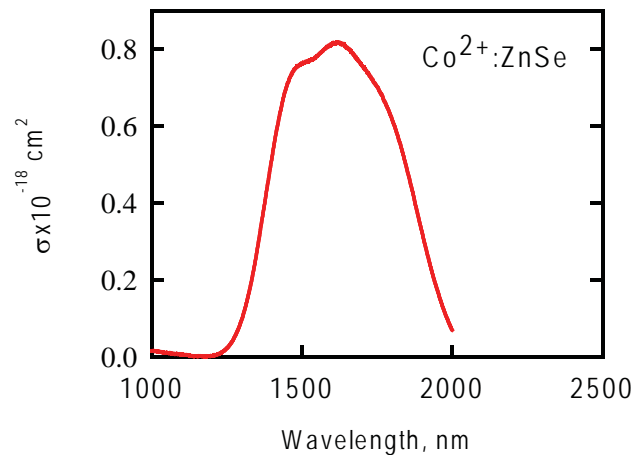
These lasers are used in numerous applications, such as free-space communication systems, target

designation, time-of-flight range finding, surgery, reflectometry, laser lidars, etc.

IPG offers a large variety of diffusion-doped Co<sup>2+</sup>:ZnS, Co<sup>2+</sup>:ZnSe, Cr<sup>2+</sup>:ZnS and Cr<sup>2+</sup>:ZnSe polycrystals appropriate for Q-switching of the lasers operating in the 1.5-2.1  $\mu\text{m}$  spectral range.



Samples of Cr<sup>2+</sup>: ZnS, Cr<sup>2+</sup>:ZnSe and Co<sup>2+</sup>:ZnS Saturable Absorbers



Ground-state Absorption Cross-sections of the Co<sup>2+</sup>:ZnS, Cr<sup>2+</sup>:ZnS and Cr<sup>2+</sup>:ZnSe Crystals

## Co<sup>2+</sup>:ZnS, Cr<sup>2+</sup>:ZnS and Cr<sup>2+</sup>:ZnSe Passive Q-Switches

<b>Crystallographic</b>	<b>ZnS</b>	<b>ZnSe</b>
Syngony	Cubic	Cubic
Symetry Class	---	43 m
<b>Mechanical</b>		
Density, g/cm <sup>3</sup>	4.09	5.27
Young Modulus, Pa	7.45x10 <sup>10</sup>	7.03x10 <sup>10</sup>
Poisson Ration	0.28	0.28
<b>Thermal</b>		
Thermal Expansion, dec C <sup>-1</sup>	6.5x10 <sup>-6</sup>	7.6x10 <sup>-6</sup>
Thermal Conductivity, W/(m deg C)	27.2	16
Specific Heat, J/(kg dec C)	0.515x10 <sup>3</sup>	0.339x10 <sup>3</sup>
<b>Optical</b>		
Refractive Index at 1.0 μm	2.29	2.49
dn/dt, deg C <sup>-1</sup> <sub>01/11</sub>	5.4x10 <sup>-5</sup>	6.1x10 <sup>-5</sup>
Transmission Range, μm	0.37-14	0.55-20

<b>Q-switching</b>	<b>Cr:ZnS</b>	<b>Cr:ZnSe</b>	<b>Co:ZnS</b>	<b>Co:ZnSe</b>
σ <sub>GSA</sub> (at 1.54 μm)	1.6x10 <sup>-18</sup>	1.3x10 <sup>-18</sup>	0.7x10 <sup>-18</sup>	0.76x10 <sup>-18</sup>
σ <sub>ESA</sub> (at 1.54 μm)	0	0.02x10 <sup>-18</sup>	0.1x10 <sup>-18</sup>	0.1x10 <sup>-18</sup>
τ (at 1.54 μm)	5 μs	8 μs	200 μs	290 μs

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