Electronic Supplementary Information for:

Biogenic synthesis of photocatalytically active Ag/TiO_2 and Au/TiO_2 hybrid composites

Contents:

1. Au and Ag nanoparticles synthesised at different pH values

Au and Ag nanoparticles were formed from the reduction of aqueous Ag^+ and $AuCl_4^-$ ions, respectively, by *C. limon* extract at pH 3, 7 and 11, and the products were examined by UV-vis spectroscopy and TEM (Figure S1). The best results were obtained for Au nanoparticles synthesised at pH = 7 and Ag nanoparticles synthesised at pH = 11; other synthesis conditions produced inferior results.

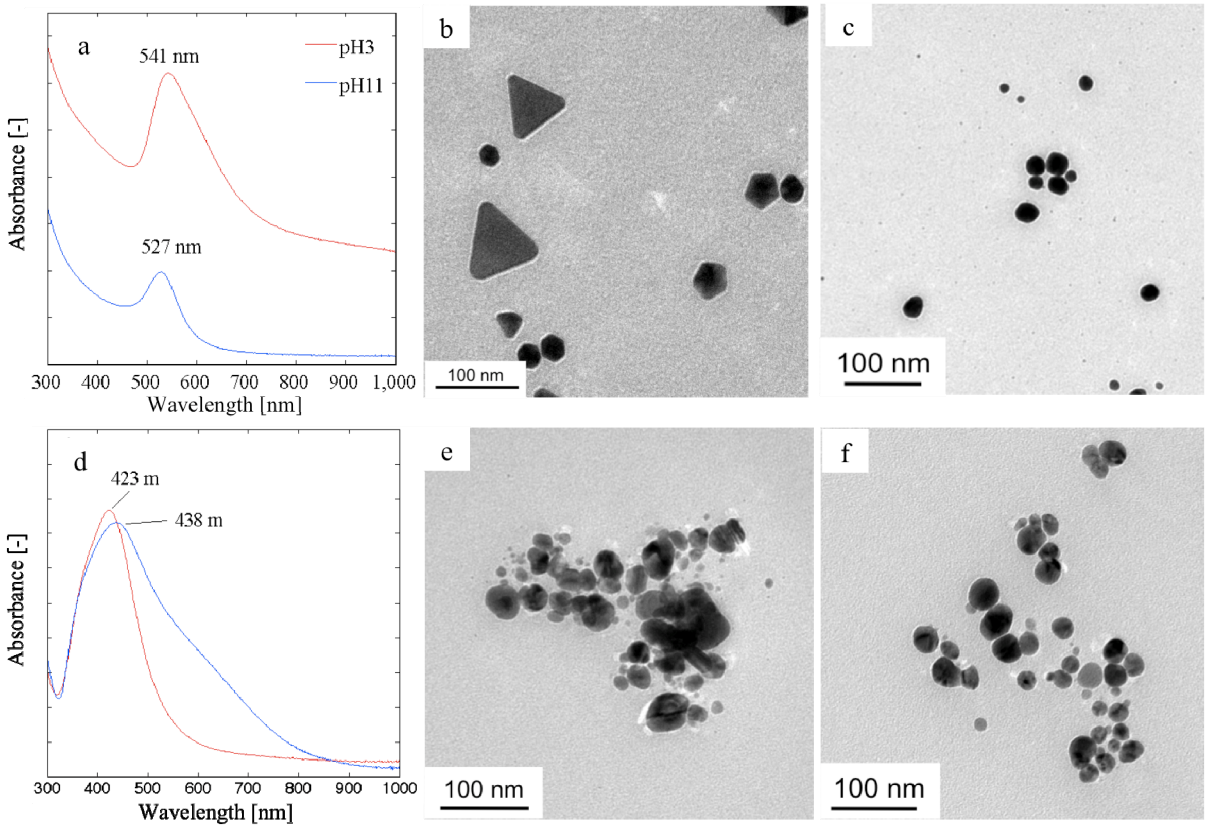

Figure S1. (a) UV-vis spectrum and (b, c) TEM images of Au nanoparticles synthesised by *C. limon* extract at pH = 3 and 11, respectively, as well as (d) UV-vis spectrum and (e, f) TEM images of Ag nanoparticles synthesised by *C. limon* at pH = 3 and 7, respectively.

