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Light-Responsive Gold Nanoparticles for Tumour Theranostics

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Abstract

Gold nanoparticles (AuNPs) as potent theranostic agents have extensively been studied for photothermal therapy, radiosensitization, and photoacoustic (PA) imaging of cancers. Spatiotemporally manipulating the aggregation behavior can effectively improve the photothermal efficacy, radiosensitization and imaging capability of small AuNPs in vivo. Herein, we for the first time demonstrated that AuNPs decorated with photolabile diazirine moieties could form covalently cross-linked aggregates upon laser irradiation (λ = 405 nm). Both in vitro and in vivo studies indicated that the light-triggered assembling remarkably shifted the surface plasmon resonance of Au particles to near-infrared regions and prolonged the residence time of AuNPs within tumors, which in consequence effectively enhanced the efficacy of photothermal therapy, radiosensitization, and sensitivity of photoacoustic imaging of tumours. We thus believe that the light-triggered crosslinking strategy may offer a valuable approach for improving the theranostic efficacies of functional NPs.

Keywords: Gold nanoparticles; Light-responsive; Photothermal therapy; Radiosensitization; Photoacoustic imaging