

substance: $\text{SmS}_{1-x}\text{Se}_x$

property: crystal structure, physical properties

(lattice parameter a , energy gap E_g)

semiconductor-metal transition pressure and energy gap vs. x : Fig. 1

$x = 0.11$

90N

a 6.003 Å

E_g 0.165 eV

pressure and temperature dependence of
resistivity: Fig. 2...5

$x = 0.44$

90N

a 6.084 Å

E_g 0.280 eV

specific volume, bulk modulus vs. ρ : Fig. 6

References:

- 70J Jayaraman, A., Narayanamurti, V., Bucher, E., Maines, R.G.: Phys. Rev. Lett. 25 (1970) 1430.
- 72B Bucher, E., Maines, R.G.: Solid State Commun. 11 (1972) 1441.
- 83L Lapierre, F., Ribault, M., Flouquet, J., Holtzberg, F.: J. Magn. Magn. Mater. 31-34 (1983) 443.
- 90N Neuenschwander, J., Wachter, P.: Physica B 160 (1990) 231.

Fig. 1.

$\text{SmS}_{1-x}\text{Se}_x$. Variation of the transition pressure p_{cr} (left part) and the energy gap (right part) with stoichiometry x from [90N] and dashed [72B]. The triangles are from [70J] and the cross from [83L]. The straight lines are the eye [90N].

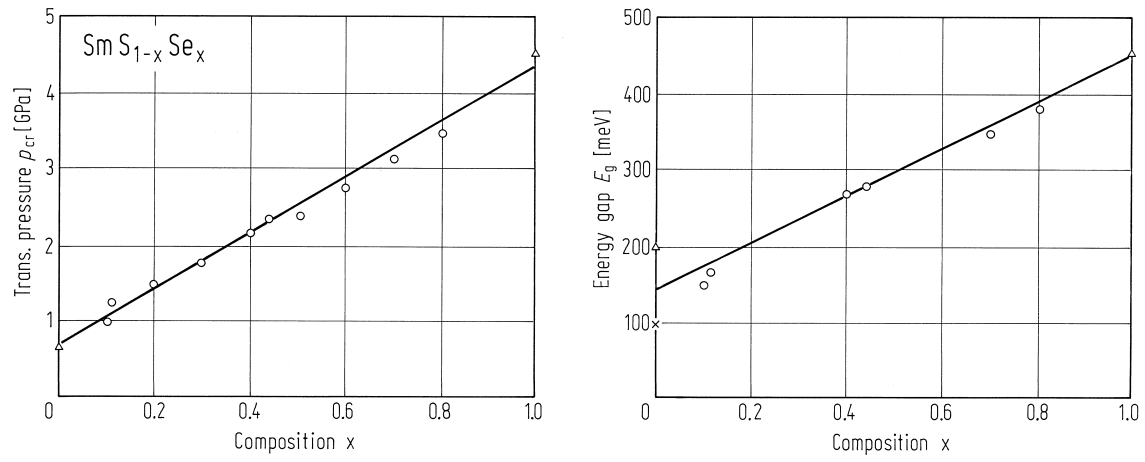


Fig. 2.

$\text{SmS}_{1-x}\text{Se}_x$. Pressure dependence of the electrical resistivity at room temperature. The solid lines represent data from [72B]. In the case of $\text{SmS}_{0.56}\text{Se}_{0.44}$ the measurement could be performed only up to the SMT; the line gives the expected behavior [90N].

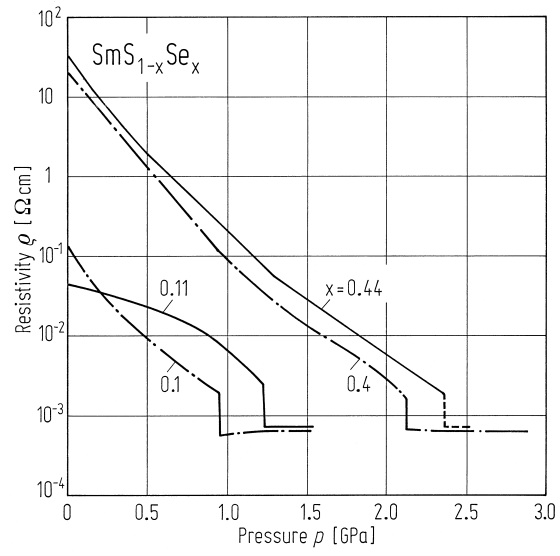


Fig. 3.

$\text{SmS}_{0.89}\text{Se}_{0.11}$. Temperature dependence of the electrical resistivity for various pressures. The pressures indicated are values at room temperature [90N]. Inset shows $\rho(T)$ in the pressure driven metallic state.

