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Theoretical Investigations of Nano-sensors for Radiation Processes

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Abstract

Problem of fixing radiation sources occurs in case of environmental contamination by radionuclides. Because of low concentrations their detection is connected with difficulties. At the same time, long-term exposure of radiation sources, even at their low concentration, brings to essential changes in biological processes.

Possibilities of modern technical registration facilities may be used during investigation radiation sources, when their concentration is low. For

example, very weak luminescence, virtually single photons may be registered in optical range. Concentration of radionuclides in liquid media may be increased with the help of synthetic or natural adsorbents.

Application of optical methods of registration allows using sensors, based on registration of the photons.

The processes passing in investigated system can be divided in two groups. First group - charge transfer and phototransfer processes in condensed medium between the particles and between electrode and particle. Second group - processes of electron excitation of separated particles, electron excitation energy transfer between the particles in condensed medium.

Analytical expressions for rate constant and kinetic parameters of charge transfer processes and electron excitation transfer processes between impurity particles are obtained. A dipole moment of transfer may be calculated when known distribution function of reagents and transfer interval being rather substantial during investigation of complicated systems can be evaluated.

This work is continuation of the works carried out in frames of international project GR 77. Theoretical and experimental investigations of some types of

nano-sensors for biological objects were conducted in these works.

Keywords

Nano-sensor **Radiation** **Photon**

Charge transfer **Energy transfer**

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