# INVESTIGATION OF THE INFLUENCE OF THE CONFINEMENT EFFECT ON THE YIELD OF LUMINESCENCE IN QUANTUM DOTS OF CDSE AND CDTE

*D.H. DAURENBEKOV, T.N. NURAKHMETOV, B.M.SADYKOVA*, ZH.M. SALIKHODZHA, A.M. ZHUNUSBEKOV, A.ZH. KAINARBAY , K.B.ZHANYLYSOV*

*L.N. Gumilyov Eurasian national university, 13, Kazhymukana street, Astana, 010000, Kazakhstan, batsaiy_s@mail.ru, +77172709500*

In CdSe and CdTe quantum dots (QDs), the width of the forbidden band increases with decreasing size and discrete energy levels appear at the edge of the bands. We note that the energy difference between the edges of the energy levels increases with size decreasing. As a consequence of quantum confinement, the width of the forbidden band of a semiconductor nanocrystal (NCs) becomes larger with decreasing size, and for dimensionality $D^{-2}$ we can neglected by the Coulomb interaction. Also, discrete energy levels (with different quantum numbers) appear at the edges of both the conduction band and the valence band. In practice, this means that the optical width of the forbidden band of QDs can be controlled by simply changing their size.

It is important to note that the Bohr radius of the exciton $a_0$ provides a very effective relationship with the estimation of the effect of quantization on the properties of a semiconductor in a QD. As mentioned above, confinement begins to affect the wave function of the exciton, when the QD size approaches $a_0$.

This means that the manifestation of the quantum confinement effect will occur for different sizes of QDs for different semiconductors, since the Bohr`s radius of the exciton $a_0$ varies widely due to the high variability of semiconductor materials. It should be noted that $a_0$ and the width of the band gap Eg correlate, so that materials with narrower *Eg* have large $a_0$ (for example, *Eg* and $a_0$ for PbSe 0.26 eV and 46 nm, 1.75 eV and 4.9 nm for CdSe and 3.7 eV and 1.5 nm for ZnS) and thus, significant quantum confinement occurs at large nanostructure sizes.

The dependence of the energy yield of the luminescence on the wavelength of the exciting light obeys Vavilov's law. According to which the energy output initially increases in proportion to $\lambda_{exc}$, then it remains constant and after reaching a certain boundary wavelength, it falls off sharply.

There is a proportionality of the energy yield of the luminescence to the wavelength of the absorbed light, which means that the quantum yield of the luminescence in a certain spectral interval is constant. But as we know for QDs, when the size changes, the spectral position of the luminescence shifts to the form of the quantum-size effect. Since a particular spectral interval is always investigated, the relationship between the quantum-size effect and the yield of luminescence is revealed.

The question of the influence of confinement effect on the yield of luminescence remains open. To a greater extent this process is not studied. The study is in the field of increasing the yield of luminescence in the NCs, and the relationship of processes is not described.

In this paper we investigate the influence of the quantum-size effect on the yield of luminescence in the QDs CdSe and CdTe. The optimum QDs size of CdSe, CdTe is established to obtain the largest quantum yield of luminescence.