

Supporting materials

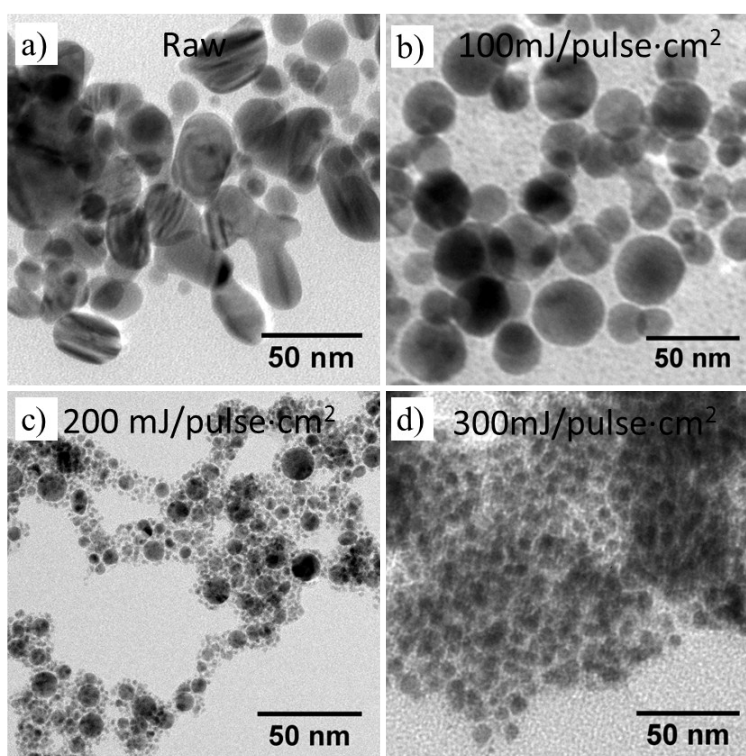


Fig. S1. TEM of Ag nanoparticles under different laser fluences: (a) 0 mJ, (b) 100 mJ, (c) 200 mJ and (d) 300 mJ.

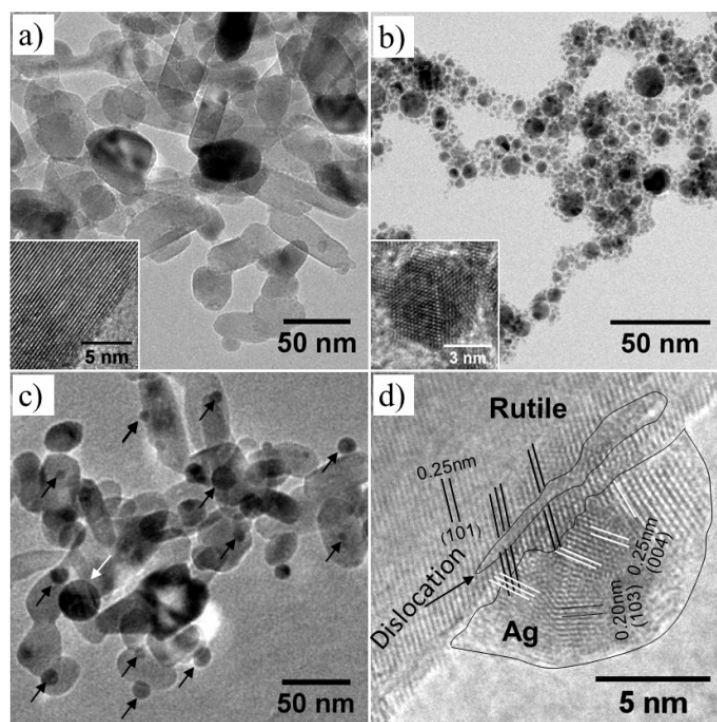


Fig. S2. TEM of raw nanoparticles and as-prepared Ag/TiO₂ (Rutile) nanocomposites: (a) raw TiO₂, (b) preprocessed Ag (200 mJ/pulse·cm²), (c) Ag/TiO₂, (d) HRTEM of Ag/TiO₂. Insets

of (a) and (b) are HRTEMs of raw TiO_2 and Ag nanoparticles. When using the preprocessed Ag nanoparticles ($200 \text{ mJ/pulse} \cdot \text{cm}^2$) as start materials, the Ag particles could also be welded on the surface of TiO_2 particles by one-step and unfocused laser irradiation of Ag and TiO_2 dispersions.