2. Particle-size distributions for nanoparticles used for catalysis

The Au nanoparticles synthesised at pH = 7 and the Ag nanoparticles synthesised at pH = 11 were used for catalysis. Their particle-size distributions were determined from TEM images using Sigmagis software (Smart Imaging Technologies), and are shown in Figure S2.

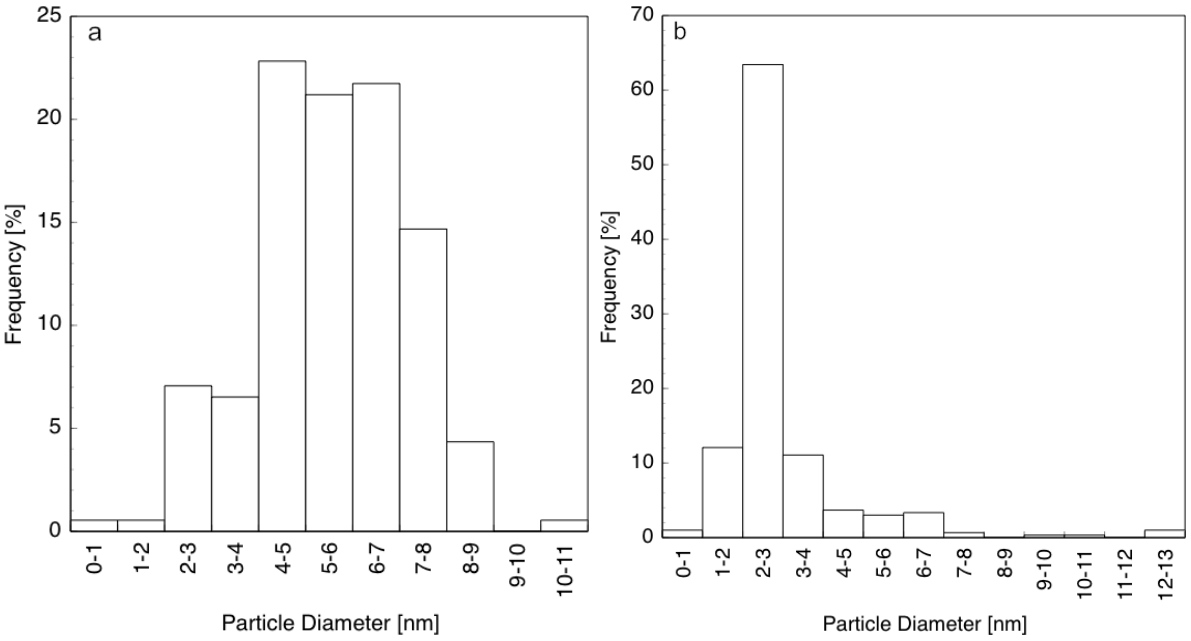

Figure S2. Particle-size distributions for (a) Au nanoparticles synthesised using *C. limon* extract at pH = 7, calculated from 184 nanoparticles, and (b) Ag nanoparticles synthesised using *C. limon* extract at pH = 11, calculated from 298 nanoparticles.

3. Photocatalytic decomposition of orange G: additional data

The decomposition of OG in the presence of commercial TiO_2 (Degussa P25) was examined in four replicate experiments. The resulting data is illustrated in Figure S3.

