ABSTRACT

A gold–chitosan composite with low symmetry zinc phthalocyanine for enhanced singlet oxygen generation and improved photodynamic therapy activity

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Novel zinc(II) 3-(4-((3,17,23-tris(4-(benzo[*d*]thiazol-2-yl)phenoxy)phthalocyanine-9-yl)oxy)phenyl)propanoic acid (complex **3**) was synthesised. Complex **3** was subsequently reacted with gold nanoparticles (AuNPs), chitosan (CT) and a gold–chitosan (AuCT) hybrid to form **3**-AuNPs, **3**-CT and **3**-AuCT, respectively. The conjugates afforded a decrease in fluorescence quantum yield with a corresponding increase in the triplet and singlet quantum yields compared to complex **3**. The *in vitro* dark cytotoxicity and photodynamic therapy activity (PDT) of complex **3** and **3**-AuCT composites were investigated against epithelial breast cancer cells (MCF-7) with both the samples showing minimum dark cytotoxicity. They both accounted for a cell viability of ≥90% at a concentration of ≤59.2 μg mL^{-1}. **3**-AuCT showed better PDT activity (compared to **3** alone) with less than 50% viable cells at a concentration of ≥29.6 μg mL^{-1} making it potentially applicable for PDT. On the other hand, AuCT displayed some activity against cancer cells, probably due to photothermal activity since gold is a light absorber, however it had more than 50% viable cells at a concentration of ≤59.2 μg mL^{-1}.