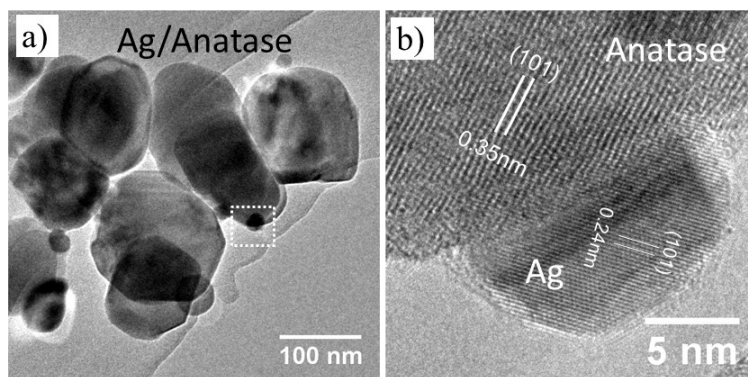


Fig. S3. TEM of as-prepared Ag/ TiO_2 (anatase) nanocomposites: (a) Ag/ TiO_2 , (b) HRTEM of Ag/ TiO_2 .

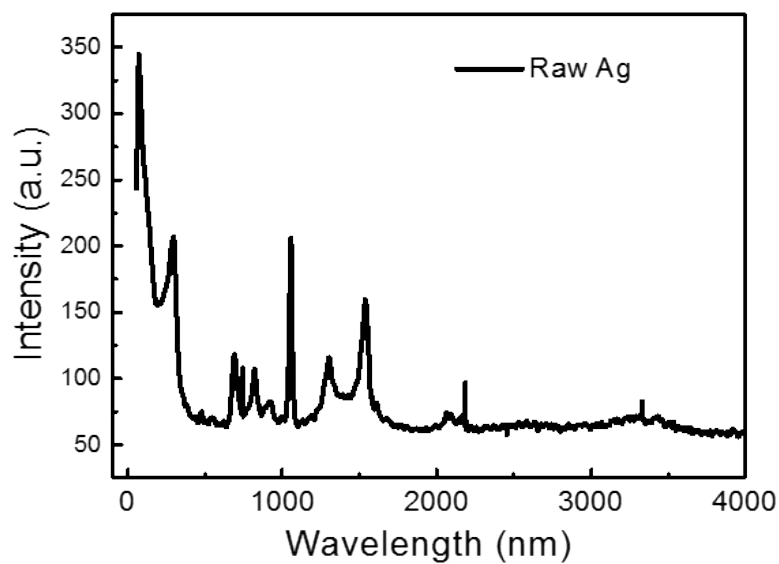


Fig. S4. Raman spectra of raw Ag.

