

621.315.592

CdTe(111)

In this work the optical properties (reflection and transmission spectra in the range 800-1100 nm, the reflection and transmission spectra in the range 1.4 - 25 μm and photoluminescence spectra at $T = 5$ K in the energy range 1.35 - 1.7 eV) high-resistance CdTe (111) single crystals with a resistivity $\rho = 10^9 - 10^{10}$ Ohm cm are investigated. The fundamental optical transition E_0 for CdTe at 300 K is 1.44 eV, and the temperature coefficient changes bandgap $\frac{dE_g}{dT}$ equal $-5.32 \cdot 10^{-4} \frac{\text{eV}}{\text{K}}$ was determined. Energy relaxation time τ ($\tau = 1.01 \cdot 10^{-14}$ s.) and the effective optical mobility μ_{opt} ($\mu_{opt} = 206.45 \text{ m}^2/\text{V s}$) of free charge carriers were calculated.

Keywords: spectroscopy, reflection, transmission, optical density, photoluminescence, CdTe.

CdTe

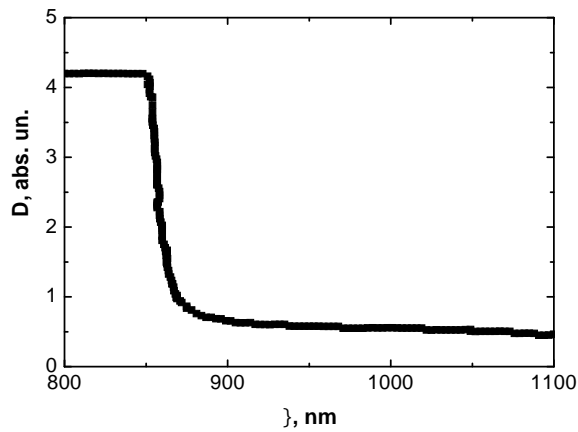
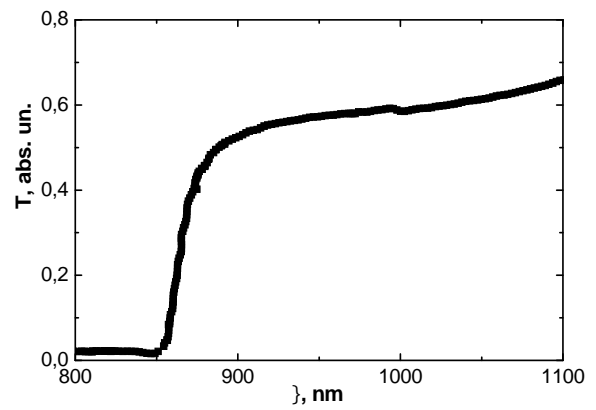
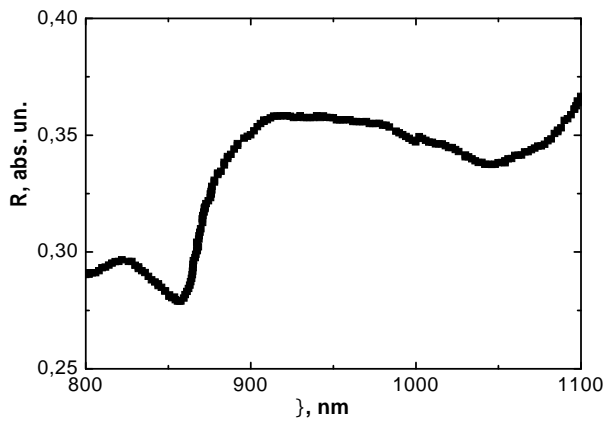
[1].

