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C3-SiO2-NH2@Au nanoparticles for Pickering interfacial catalysis

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PURPOSE OF THE ABSTRACT

Ultra-small gold nanoparticles (Au NPs) (? 3 nm) have shown great promise for the catalysis of organic reaction, especially for the oxidation of alcohol [1]. The grafting of ultra-small Au NPs on the surface of amphiphilic silica particles provides new insights into the design and fabrication of Pickering interfacial catalysis system for biphasic reaction [2-4]: amphiphilic silica NPs serve as solid emulsifiers at the oil-water interface to increase the contact area and mass transfer, while the Au NPs on the surface simultaneously act as interfacial catalysts for the catalytic reaction.

Herein, we prepared C3-SiO2-NH2@Au emulsifiers via a two-steps protocol: i) silica NPs were surface-functionalized with propyltrimethoxysilane and (3-aminopropyl)triethoxysilane (APTES); ii) Au NPs were grafted onto the silanes-modified SiO2 particles via an Au / NH2 coupling. The obtained hybrid NPs have been characterized by transmission electron microscopy (TEM) in order to confirm the homogeneous distribution of gold onto the silica surface and their narrow size distribution (1-2 nm).

The ability of C3-SiO2-NH2@Au NPs to form stable Pickering emulsions with oils of different nature has been examined and the resulting systems have been characterized. The oxidation of benzyl alcohol in the presence of H2O2 was studied to evaluate the catalytic performances of the Pickering interfacial catalysis system. The as-obtained C3-SiO2-NH2@Au NPs-stabilized Pickering emulsions will pave ways for providing highly-effective and environmentally-friendly platform for the oxidation of hydrophobic alcohol.

FIGURES

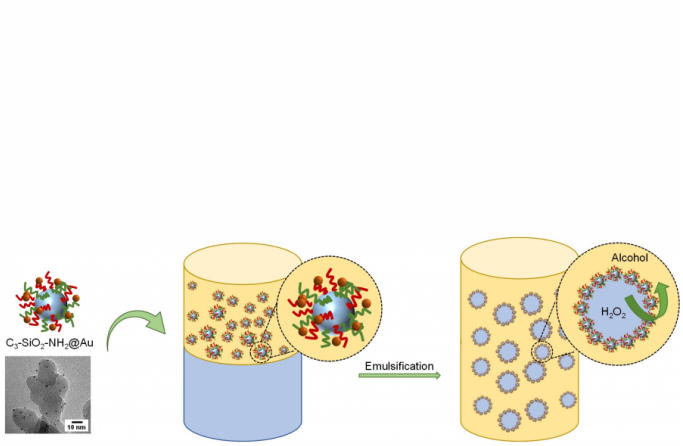

FIGURE 1

Schematic illustration of the preparation of the C3-SiO2-NH2@Au NPs stabilized Pickering emulsion and TEM image of C3-SiO2-NH2@Au NPs (scale bar: 10 nm)

FIGURE 2

KEYWORDS

Pickering emulsion | Gold nanoparticles | Oxidation | Amphiphilic silica nanoparticles

BIBLIOGRAPHY