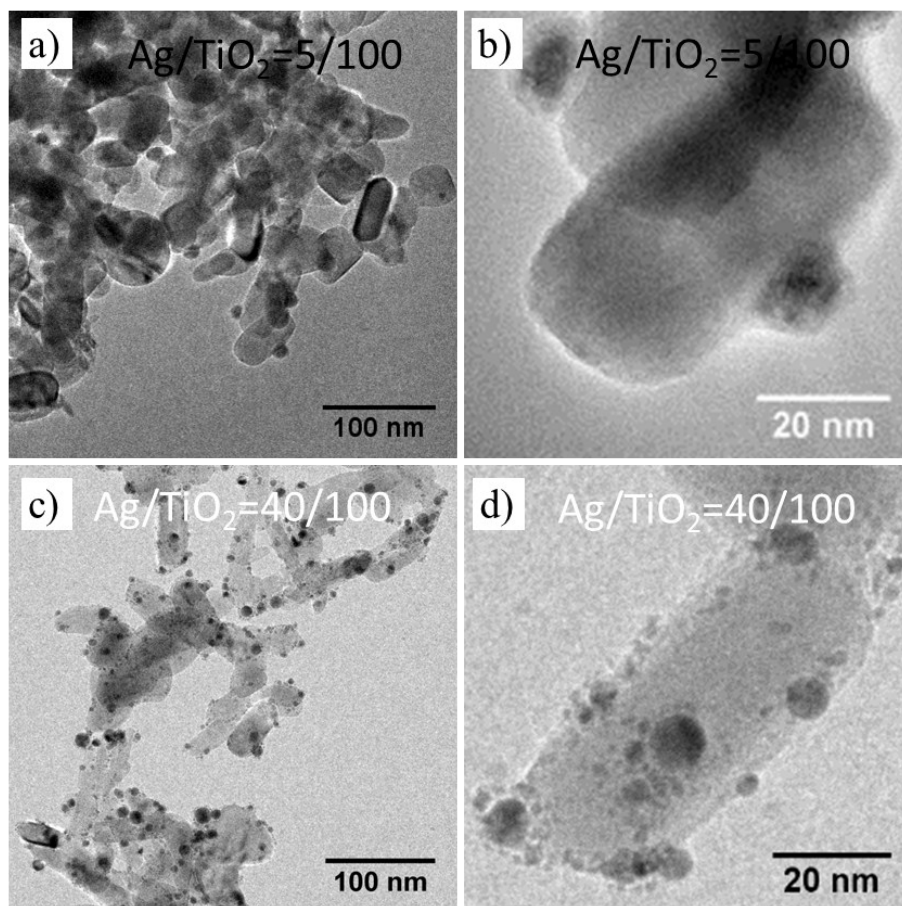


Fig. S5. TEM of as-prepared Ag/TiO₂ (rutile) nanocomposites with different composition ratios of Ag and TiO₂: (a), (b) Ag/TiO₂=5/100 (c), (d) Ag/TiO₂=40/100.

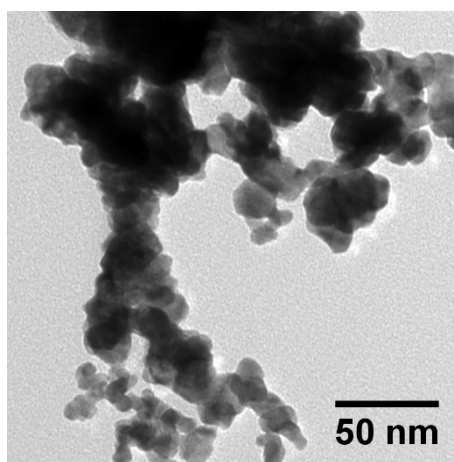


Fig. S6. TEM of raw Pt nanoparticles (ALDRICH)

S7 Photocatalytic Activity Experiments

The photocatalytic hydrogen evolution experiment was performed in an online photocatalytic hydrogen generation system (CEL-SPH2N, AuLight, Beijing) at ambient temperature (25 °C). 10 mg of photocatalyst (loaded with Pt 5 wt. %) was suspended in 100 mL of aqueous solution containing 40% of methanol in volume. the

suspension was sonicated in an ultrasonic bath for 10 min, and then degassed with a vacuum pump for 10 min in order to completely remove the dissolved oxygen and to ensure the reaction system under an inertial condition. The suspension was stirred continuously with a magnetic stirrer throughout the experiment in order to keep a good dispersion of the photocatalysts. The produced hydrogen was analyzed by gas chromatography (GC) using a thermal conductivity detector (TCD) with nitrogen as a carrier gas. The above mentioned xenon lamp (300 W, a total light intensity of 600 mW cm⁻²) was used as a UV light source. Visible light was simulated by equipping the xenon lamp with a cutoff filter (UVCUT400, AuLight, Beijing, $\lambda > 400$ nm), and the visible light illumination intensity was set at ~550 mW cm².