

C₆₀-Photosensitizer Based on Au Nanoparticles

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Introduction

Recently, it has been demonstrated that C₆₀ is a powerful photosensitizer for the production of singlet oxygen. When crosslinked with Gold nanoparticles, the composition exhibited unique light-absorption, emission and quantum yield of singlet oxygen. The C₆₀ attached on Au nanoparticles stabilized with amino group in toluene solution. When the C₆₀ moieties are tethered onto Au nanoparticle surfaces, the main absorption peak is found at 340 nm, and a small peak can be found at 416 nm for the Au-C₆₀ nanocomposites, which corresponds to the electronic transition at 410 nm observed with C₆₀. The small red-shift arises from the saturation of one of the double bonds of the C₆₀ by the amination reaction. After irradiated by laser pulse, it will generate singlet oxygen.

Up to now, few report about Au-C₆₀ nanocomposite application in photosensitizer. This offers a new way synthesis new photosensitizers based on nanocomposite materials.

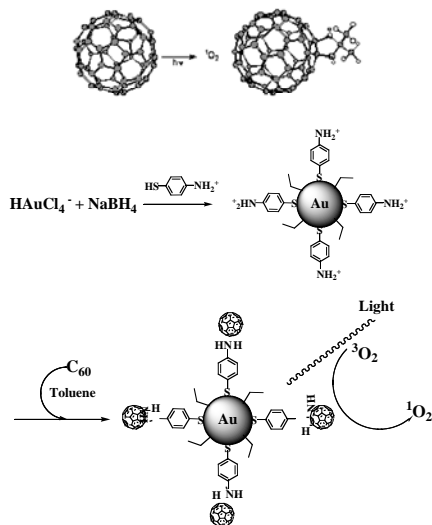


Figure 1. Synthesis of Au-C₆₀ nanocomposites and schematic of production of singlet oxygen by Au-C₆₀ nanocomposite

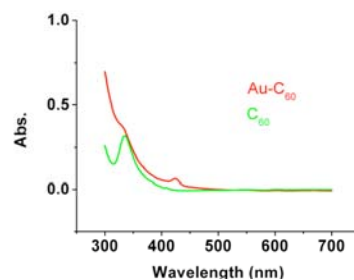


Figure 2. UV-visible absorption spectra of Au-C₆₀ nanocomposite and C₆₀. The sample were all dissolved in benzene.

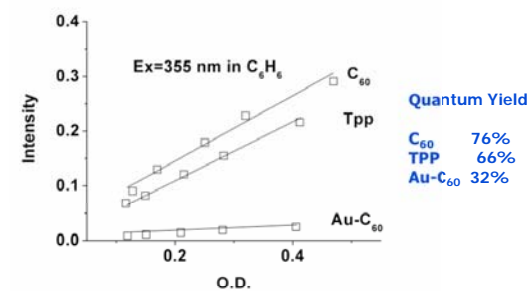


Figure 3. Relative intensity of singlet oxygen production vs absorbance for C₆₀, TPP and Au-C₆₀.

Results and discussion

The strong affinity of C₆₀ to amine moieties of Gold nanoparticles was exploited to assemble Au nanoparticle-C₆₀ composite.

The Au nanoparticle-C₆₀ were shown to effectively generate singlet oxygen as compared to the free C₆₀.

The results suggest that these nanocomposite has potential as a useful vehicle for the delivery of photosensitizer agents in photodynamic therapy .

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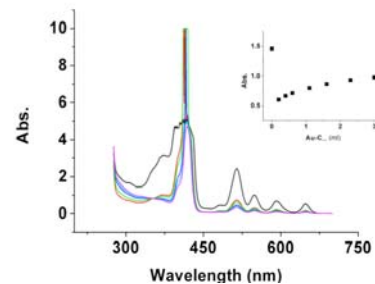


Figure 3. Effect of TPP concentration on the changes in absorption spectrum of Au-C₆₀ in Benzene. Inset shows the calibration curve of Au-C₆₀ nanocomposite concentration on absorption at 355 nm.