

substance: SmTe

property: crystal structure, physical properties

crystal structure cubic ($O_h^5 - Fm3m$)

lattice parameters

a	6.594 Å		70J
	6.6600(4) Å		71S

energy gap

E_g	0.63 eV	4f–5d transition	70J
dE_g/dp	– 11.9 meV/kbar	optical spectra	73J

bulk modulus

B_0	400 kbar		72C
-------	----------	--	-----

Debye temperature

Θ_D	151(20) K		77S
------------	-----------	--	-----

electrical conductivity

σ	$\approx 10^{-3} \Omega^{-1} \text{ cm}^{-1}$		70J
----------	---	--	-----

Figures and further references:

band structure: Figs. 1, 4

photoemission spectrum: Fig. 2

reflectivity spectrum: Fig. 5

pressure dependence of **resistivity:** Fig. 3

intermediate valence and **metal-semiconductor transition** [70J, 80F, 78S]

References:

- 70J Jayaraman, A., Narayanamurti, V., Bucher, E., Maines, R. G.: Phys. Rev. Lett. 25 (1970) 1430.
71D Davis, H. L.: Proc. 9th RE Conference, p. 3, Virginia Polytechnic Inst., Blacksburg, Va., 1971.
71S Suryanarayanan, R., Paparoditis, C.: Int. Conf. on Rare Earths and Actinides, Durham p. 210, 1971.
72C Chatterjee, A., Singh, A. K., Jayaraman, A.: Phys. Rev. B 6 (1972) 2285.
73J Jayaraman, A.: IV. Int. Conf. on Solid Compounds of Transition Elements, Geneva, 1973, p. 148.
76B Batlogg, B., Kaldis, E., Schlegel, A., Wachter, P.: Phys. Rev. B 14 (1976) 5503.
76C Campagna, M., Wertheim, G. K., Bucher, E.: In Structure and Bonding, Vol. 30, Springer: Berlin 1976.
77S Subhadra, K. G., Sirdeshmukh, D. B.: Pramana 9 (1977) 223.
78S Smirnov, I. A., Oskotskii, V. S.: Sov. Phys. Usp. 21 (2) (1978) 117.
80F Farberovich, O. V.: Sov. Phys. Solid State 22 (3) (1980) 393.

Fig. 1.

SmS, SmTe. Calculated band structure for semiconducting SmS (top) and SmTe (bottom). Note the absence of 4f states in the case of the telluride [76C, 71D].

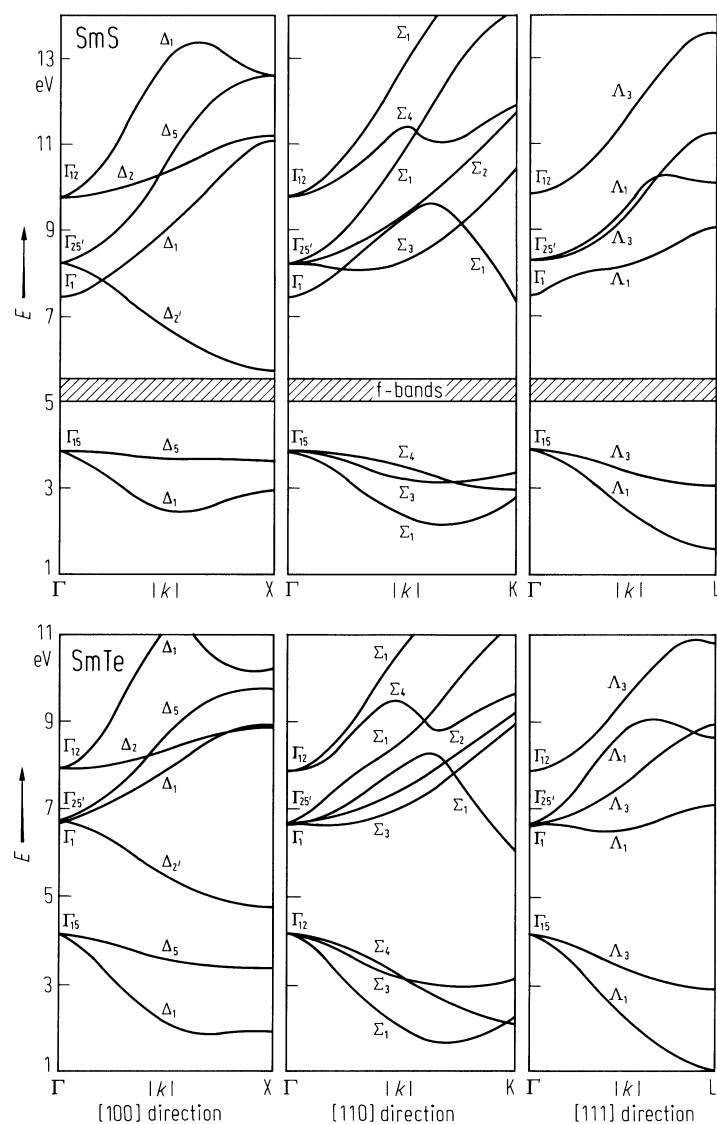


Fig. 2.