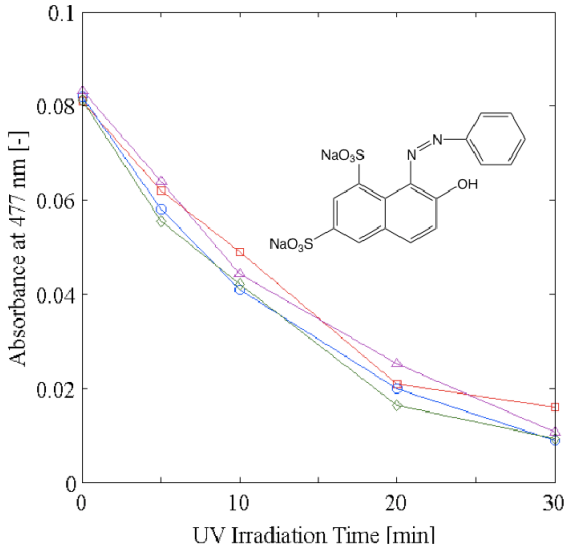

Figure S3. Photocatalytic decomposition of 100 mL of a 20-mg/L solution of **OG** in the presence of 0.2-g/L TiO_2 and under irradiation at λ = 254 nm at room temperature.

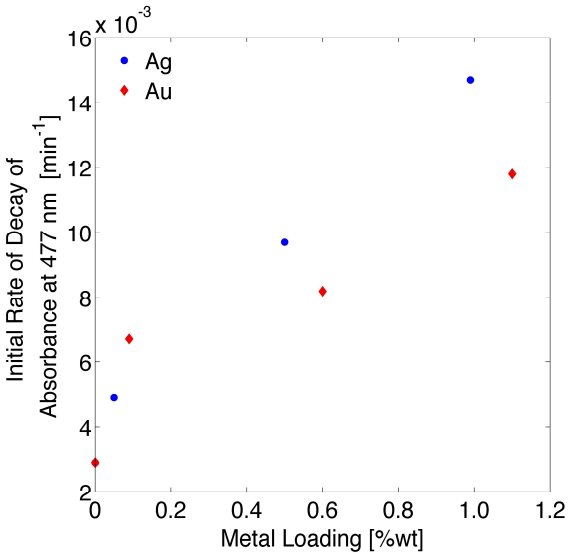

Figure S4. Initial rate of OG degradation as a function of metal loading. In all cases, a 20-mg/L solution of **OG** was degraded in the presence of 0.2-g/L catalysts and under irradiation at λ = 254 nm at room temperature. Initial rates were determined over the first four minutes of the reaction.

In order to compare various catalyst loadings, initial rates of OG degradation were calculated based on data from the first four minutes of the reaction. These data are summarised in Figure S4.

4. Thermogravimetric analysis of M/TiO_2 composites

The amount of organics on each M/TiO_2 composite was estimated using thermogravimetric analysis (TGA) at three stages: when the composite was fresh, after the composite had been exposed to UV irradiation in solution for 30 min, and after the composite had been used as a catalyst for the degradation of OG dye. The results are shown in Figure S5.

