

Hexagonal phase unconversion nanoparticles for cancer photodynamic therapy and imaging

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Lanthanide ions-doped upconversion nanoparticles (UCNPs) exhibit unique luminescent properties, including the ability to convert NIR long-wavelength excitation radiation into shorter visible wavelengths through a process known as photon upconversion, which can further activate the photosensitizers (PSs) attached on nanoparticles to produce ROS. The advent of UCNPs would open a new gate for full utilization of currently commercial available PSs upon NIR irradiation. UCNP-based PS carriers have a small and tunable size, while exhibiting thermodynamic and kinetic stability in vivo, a high PSs-conjugating capacity, and good biocompatibility. In this study, UCNPs were synthesized by thermal decomposition method to investigate the photoluminescence efficiency according to size and shape. Their surface modification was conducted for PDT application. In addition, the physicochemical properties and PDT effect of surface-modified UCNPs were investigated.