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Undoped and Tb-doped cerium fluoride nanoparticles: excitation energy transfer to chlorin e_6 photosensitizer

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Radiodynamic therapy (RDT) is a novel approach for the treatment of cancer and is currently intensively studied. To be appropriate for using in RDT, the sensitizer should be able to generate singlet oxygen under X-rays excitation. For this the nanosystems (NS) developed as potential sensitizers should contain scintillator part excited by the X-rays and sensitizer part generating the singlet oxygen; electronic excitation energy transfer (EEET) from the former to the latter should take place. Cerium fluoride nanoparticles (NP) are possible candidates to be used as scintillator part of the developed NS for RDT. Recently we have studied EEET processes and pathways in the NS containing Tb-doped $Ce_{0.85}Tb_{0.15}F_3$ NP and chlorin e_6 photosensitizer assembled with the help of the cetrimonium bromide (CTAB) shell [1]. It was shown that excitation of Ce^{3+} ions results in EEET from both Ce^{3+} and Tb^{3+} ions to chlorin e_6. At the same time, Tb^{3+} ions themselves obtain their excitations from Ce^{3+}; these excitations could have been otherwise transferred from Ce^{3+} directly to chlorin e_6. Thus the question about the positive or negative influence of Tb-doping of cerium fluoride NP on the total efficiency of EEET to chlorin e_6 is an intriguing question. Here we compare EEET processes in CeF_3-CTAB-chlorin e_6 and $Ce_{0.85}Tb_{0.15}F_3$-CTAB-chlorin e_6 nanosystems.

1. *Losytskyy M. Yu., Kuzmenko L. V., Shcherbakov O. B., Gamaleia N. F., Marynin A. I., Yashchuk V. M.* Energy Transfer in $Ce_{0.85}Tb_{0.15}F_3$ Nanoparticles-CTAB Shell-Chlorin e_6 System // Nanoscale Res Lett.-2017.-**12**.-294.