SmS, SmSe, SmTe. XPS spectra of the valence band and the 4f region (electron intensity vs. binding energy) [76C].

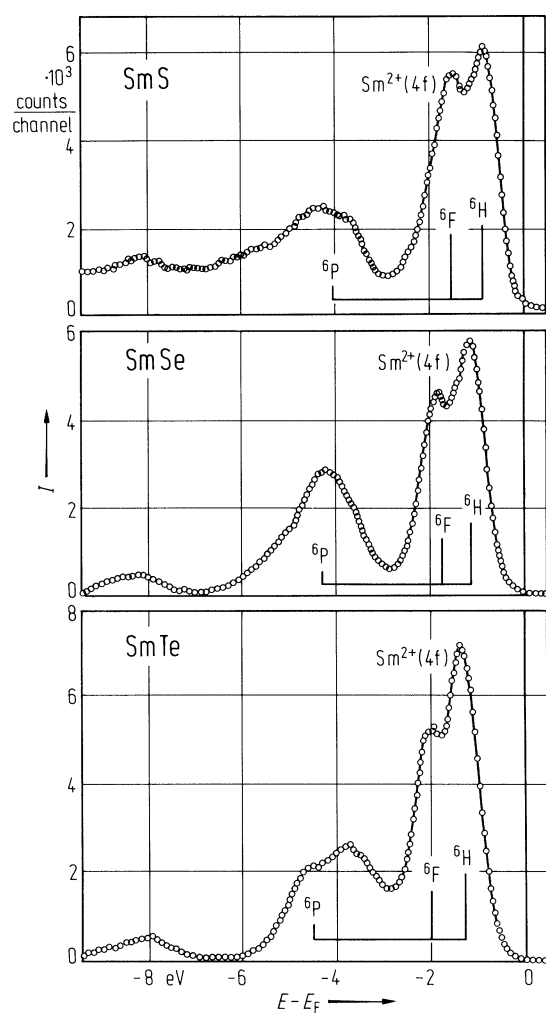


Fig. 3.

SmS, SmSe, SmTe. Normalized resistivity vs. pressure for SmS. The actual resistivity at pressures greater than 6.5 kbar is $\approx 3 \dots 4 \cdot 10^{-4} \Omega \text{ cm}$. The data for SmSe and SmTe are shown in the inset [70J].

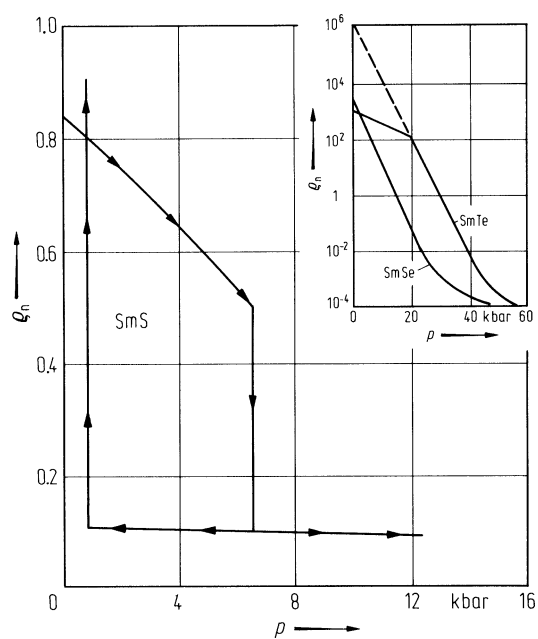


Fig. 4.

SmTe. Band structure [80F].

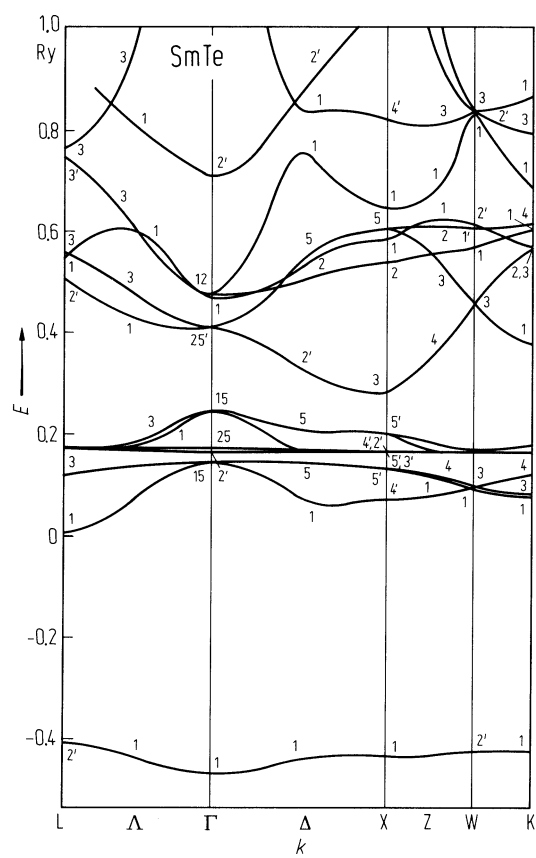


Fig. 5.

SmTe. Reflectivity vs. photon energy [76B].

