Synthesis of Au Nanoparticles Assisted by Linker-Modified TiO2 Nanoparticles

Ortiz P.D.

Castillo-Rodriguez J.

Zarate X.

Martin-Trasanco R.

Benito M.

Mata I.

Molins E.

Schott E.

Plasmonic nanoparticles, especially gold ones, have been widely employed as photosensitizers in photoelectrovoltaic or photocatalytic systems. To improve the system's performance, a greater interaction of the nanoparticles with the semiconductor, generally TiO2, is desired. Moreover, this performance is enhanced when an efficient covering of TiO2 surface by the sensitizer is achieved. The Brust-Schiffrin-like methods are of the most employed approaches for nanoparticles synthesis. In a traditional approach, the reduction of the gold precursor is performed in the presence of a stabilizer (typically a thiol molecule) free in solution. A second step in which the obtained nanoparticles are anchored to the semiconductor surface is necessary in the case of photosensitive applications. Drawbacks like steric hindrance turn more difficult the covering of the semiconductor's surface by nanoparticles. In this paper, we report a variation of this methodology, where the linker is previously anchored to the TiO2 nanoparticles surface. The resulting system is employed as the stabilizer in the gold reduction step. This strategy is carried out in aqueous media in two simple steps. A great covering of the titania surface by gold nanoparticles is achieved in all cases and the gold nanoparticles in the resulting nanoaggregate might be useful for photoelectrovoltaic or photocatalytic applications.