

Preparation of TiO_2/Ag Janus Nanoparticle from Hybrid Core-Shell inorganic-organic material

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Janus TiO_2 / Ag nanoparticles were compounded with hybrid inorganic-organic material, Titanium dioxide-Poly(ethylene glycol) methyl ether methacrylate (TiO_2 -POEM), as a substrate. First, hydrophilic polymers, poly(oxyethylene methacrylate) (POEM), was grafted from TiO_2 nanoparticles via the surface-initiated atom transfer radical polymerization (ATRP) technique. The hybrid inorganic-organic material was used to substrate the nucleation and growth mechanism of silver nanoparticles by the introduction of an Ag precursor and a NaBH_4 aqua solution reduction process. The polymer chains were successfully grafted from the surface of TiO_2 nanoparticles, and the in situ formation of silver nanoparticles within the hybrid inorganic-organic material was confirmed with TEM, SEM, UV-vis, and Waxes. FT-IR also proofed the selective incorporation and in situ formation of Ag nanoparticles within the hydrophilic organic material, which were mostly due to the stronger interaction strength of the Ag nanoparticles with the carbonyl oxygens of POEM in the hybrid inorganic-organic material. This study shows a simple route for the in situ synthesis of Ag nanoparticles within hybrid inorganic-organic material.