substance: $FeAs_2$
property: physical properties

energy level scheme: Fig. 1.

energy gap

$E_{g,th}$	0.2 eV		from log $\rho \propto E_g/2kT$, T = 300...550 K	59H, 65J
	0.22 eV		from log $\rho \propto E_g/2kT$ intrinsic above 170 K	72F

resistivity

ρ	0.012 Ω cm	RT	single crystal grown by chlorine transport	72F
	0.05 Ω cm		sintered sample	59H
	0.002 Ω cm		natural crystal	65J

For temperature dependence, see Fig. 3.

Hall coefficient

R_H	– 10 $cm^3\ C^{-1}$	T = 60...170 K	exponential function of T above	72F
	– 100 $cm^3\ C^{-1}$	T = 9 K	170 K, single crystal of unknown orientation	

For temperature dependence, see Fig. 3.

carrier concentration

n	$5 \cdot 10^{19}\ cm^{-3}$	T = 60...170 K	from Hall coefficient	74B, 72F

mobility ratio

b	< 1	high T	from sign change of S(T) at 800 K	65J

thermoelectric power

S	≈ – 200 $\mu V\ K^{-1}$	T ≈ 285 K	single crystal	72F
	– 120 $\mu V\ K^{-1}$	T ≈ 300 K	polycrystalline natural sample	65J

For temperature dependence in the range 77...900 K, see Fig. 2; S > 0 above 800 K [65J].

magnetic susceptibility

χ_m	$-14.0 \cdot 10^{-6}$ $cm^3\ mol^{-1}$	T = 80...500 K (?)	temperature independent, single crystal of unknown orientation; χ_m in CGS-emu	72F

far infrared absorption: for spectrum in the range 50...400 cm^{-1}, see [83L].

decomposition temperature

T_{dec}	1287 K		loses As in vacuum at 800 K	77K, 79K, 72R

lattice parameters: $a(T)$, $b(T)$ linear with T (300...1280 K), $c(T)$ linear above 600 K [77K].

volume expansion coefficient

β	$\approx 3.7 \cdot 10^{-5}$ K^{-1}	T = 300 K	increases up to ≈ 600 K, taken from graphical representation	77K
	$6.3 \cdot 10^{-5}$ K^{-1}	T = 800 K	T = 600...1280 K	

Comparative tables on structural data of transition metal dipnictides:

structure, chemical bond: , see document ,

crystallographical data of compounds with octahedrally coordinated cations, see document ,

interatomic distances in marcasite- and loellingite-type compounds, see document .

References:

59H Hulliger, F.: Helv. Phys. Acta 32 (1959) 615.
65J Johnston, W. D., Miller, R. C., Damon, D. H.: J. Less-Common Met. 8 (1965) 272.
72F Fan, A. K. L., Rosenthal, G. H., McKinzie, H. L., Wold, A.: J. Solid State Chem. 5 (1972) 136.
72G Goodenough, J. B.: J. Solid State Chem. 5 (1972) 144.
72R Rosenthal, G., Kershaw, R., Wold, A.: Mat. Res. Bull. 7 (1972) 479.
74B Baghdadi, A., Wold, A.: J. Phys. Chem. Solids 35 (1974) 811.
77K Kjekshus, A., Rakke, T.: Acta Chem. Scand. A31 (1977) 517.
79K Kjekshus, A., Peterzens, P. O., Rakke, T., Andresen, A. F.: Acta Chem. Scand. A33 (1979) 469.
83L Lutz, H. D., Schneider, O., Kliche, G.: Phys. Chem. Minerals 9 (1983) 109.

Fig. 1.

$FeAs_2$. One-electron energy levels for the valence electrons in loellingite [72F, 72G].

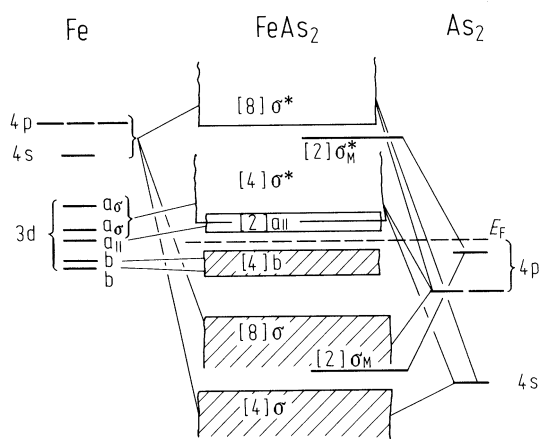

Fig. 2.

$FeAs_2$, $FeSb_2$, $OsSb_{1.95}Te_{0.05}$. Seebeck coefficient vs. temperature [65J]. $FeAs_2$: polycrystalline natural sample containing traces of calcite; $FeSb_2$ and $OsSb_{1.95}Te_{0.05}$: pressed samples sintered at 873 K and 973 K, respectively.

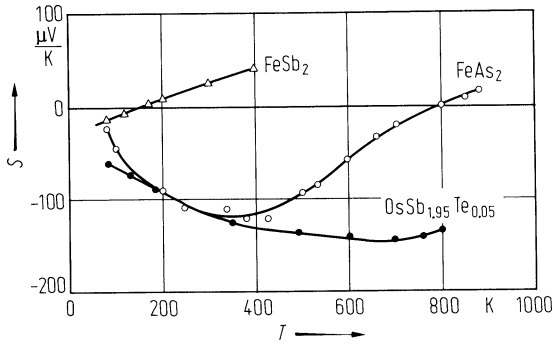

Fig. 3.

$FeAs_2$. Hall coefficient and resistivity vs. reciprocal temperature of an n-type single crystal of unknown orientation [72F].