

LUMINESCENT QUANTUM DOTS AS LABELS FOR IMMUNOASSAY

Goryacheva I.Yu., Novikova A.S., Sobolev A.M., Drozd D.D., Ponomaryova T.D.

*Saratov State University, Chemistry Institute, Saratov, Astrakhanskaya, 83,
E-mail: goryachevaiv@mail.ru, 410012*

The presentation is devoted to the synthesis and application of semiconductor quantum dots (QDs) as well as labels multiloading with QDs as luminescent labels for immunoassay. The properties of nanoparticles, which determine the possibility of their effective usage, the methods of synthesis, hydrophilization and modification, variants of immunochemical methods based on luminescent nanoparticles for the determination of various types of analytes are discussed. The constraints imposed by the properties of the labels are considered in details.

In recent years QDs' applications in immunoassays can be mentioned as one of the most extensive area of bioassay labeling. Various types of QDs such as InP, InAs, GaAs, GaN, CuInS₂, etc. were synthesized for different research applications, as well as QDs comprising more heavy atoms such as CdTe, HgSe or PbSe. However, the most popular core for bioassay application is CdSe because different sized dots emit light across the whole visible spectrum. QD diameter can be selected to achieve emission of a variety of colors. Shelling of cores with higher band gap inorganic materials improved the photoluminescent quantum yields by passivation of the surface nonradiative recombination sites.

QDs application is based both on the direct photoluminescence measurements as well as on the energy transfer with different composition of FRET pairs. Examples of the QDs applications in the analysis are presented; the prospects of rapid tests, as well as modifications of classical methods are discussed.

This work was supported by the Ministry of Science and High Education (project 4.1063.2017 / 4.6).