**The splitting of exciton states in germanium/silicon nanosystem with germanium quantum dots: Theory**

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 It is shown that electron tunneling through a potential barrier that separates two quantum dots of germanium leads to the splitting of electron states localized over spherical interfaces (a quantum dot – a silicon matrix). The dependence of the splitting values of the electron levels on the parameters of the nanosystem (the radius *a* quantum dot germanium, as well as the distance *D* between the surfaces of the quantum dots) is obtained. It is shown that, the splitting of electron levels in the QD chain of germanium causes the appearance of a zone of localized electron states, which is located in the bandgap of silicon matrix. It was found that the motion of a charge-transport exciton along a chain of quantum dots of germanium causes an increase in photoconductivity in the nanosystem [1, 2]. The effect of increasing photoconductivity can make a significant contribution in the process of converting the energy of the optical range in photosynthesizing nanosystems.

It has been established that comparison of the splitting dependence Δ$E\_{ex}$(*a*, *D*)$ $of the exciton level $E\_{ex}\left(a\right)$ at a certain radius *a* QD with the experimental value of the width of the zone of localized electron states arising in the QD chain of germanium, allows us to obtain the distances *D* between the QD surfaces [1, 2].

It has been shown that by changing the parameters of Ge/Si heterostructures with germanium QDs (radii *a* QD germanium, as well as the distance *D* between the surfaces of the QDs), it is possible to vary the positions and widths of the zones of localized electronic states. The latter circumstance opens up new possibilities in the use of such nanoheterostructures as new structural materials for the creation of new nano-optoelectronics and nano-photosynthesizing devices of the infrared range [1, 2].

1. Sergey I. Pokutnyi, Physica Status Solidi B, Vol. **257**, No. 7, p. 2000221 (2020).
2. Sergey I. Pokutnyi, Physica B: Phys. Condensed Matter, Vol. **601**, p. 412583 (2021).