substance: transition metal-(V)$_3$ compounds
property: physical data for skutterudite-type semiconductors

(see also Figs. 1...7).

Compound	E_g [eV]	ρ [Ω cm]		$\varepsilon(\infty)$	$10^6 \cdot \chi_m$*) [$cm^3 mol^{-1}$]	S [μV K^{-1}]	Ref.
		RT	77 K		RT	RT	
CoP_3	0.45 (opt.)	$5.6 \cdot 10^{-4}$	$8.1 \cdot 10^{-4}$	g)	– 14	≈ + 50b)	77Aa)
						≈ + 150	61H
$CoAs_3$	< 0.4 (opt.)	$3.1 \cdot 10^{-4}$	$1.6 \cdot 10^{-4}$		– 30	≈ + 1	77Aa)
	≈ 0.25					± ≈ 100	59H, 61H
	≈ 0.13				– 44.8e)	≈ + 135f)	62P
				6.47g)			82L
$CoSb_3$	< 0.4 (opt.)	$1.4 \cdot 10^{-4}$	$0.7 \cdot 10^{-4}$		– 47	≈ + 1	77Aa)
	c)					– 400	61H
	0.49	0.12				– 300	56D
		0.03...0.1				– 200...+30	59D
				10.84g)			82L
RhP_3	metallicd)	$14.5 \cdot 10^{-5}$	$4.9 \cdot 10^{-5}$		– 33.6	+ 32	78O
	c)				– 55	+ 50	61H
$RhAs_3$	c)				– 70	+ 70	61H
	> 0.1				– 71.8e)		62P
$RhSb_3$	c)				– 95	+ 60	61H
IrP_3						+ 200	61H
$IrAs_3$	c)				– 105	+ 150	61H
					– 108		61K
					– 105e)		62P
$IrSb_3$	c)				– 145	+ 200	61H
					– 134		61K

*) χ_m in CGS-emu.

a) Measurements made on single crystals grown by a chlorine transport reaction.

b) Hall coefficient $R_H > 0$ at room temperature [77A].

c) Measurements on sintered samples. From $\log \rho \propto E_g/2kT$ values of 0.2...1.3 eV were derived for E_g.

d) Single crystals grown from a tin flux. Carrier concentration: $3.7 \cdot 10^{19}$ cm^{-3} at 77 K and $6 \cdot 10^{19}$ cm^{-3} at 290 K [78O].

e) χ measured between 100 and 700 K. Slight decrease in diamagnetic susceptibilities at higher temperatures, consistent with the semiconducting behavior; see also Fig. 7.

f) The Seebeck coefficient increases from 10 μV K^{-1} at 100 K to a maximum of 140 μV K^{-1} at 320 K, and then decreases to 85 μV K^{-1} at 600 K [62P].

g) Far infrared spectra at various temperatures: [81L1, 81L2, 82L].

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Fig. 1.

$CoAs_3$, $RhAs_3$ and $Co_{1-x}Ni_xAs_3$. Resistivity vs. reciprocal temperature [62P].

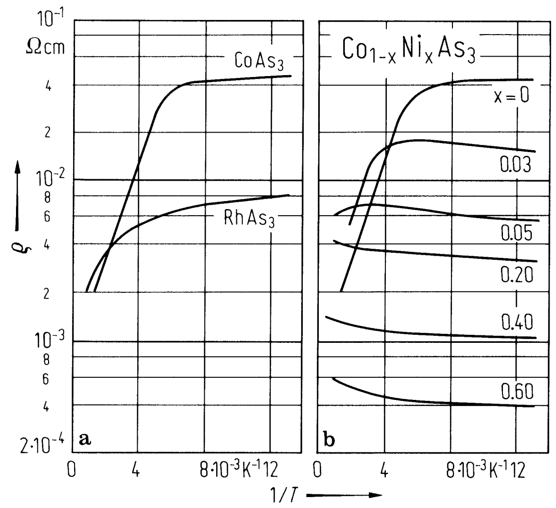

Fig. 2.

$Co_{1-x}Fe_xAs_3$ and $Ni_{1-x}Fe_xAs_3$. Resistivity vs. reciprocal temperature [62P].

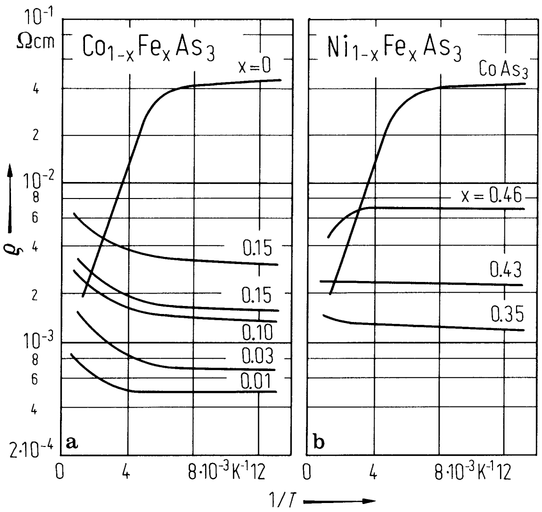

Fig. 3.

