CMT 18P THE BEHAVIOUR B - EXCITON n=1 SERIES OF THE MONOCLINIC DIPHOSPHIDE ZINC IN THE ELECTRIC FIELD OF SHOTTKY BARRIER

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The Wannier — Mott excitons have been discovered in absorption spectra of β-ZnP_2 crystals and examined in detail. Due to low symmetry of crystals and, also, crystal field splitting the Wannier — Mott excitons are observed as few series of electric dipole allowed and forbidden transitions [1,2]. Moreover, the fine structure of hydrogen-like states with great oscillator strength placed near to the long wave side of the exciton spectrum appears inside ~20 nm wave range.

The results of examinations of hydrogen-like states in the absorption edge of β-ZnP_2 in the electric field of Shottky barrier are presented in the work. The research has been performed on ITO- β-ZnP_2 using the spectral dependencies of photocurrent at the temperature 80K.

The photocurrent shape lines of the resonance states reflect the spectral distribution of absorption coefficient. The latter is a consequence of a weak dependence of the photocurrent equations on the width of space charge region W at the conditions: $\alpha W<<1$ or $\alpha W>>1$, where α is the absorption coefficient of light. In this case the measurement of dependence of the absorption coefficient on the electric field of the barrier (or on bias applied to barrier) becomes feasible one. The significant broadening of photocurrent lines is due to great values of the electic field near boundary between metall and space charge region (without bias ~10^4 V/cm). The behaviour of excitonic line $C_{n=1}$ in electric field until 2 10^4 V/cm is similar to 1s state of exciton in ZnS [3]. The Stark shift is essentualy different on quadratic law and changes the signum in preionization's field. At the same range of electric field, the quadratic Stark effect, which is characterized for triplet states is observed at the spectral band of n=1 B — exciton series. The dependences of split energies of the state converge 1.545eV at the extrapolation to weak field. The coefficients of field dependencies of energy bands for the splitted states 0, +1, -1 are -(2.05, 1.66, 4.0)$\cdot 10^{-16}$ eV$\cdot$m^2/V^2 accordingly. The line contours for the photon energies E<1.525 eV and small bias applyed to barrier are not visible because of more intensive n_o=4 line of bielecton — impurity complex (BIC)[4], the position and intensity of which weakly changes at variation of electric field. The n_o=4..11 BIC — lines coincide with the reverse hydrogen-like dependence. The field shifts of these lines are not more than 0.01 meV, and the most pronounced lines n_o=5, 6 experience small shift to high energy side. The correlations between behaviour of photocurrent lines in electric field and above mentioned regularities are observed for the reflection spectra in electric barrier field. The whole photocurrent spectrum is shifted about 0.3 meV with respect to the reflection spectrum at the same bias applyed to barrier. This is due to fact that the reflection spectra were measured at the maximum of electric boundary barrier field, while the photocurrent spectra was observed at any «average» field.

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