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Luminescent organic nanoparticles doped with Europium β-diketonate complexes

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The report is devoted to methods of the development of luminescent organic nanoparticles doped with Europium β-diketonate complexes, which are used in Immunofluorescent assay (IFA). Rare-earth elements (REE) (III) have several advantages of their photophysical characteristics, which are: a large Stokes shift, long luminescence life, narrow emission bands, and immutability of their position regardless of the ligand environment. IFA with time delay (60-1000 μs) makes it possible to exclude the background influence of the intrinsic luminescence of the biological material and substrate materials (plastics of the plate), so that the sensitivity of the analysis increases significantly. The basis of IFA is labeling of biospecific interaction - antigen-antibody system - with luminescent label (Image 1a). The main way to increase the sensitivity, speed andavailability of IFA is a nanotechnology based biochipping. Biospecific interaction labeling with nanoparticles increases sensitivity by orders of magnitude and carry out Simultaneous detection of dozens of pathogen species in one well of the plate. Development of nanoparticles for IFA nowadays is one of the priority areas of the biomedical research. The aim of this work was the development of fluorescent nanoparticles doped with Europium β-dichetonate complexes for medical and biological applications. As a result of the syntheses in System: styrene - divinylbenzene - methacrylic acid - complex, Fluorescent nanoparticles of medium size from 43 to 160 nm are obtained. The implementation of such an assay is based on the use of lanthanide complexes, most often - Europium complexes with naphthoyltrifluoroacetone (NTA) as well as other ligands of a number of β-diketones (Image 1b). Dependences of the size of the obtained particles on the amounts of the introduced complex - emulsifier (SLS) - the process temperature were revealed. The luminescent spectral characteristics of nanodispersions were studied, and the specific luminescence of the particles was determined.

Image 1a: Biospecific interaction labeled with luminescent nanoparticles
1b. Ligands for new Europium ß -diketonate complexes doped into NPs.

Biography

Olga Loginova is a young encouraged scientist. Her field of scientific interests is Nanochemistry, Chemistry of polymers, Rare earth chemistry, Organic synthesis of reagents for the clinical diagnosis of diseases and pathologies. Olga is also a teacher of chemistry both in the secondary school and in the university, she is also curator of students of Biology and Chemistry faculty at MRSU, Moscow. Olga is a lecturer at Small Academy of the Moscow Region, Section "Biology and Chemistry", where she conducts lectures for gifted schoolchildren about use of nanotechnology in medicine. Olga`s goal is to develop inexpensive effective reagents for the clinical analysis of diseases and pathologies as well as methods for rapid sensitive analysis.

Nikolai Vasiliev is doctor of chemical sciences, professor and head of department of theoretical and applied chemistry at MRSU. He is an outstanding specialist шт organoelement chemistry (chemistry of fluorine), chemistry of analytical reagents, supramolecular chemistry, nanochemistry and nanotechnology, synthesis and study of new complexes of rare earth elements for immunofluorescence analysis.

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