

substance: Pr₂S₃

property: crystal structure, physical properties

α-Pr₂S₃

crystal structure orthorhombic (D_{2h}¹⁶ – Pnma) 60P

lattice parameters

<i>a</i>	7.49 Å	71B
<i>b</i>	15.69 Å	
<i>c</i>	4.10 Å	

β-Pr₂S₃

crystal structure tetragonal (D_{4h}²⁰ – I4₁/acd)

lattice parameters

<i>a</i>	15.21 Å	71B
<i>c</i>	20.17 Å	

γ-Pr₂S₃

crystal structure cubic (Th₃P₄-defect structure, T_d⁶ – I 4̄ 3d)

lattice parameter

<i>a</i>	8.592 Å	85Z 65F, 75B 60P
	8.573 Å	
	8.592 Å	

coordination polyhedra: Fig. 1

melting point

<i>T_m</i>	1758°C	72G
	1795°C	60P

linear thermal expansion coefficient

<i>α</i>	11.3·10 ⁻⁶ K ⁻¹	66D
----------	---------------------------------------	-----

thermal conductivity

<i>κ</i>	2.26·10 ⁻² W cm ⁻¹ K ⁻¹	72G
----------	--	-----

further parameters

energy gap

<i>E_g</i>	2.42 ± 0.1 eV	optical gap
	2.6 ± 0.25 eV	thermodynamic

conductivity

<i>σ</i>	< 10 ⁻⁹ Ω ⁻¹ cm ⁻¹
----------	---

refractive and absorption indices

<i>n</i>	2.736	<i>λ</i> = 632.8 nm	reflectivity: Fig. 2; <i>ε</i> ₁ , <i>ε</i> ₂ : Fig. 3; refractive index, extinction coefficient: Fig. 4; Im <i>ε</i> ⁻¹ : Fig. 5
<i>k</i>	0.44	<i>λ</i> = 632.8 nm	

References:

- 60P Picon, M., Domange, L., Flahaut, J., Guittard, M., Patrie, M.: Bull. Soc. Chim. Fr. 2 (1960) 221.
- 65F Flahaut, J., Guittard, M., Patrie, M., Pardo, M. P., Golabi, S. M., Domange, L.: Acta. Cryst. 19 (1965) 14.
- 66D Dudnik, E. M., Lashkarev, G. V., Paderno, Y. B., Obolonchik, V. A.: Inorg. Mater. 2 (1966) 833.
- 66H Holtzberg, F., Methfessel, S.: J. Appl. Phys. 37 (1966) 1433.
- 71B Besancon, P.: Doctor Thesis, Univ. René Descartes, Paris 1971.
- 72G Goryachev, Yu. M., Kutsenok, T. G.: High Temp. High Press. 4 (1972) 663.
- 75B Bucher, E., Andres, K., di Salvo, F. J., Maita, J. P., Gossard, A. C., Cooper, A. S., Hull jr., G. W.: Phys. Rev. B 11 (1975) 500.
- 85Z Zhuze, V.P., Karin, M.G., Sidorin, K.K., Sokolov, V.V., Shelykh, A.I.: Sov. Phys. Solid State 27(12) (1985) 2205.

Fig. 1.

Th₃P₄-type compounds. The coordination polyhedra of the cations and the anions. Full circles: Th- atoms, other circles: P-atoms [66H].

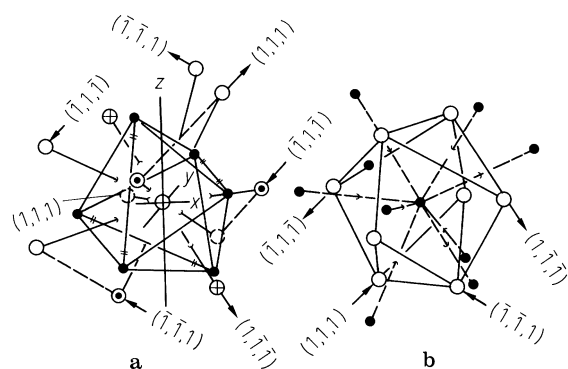


Fig. 2.

γ -Pr₂S₃. Reflection spectrum of a single crystal [85Z].

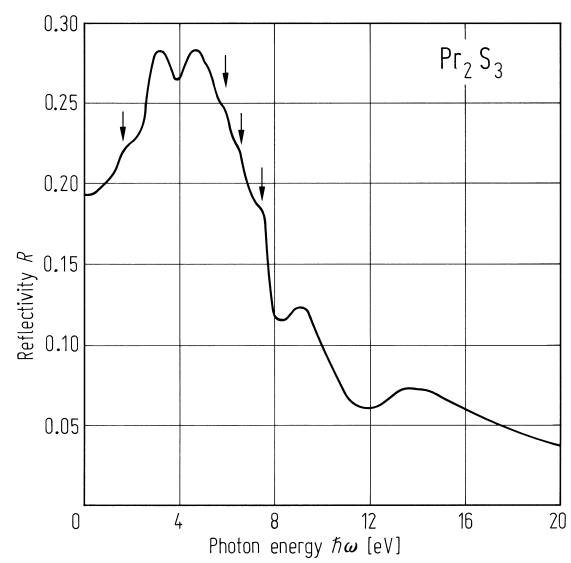


Fig. 3.

γ -Pr₂S₃. Dielectric constants of a single crystal [85Z].

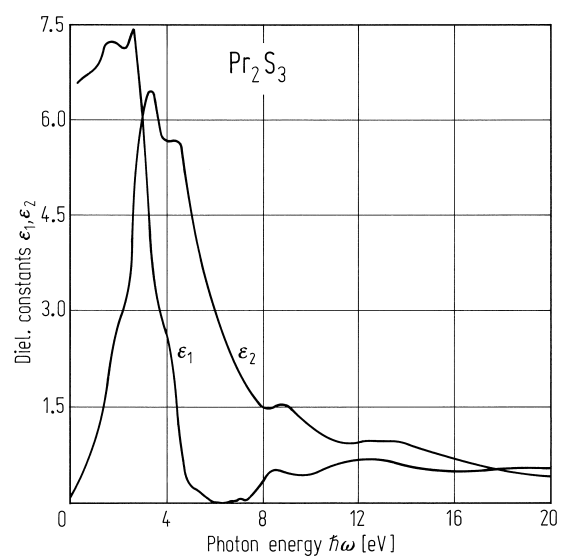


Fig. 4.

γ - Pr_2S_3 . Refractive index n and absorption index k of single crystal [85Z].

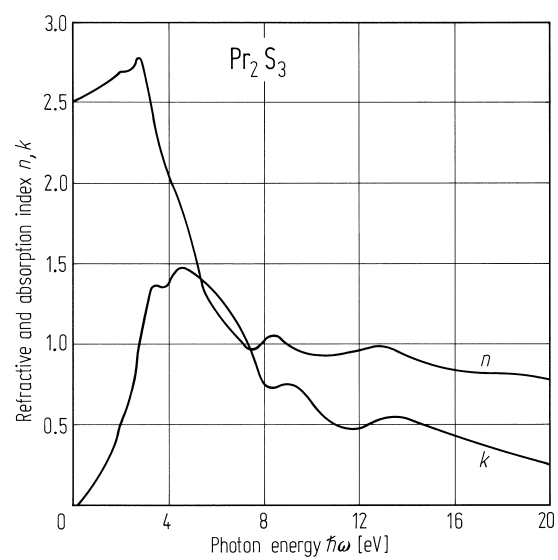


Fig. 5.

γ -Pr₂S₃. Spectrum of Im ϵ^{-1} for a single crystal [85Z].

