New method to study semiconductor nanoparticles

Scientists of Siberian Federal University and Kirensky Institute of Physics of the SB RAS have applied a new method for studying nanoparticles from cadmium and tellurium. They used the peculiarity of this compound that its interaction with light varies depending on magnetic field. Indicator, information and service portal devoted to science, wrote about the research. The paper with the results was published in the journal Physics Letters A.

The interaction of certain substances with electromagnetic radiation depends on magnetic characteristics of medium. In particular, there is such an effect of magnetic circular dichroism, in which the absorption of light from different circular polarizations is different if it moves along the direction of the magnetization of the medium. The magnetization can be caused both by the properties of the substance itself (in the case of ferromagnets) and by the action of an external magnetic field.

Physicists from SibFU are engaged in the formation of structures from colloidal (suspended in the medium, in this case — water) quantum dots.

"*Since these are very small objects — the size of quantum dots is about three nanometers - the structures that are obtained from them are also very small,*" — explains the co-author of the work, **Alexei Tsipotan**. — *After the experiments and the formation of structures, they must be studied. There are such methods as electron microscopy or optical spectroscopy. However, in the case of electron microscopy, it is necessary to first deposit the object on a substrate, as a result, a different structure may appear.*"

While developing a new method, an idea to use the effect of magnetooptics for the study of structures without additional modifications has occurred. It turned out that the used colloidal nanoparticles are characterized by the effect of magnetic circular dichroism. This aspect makes it possible to use methods based on it to study the forming structures. Particles from cadmium and tellurium do not have intrinsic magnetization, so the effect occurs only in the case of an external magnetic field.

"*The prospective spectrum of applications of colloidal quantum dots is huge,*" — **Mr. Tsipotan** sums up. — *The main thing is that they are very good luminophors — the quantum yield of luminescence is at the same level as the dyes, but they are more photostable, that is, they do not «burn out» under the sunlight. Due to this property, they can be used as light-emitting elements of photodiodes. Also, they can be used in solar cells to convert sunlight more efficiently. Another area of their possible applications is biology, where quantum dots can be used as labels. Moreover, recently Samsung manufactured a TV in which quantum dots were added to light emitting diodes.*"

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