$CoSb_3$. Electrical conductivity vs. reciprocal temperature [56D].

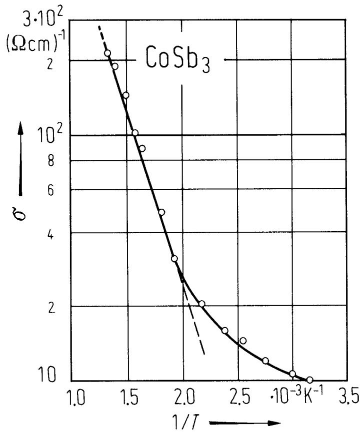

Fig. 4.

$Co_{1-x}Ni_xSb_3$. Conductivity vs. reciprocal temperature [57D].

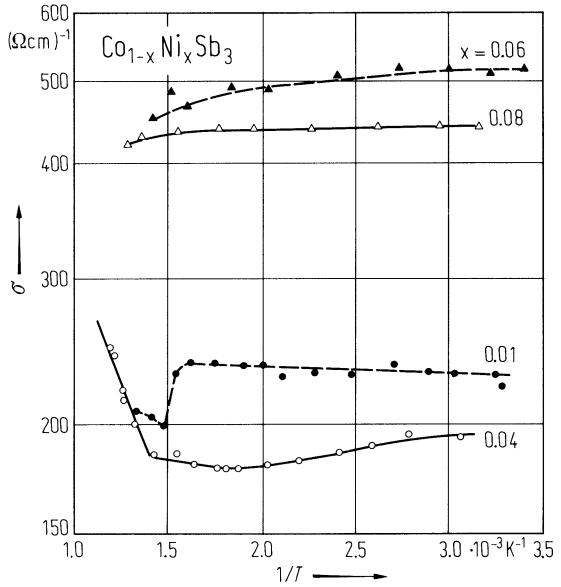

Fig. 5.

$CoSb_3$ and $Co_{1-x}Ni_xSb_3$. Thermoelectric power (circles) vs. reciprocal temperature for $CoSb_3$ [56D] and its room-temperature value (triangles) vs. concentration x for $Co_{1-x}Ni_xSb_3$ [57D].

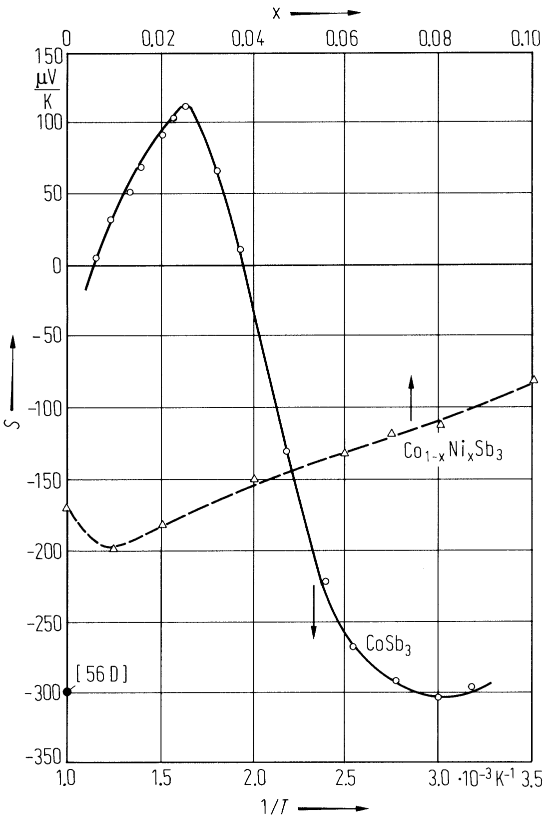

Fig. 6.

$Co_{1-x}Ni_xSb_3$. Thermoelectric power vs. reciprocal temperature [57D]. Concluding from Fig. 5 the curves for x = 0.06 and x = 0.08 should be interchanged.

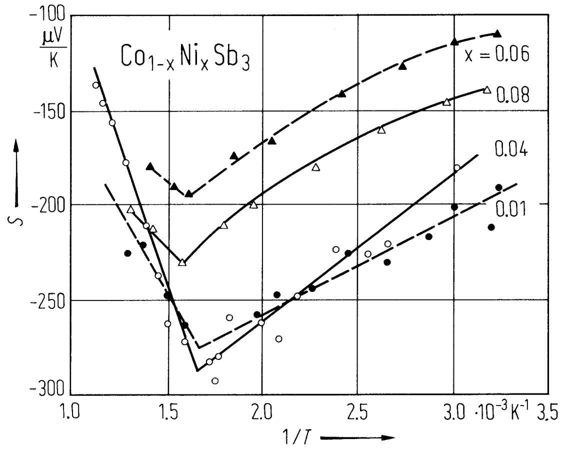

Fig. 7.

$CoAs_3$, $RhAs_3$, $IrAs_3$. Mass susceptibility (at infinite field strength) vs. temperature [62P]. Open circles represent the data for $IrAs_3$ of [61K]. χ_g in CGS-emu.