substance: $FeSi_2$
property: electronic properties

energy gaps

$E_{g,th}$	0.85 eV	T = 0 K	calculated from the transition temperature 1210 K	69B2
	0.88 eV	T = 0 K	from log $\rho \propto E_g/2kT$ in the intrinsic range	64W
	0.9...1.0 eV	T = 0 K	from log $\rho \propto E_g/2kT$ in the intrinsic range (≈ 0.9 eV for Al-doped, 1.0 eV for Co-doped samples)	69B1
	0.95 eV	T = 0 K	from log $\rho \propto E_g/2kT$	73N
E_g	1.0 eV	T = 295 K	from optical absorption	70B2

E_g decreases with x in $Fe_{1-x}Mn_xSi_2$: 0.92 eV for x = 0.03, 0.50 eV for x = 0.06 [73N].

E_g increases (?) with x in $Fe_{1-x}Co_xSi_2$ (x = 0: 1.14 eV, x = 0.04: 1.3 eV) [71U].

dE_g/dT	– 0.45 meV K^{-1}	T = 700...1200 K	from thermal conductivity	73W

density of states

g	$5.2 \cdot 10^{22}$ cm^{-3}	T_{tr}	from magnetic susceptibility	69B1
	$4.9 \cdot 10^{22}$ cm^{-3}	T_{tr}	from electrical conductivity	69B2
	$7.46 \cdot 10^{22}$ cm^{-3}			73N

Various energy band models for $FeSi_2$ are discussed in [69B1, 69B2, 69H, 70B1, 73B] (Figs. 1, 2).

References:

64W Ware, R. M., Mc Neill, D. J.: Proc. IEE 111 (1964) 178.

69B1 Birkholz, U., Frühauf, A.: Phys. Status Solidi 34 (1969) K 181.

69B2 Birkholz, U., Scheim, J.: Phys. Status Solidi 34 (1969) K177.

69H Hesse, J.: Z. Metallkde. 60 (1969) 652.

70B1 Birkholz, U., Frühauf, A., Schelm, J.: Proc. Tenth Int. Conf. Phys. Semicond., Cambridge, Mass. (1970) 311.

70B2 Birkholz, U., Naegele, J.: Phys. Status Solidi 39 (1970) 197.

71U Ugai, Ya. A., Ivanova, T. V., Inozemtseva, V. P.: Izv. Akad. Nauk SSSR, Neorg. Mater. 7 (1971) 1983 (translation: Inorg. Mater. 7 (1971) 1766).

73B Blaauw, C., van der Woude, F., Sawatzki, G. A.: J. Phys. C6 (1973) 2371.

73N Nishida, I.: Phys. Rev. B17 (1973) 2710.

73W Waldecker, G., Meinhold, H., Birkholz, U.: Phys. Status Solidi (a) 15 (1973) 143.

Fig. 1.

$FeSi_2$. Energy-band scheme derived from optic measurements [70B1].

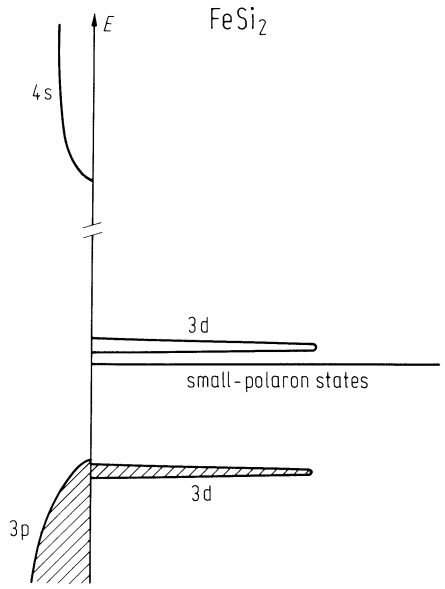

Fig. 2.

$FeSi_2$. Schematic representation of the valence and conduction band and the localized 3d levels [73B]. Δ_{ex} is the exchange-splitting parameter. Arrows indicate spin-up and spin-down levels. $E_g \approx 0.85$eV for the "vertical transition". The transition from the (s,p) valence band to the lowest unoccupied 3d level is crossed because of its negligible probability.