

A novel environmentally friendly method in solid phase for in situ synthesis of chitosan-gold bionanocomposites with catalytic applications

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A novel method to obtain catalytic bio-nanocomposites based on chitosan containing different amounts of gold nanoparticles generated in situ is reported. The formation of gold nanoparticles takes place in solid phase assisted by a heating induced process. This method only involves the use of chitosan biopolymer and a gold salt precursor. Unlike other methods the addition of external reducing and stabilizing agents to generate gold nanoparticles, is not needed because these roles are played by chitosan. Therefore, the striking properties of chitosan (e.g., high functionality, biodegradability and biocompatibility) are profited, in order to design a facile and green route of synthesis. Additionally, the described method allows to vary the amount and size of the gold nanoparticles contained in the bio-nanocomposite by using different gold ion compositions and temperatures of heating process. Finally, the bio-nanocomposite performance as heterogeneous catalyst on the reduction of p-nitrophenol (4-NP) to p-aminophenol (4-AP) as a model system was assessed. The results showed a significant catalytic effect that increases as the content of gold nanoparticles in the bio-nanocomposite also increases.