

# Anisotropy of Edge Absorption and Photoluminescence of Tetragonal $ZnP_2$ and $CdP_2$ Single Crystals

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Short Notes

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Optical properties of zinc and cadmium diphosphide at the fundamental absorption edge are little investigated (1 to 5). The earlier works were performed on imperfect samples and with non-polarized light preventing the character of electronic transitions at the minimal interband energy gaps to be established, and their energy values ( $E_{g \text{ ind.}}$ ,  $E_{g \text{ dir.}}$  - see Table 1) to be determined.

In the present paper the edge absorption spectra (293 and 77 °K) and photoluminescence spectra (77 °K) of zinc and cadmium diphosphide single crystals were studied in polarized light ( $\xi \parallel c$  and  $\xi \perp c$ , Fig. 1 to 3). The samples were cleaved in the form of thin plates or bulk crystals from single crystals grown from the vapour phase.

Table 1

The minimal energy gaps, due to the indirect ( $E_{g \text{ ind.}}$ ) and direct ( $E_{g \text{ dir.}}$ ) transitions for tetragonal  $ZnP_2$  and  $CdP_2$  single crystals

com- pound	type of the tran- sition	polari- zation	energy band gaps (eV)		$\beta = \Delta E / \Delta T$ (eV/deg)
			293 °K	77 °K	
$ZnP_2$	$E_{g \text{ ind.}}$	$\xi \parallel c$	1.85	1.90	$-2.3 \times 10^{-4}$
		$\xi \perp c$	1.65	1.70	$-2.3 \times 10^{-4}$
	$E_{g \text{ dir.}}$	$\xi \parallel c$	2.18	2.30	$-5.5 \times 10^{-4}$
		$\xi \perp c$	2.18	2.30	$-5.5 \times 10^{-4}$
$CdP_2$	$E_{g \text{ ind.}}$	$\xi \parallel c$	1.65	1.70	$-3.7 \times 10^{-4}$
		$\xi \perp c$	1.55	1.64	$-4.2 \times 10^{-4}$
	$E_{g \text{ dir.}}$	$\xi \parallel c$	1.92	2.11	$-8.6 \times 10^{-4}$
		$\xi \perp c$	1.92	2.11	$-8.6 \times 10^{-4}$