

Preparation of Silver Nanoparticle-Decorated Nanotubes at Room-Temperature

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In this study, a simple and straightforward method to synthesize metal and metal sulfide nanoparticle-decorated nanotubes is reported. Aqueous metal precursor solutions in a water-organic mixture were transferred to organic phase using phase-transfer agent, and then reduced to metal and metal sulfide nanoparticles under the guidance of the self-assembly of alkylthiol molecules. During the reduction of the precursor solution following solidification, the alkylthiol molecules simultaneously formed cylindrical template that associates with those metal and metal sulfide nanoparticles. Through this simple procedure, one-step preparation of semiconductor nanotubes was achieved at room temperature. A series of concentration control experiments were carried out in order to survey the process of nanotube synthesis. The concentration of alkylthiol was a key factor determining the final structure of the product. These results will provide a advanced synthesis method on the surfactant-based nanotubes decorated with functional nanoparticles.