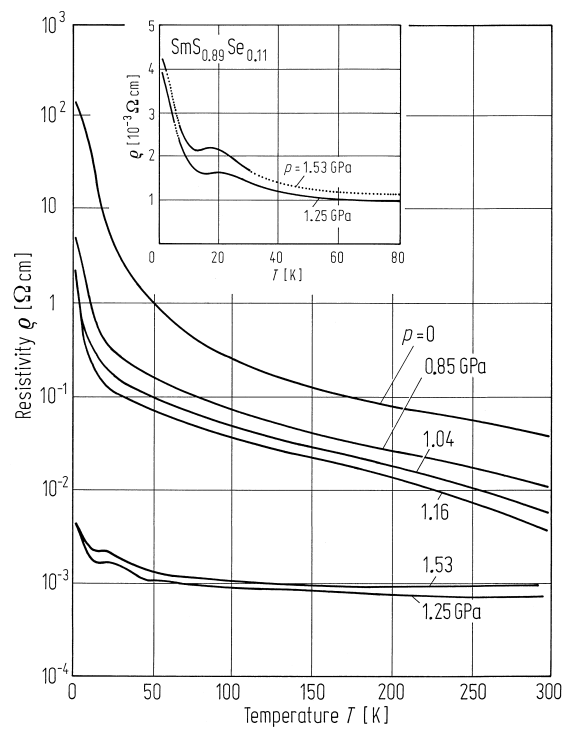


Fig. 4.

$\text{SmS}_{0.89}\text{Se}_{0.11}$. Temperature dependence of the electrical resistivity at ambient pressure in a $\log \rho$ vs. $T^{-1/4}$ plot. The circles represent the measurement; for clarity only few data points are shown. The straight line fits the data very well [90N].

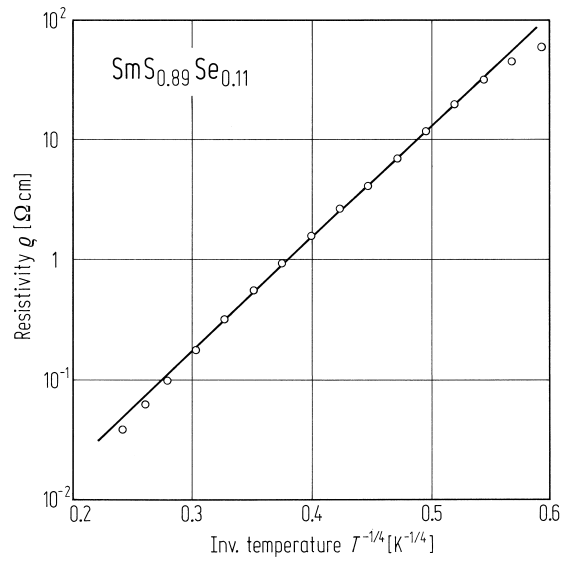


Fig. 5.

$\text{SmS}_{0.89}\text{Se}_{0.11}$. Pressure dependence of the electrical resistivity for various temperatures. Note the large hysteresis measured at room temperature [90N].

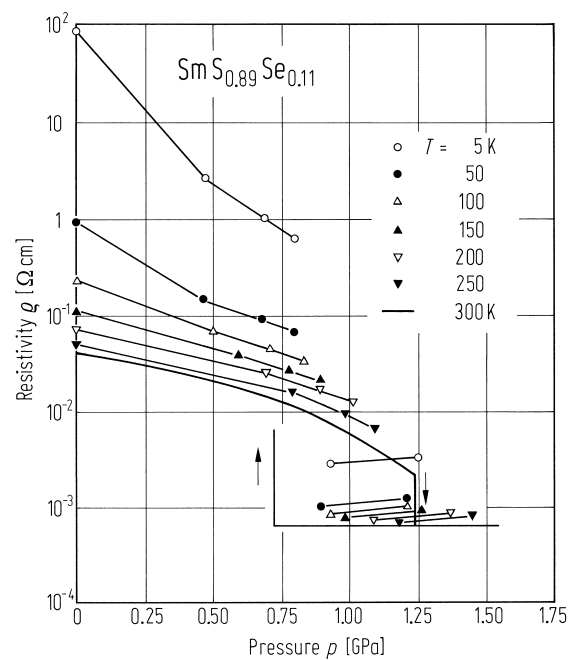


Fig. 6.

$\text{SmS}_{0.56}\text{Se}_{0.44}$. Pressure dependence of the relative volume (left part) and the corresponding bulk modulus (right part) at room temperature. Note the considerable softening of the lattice above 1.5 GPa [90N].

