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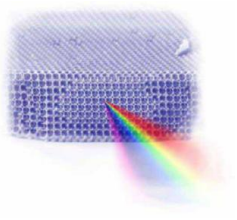

Book of Abstracts

17th Photonics Workshop

(Conference)

PHOTONICS
CENTER

17th Photonics Workshop (2024)

Book of abstracts

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Selective in vitro labeling of cancer cells using NaGd0.8Yb0.17Er0.03F4 nanoparticles

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Abstract. Cancer represents one of the leading problems of today, with clinical detection oftentimes being difficult, currently based on imaging techniques, such as X-ray, computed tomography (CT) and magnetic resonance imaging (MRI). However, mortality rate is often reduced by early detection, therefore much focus has been directed towards developing methods for early detection of the disease. Recent research in the field of nanotechnology is focused on the use of nanoparticles, particularly Lanthanide-doped up-conversion nanoparticles (UCNPs), for the detection of cancer cells using near infrared (NIR) fluorescence microscopy. The reason for this is that in long-term tracking tests, near-infrared (NIR) light, has lower phototoxicity and higher tissue penetration depth in living systems as compared with UV/VIS light. In this research, $NaGd_{0.8}Yb_{0.17}Er_{0.03}F_4$ UCNPs were prepared by solvothermal synthesis in the presence of chitosan, a ligand which enables UCNPs biocompatibility and the specific antibody conjugation. Morphological and structural characterization of synthetized UCNPs were performed based on X-ray powder diffraction (XRPD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR) and photoluminescence spectroscopy (PL). Results confirmed the presence of the cubic phase with a minor portion of hexagonal phase in nanoparticles. Synthesized nanoparticles were conjugated further with anti-human CD44 antibodies, labeled with fluorescein isothiocyanate (FITC), which signal is used for confirmation of nanoparticles positioning in cells. Such obtained conjugates were successfully used for selective *in vitro* biolabeling of oral squamous cell carcinoma cells.