CdTe,

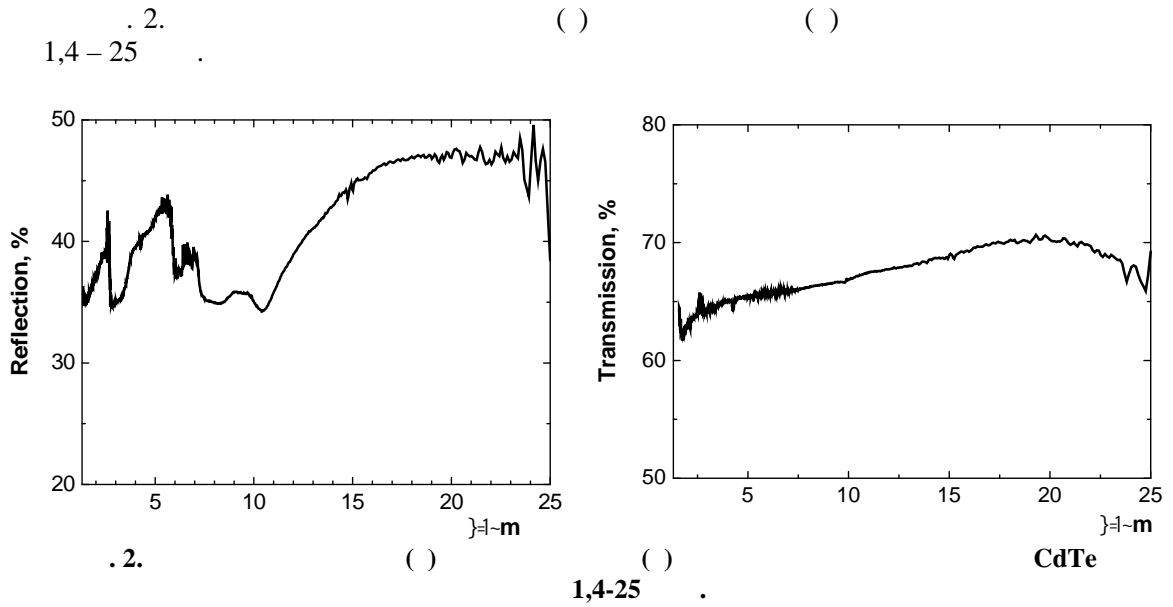
[2].

2 6,

CdTe ()
 CdTe (111) (800-1100)
 -23.
 1,4-25 BXII. "Perkin Elmer" Spectrum
 -Ne (-
 -62 (-23).



.1. () () ()
 CdTe
 (CdTe (111) = 10^9-10^{10})
 .1. () () ()
 CdTe, 10^9-10^{10}



929 910

CdTe (= 1,44)

1,43 [3],

d n-

[1] 1,47

300

[5] 1,5

t (E · t)