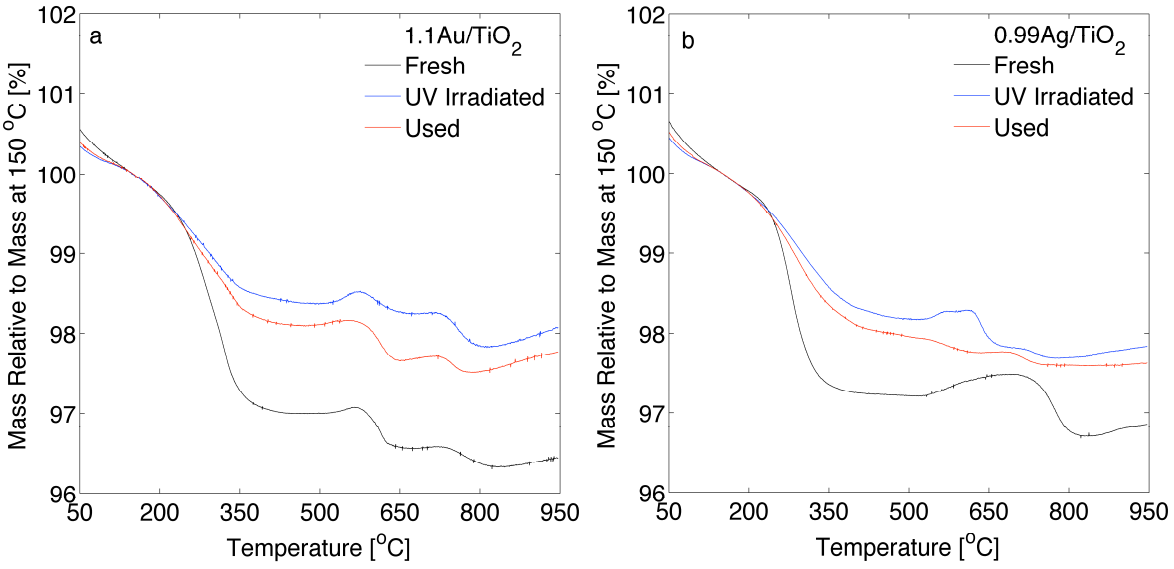

Figure S5. TGA analysis of (a) **1.1%Au/TiO_2**, and (b) **0.99%Ag/TiO_2** before and after use as a photocatalyst. All experiments were conducted under a flow of 60 mL/min air and with $\partial T/\partial t$ = 10 °C/min.

5. TEM images of M/TiO2 produced by reducing with NaBH4

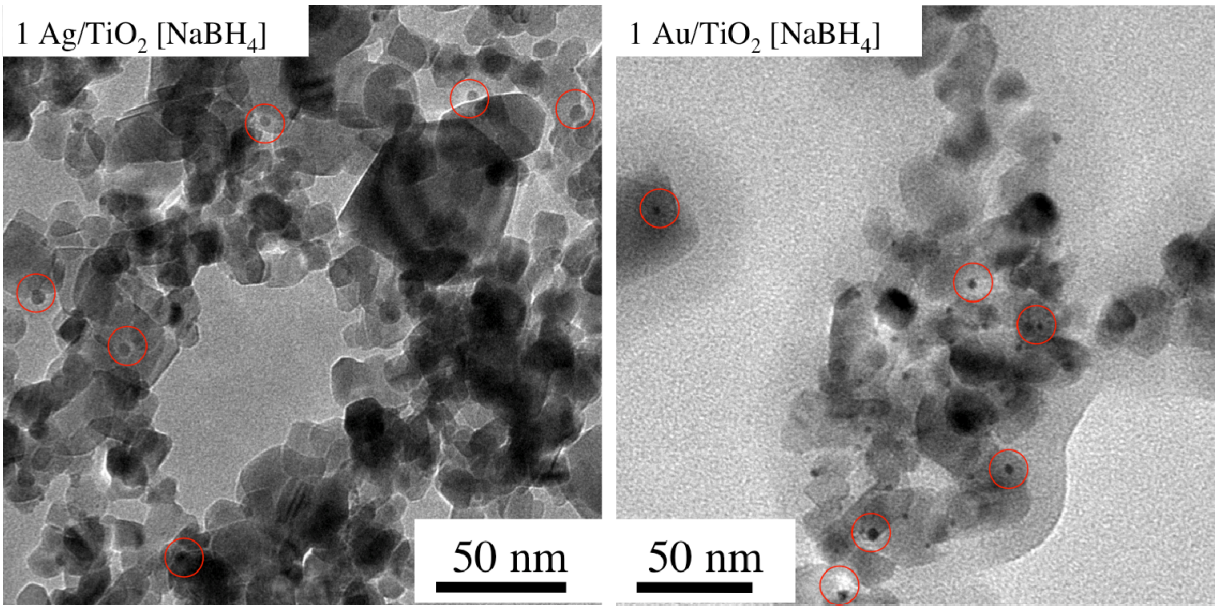

Figure S6. TEM images of M/TiO_2 produced by reducing with $NaBH_4$.