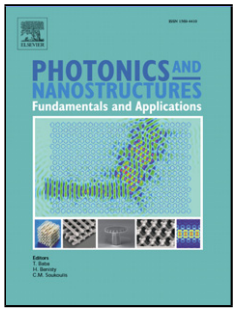

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Tuning light concentration inside plasmonic core-shell nanoparticles during laser irradiation

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HIGHLIGHTS

- The intensity distributions of optical (laser) radiation with wavelengths in the range of 180 - 540 nm concentrated during irradiation inside spherical two-layered core-shell nanoparticles with the core radii in the range 10-30 nm and shell thicknesses range 5-40 nm are investigated.
- The effect of extreme light intensity concentration exists in different areas inside plasmonic core-shell nanoparticles with localizing light at the nanoscale for the selected values for nanoparticle sizes and radiation wavelengths.

Abstract Computer modeling was carried out of the intensity distributions of optical (laser) radiation with wavelengths in the range of 180 - 540 nm concentrated inside spherical two-layered core-shell nanoparticles with the core radii in the range 10-30 nm and shell thicknesses range 5-40 nm during irradiation. Different metals and oxides are used for core and shell materials of nanoparticles. Novel effect of light localizing at the nanoscale inside spherical two-layered core-shell NPs has been established on the base of computer calculations in the frame of the theory of diffraction of electromagnetic radiation on multilayer sphere. Light intensity concentrates in shadow hemisphere of core-shell NPs for the selected values of nanoparticle sizes and radiation wavelengths. These results can be applied in nanophotonics for construction of novel plasmonic devices and photonic components, and for different applications of the core-shell nanoparticles.

Keywords: nanoparticles, core-shell, laser irradiation, internal intensity concentration