substance: gallium sulfide (GaS)
property: indirect energy gap and exciton energies

indirect energy gap

The values quoted in the literature correspond to the ground state of the indirect free exciton (see [77D1] and the transition energy of the indirect exciton, see below) . The binding energy of the indirect exciton is not known.

indirect exciton transition energy

$E_{gx,ind}$	2.593 eV	$T = 1.5$ K	optical absorption	77D2
	2.600 eV	$T = 4.2$ K	photoluminescence for GaS_xSe_{1-x}	80S
	2.5947(6) eV	$T = 4.2$ K	photoluminescence	73R
	2.576(1) eV	$T = 77$ K	wavelength modulated absorption	75K

For temperature dependence of indirect exciton transition energy, see Fig. 1.

pressure coefficient of $E_{gx,ind}$

$dE_{gx,ind}/dp$	$-13.5 \cdot 10^{-6}$ eV bar^{-1}	$T = 300$ K	photoconductivity	69N
	$-11.0(15) \cdot 10^{-6}$ eV bar^{-1}	$T = 300$ K, $p < 6$ kbar	optical absorption, see Fig. 2	78M
	$-4 \cdot 10^{-6}$ eV bar^{-1}	$T = 300$ K, $p \approx 40$ kbar		

pressure coefficient of $E_{gx,ind}$

$dE_{gx,ind}/dp$	$-3.1 \cdot 10^{-11}$ eV Pa^{-1}	$T = 4.2$ K, $0 < p \le 80$ MPa	optical absorption, uniaxial pressure	83S

g-value of indirect free triplet exciton

$g_\parallel$	2.006(2)		optical detected magnetic resonance	79D

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77D1   Depeursinge, C., Le Chi Thanh: Proc. 13th Intern. Conf. Phys. Semicond., Rome 1976, ed. by F. Fumi, Veschi, Roma, 1977, p. 383.

77D2   Depeursinge, C.: Thesis, Lausanne 1977, unpublished.

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79D   Dawson, P., Killoran, N., Cavenett, B. C.: Solid State Commun. 32 (1979) 1133.

80S   Serizawa, H., Sasaki, Y., Nishina, Y.: J. Phys. Soc. Jpn. 48 (1980) 490.

83S   Sasaki, Y., Hoshi, K., Saito, S., Yamaguchi, K., Nishina, Y.: J. Phys. Soc. Jpn. 52 (1983) 3706.

Fig. 1.

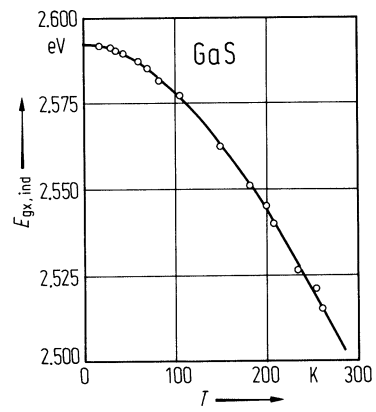GaS. Energetic position of indirect exciton ground state transition vs. temperature [77D2].

Fig. 2.

GaS. Absorption coefficient for $E \perp c$ ($K_\perp$) at 300 K vs. photon energy for different hydrostatic pressures, *1*, 1 bar; *2*, 10 kbar; *3*, 19.5 kbar; *4*, 29.5 kbar; *5*, 43.5 kbar [78M].