$\Gamma = \frac{\hbar}{\tau}$

$$\tau_{opt} = \frac{e\hbar}{m^*\Gamma}, \tag{1}$$

$$\frac{1}{m^*} = \frac{1}{m_e} + \frac{1}{m_p}, \tag{2}$$

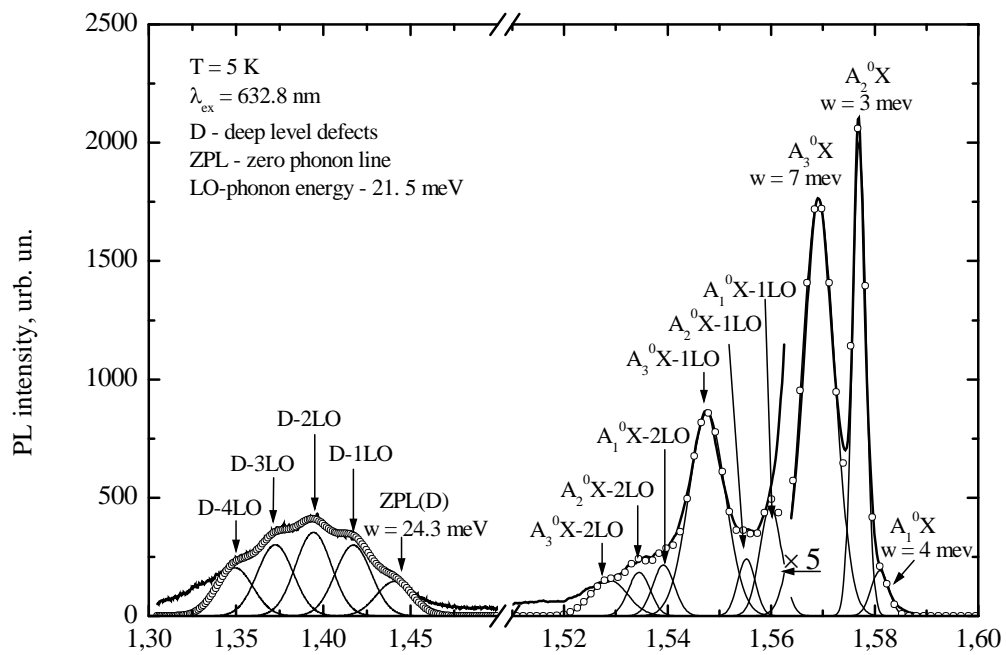
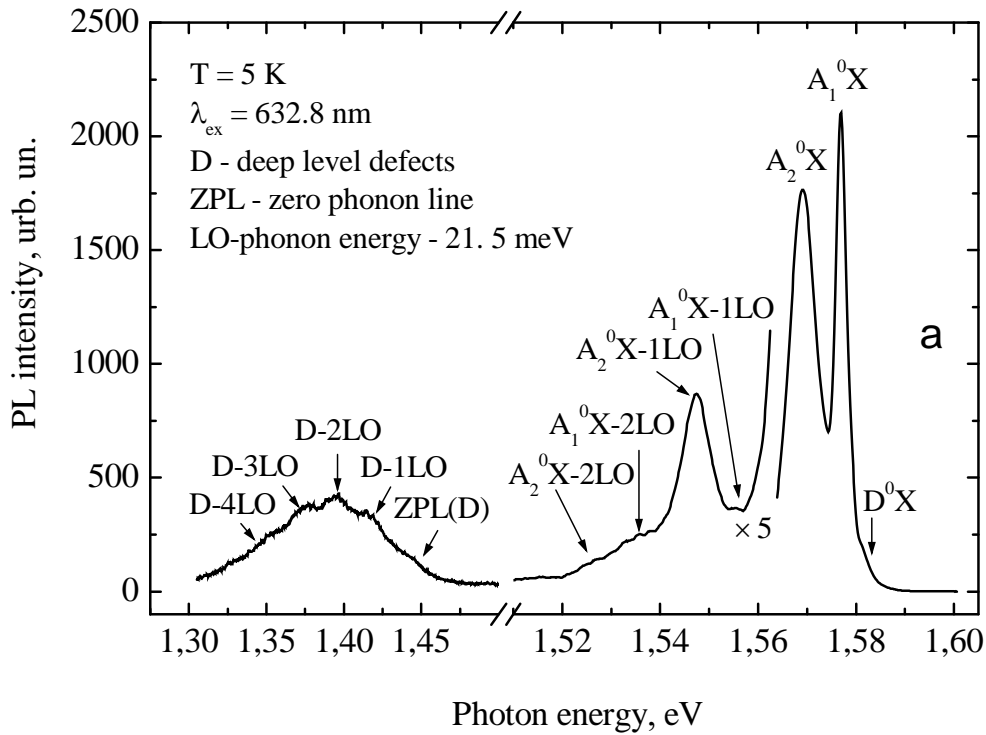
; $m_e = 0,11 m_0$; $m_p = 0,40 m_0$.

[5; 6].

$1,01 \cdot 10^{-14}$

206,45 $\frac{2}{\dots}$

$$R = \frac{(n-1)^2 + t^2}{(n+1)^2 + t^2} \quad (3)$$



.3.

CdTe:

(d) : (R), () -

$$T = \frac{(1-R)^2 e^{-rd}}{1-R^2 e^{-2rd}}, \quad (4)$$

$$r = \frac{1}{d} \ln \frac{2TR^2}{-(1-R)^2 + \sqrt{(1-R)^4 + 4T^2 R^2}} \quad (5)$$

α , χ :

$$r = \frac{4ft}{\dots} \quad (6)$$

ε₂ n ε: χ, ε₁

$$v_1 = n^2 - t^2 \quad (7)$$

$$v_2 = 2nt \quad (8)$$

(. 1, 2)

D (D = ln 1/T) ,

$$D = r \cdot d.$$

0,8-25) CdTe (-)

X, D₀ ,

D₀.

(. 3) (. 3).

$$1^0 -1LO, 1^0 -2LO, 2^0 -1LO, 2^0 -2LO$$

1⁰, 2⁰, 1⁰, 2⁰ Au Cu

V_{Cd}.

(-). :

1. S (1⁰) = 2;
2. S (2⁰) = 0,1;
3. S (3⁰) = 0,6;
4. S (D) = 2

800-1100 ,
 $E_0(\text{CdTe}) = 1,5997 - 5,32 \cdot 10^{-4} \frac{eB}{K} T$
 = 300 CdTe
 CdTe
 $5,32 \cdot 10^{-4} \frac{eB}{K}$
 (= $1,01 \cdot 10^{-14}$)
 $\sim_{opt} (\sim_{opt} = 206,45 \frac{2}{})$
 800-1100 , (1,4-25
 5 1,35-1,7)
 () ,

1. , . . . : - /
2. , . . . , - : « », 2000. – 200 . /
CdTe : . /
3. , „ , . . . , - / - ,
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