Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary information:

Thermal activation process of Au/TiO_2 system: A molecular spectroscopy study

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TEM study of the TiO_2 supported Au nanoparticles.

The TiO_2 supported AuNPs growth as results of the thermal treatment were examined by High Resolution TEM with a Jeol-2010 FasTem analytical microscope equipped with a Z-contrast annular detector, operated at 200 keV. The average size and distribution of the AuNPs were determined by the measurement of 1,000 particles for each sample. The size limit for the detection of gold particles on TiO_2 was about 0.5 nm. The High Angle Annular Dark Field (HAADF) image of samples treated under H_2/Ar at 300°C is illustrated in Figure S1a; this images show highly dispersed gold nanoparticles on the TiO_2 surface. The estimated average particle size of the AuNPs is 2.6 ±0.5 nm. The histogram shows that 60% of the nanoparticles have a size between 2 and 3 nm (Fig. 1Sb).

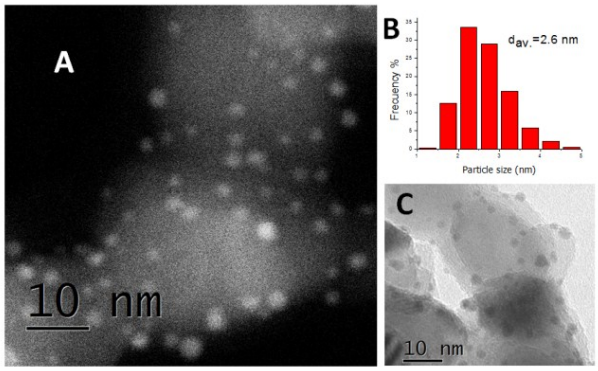

Fig. 1S Microscopic characterization (A) HAADF image, (B) Au NPs size distribution histogram, and (C) TEM image of the supported Au nanoparticles growth under H_2/Ar atmosphere.

Thermogravimetric analysis of supported and unsupported AuPrs.

The TGA curves of the unsupported AuPrs and TiO_2 supported AuPrs, displayed in the figure 2S, show that there is a difference of around 70°C between the onset of their corresponding thermal decomposition points. Knowing the equivalent chemical composition of both precursors, the lower thermal stability of the TiO_2 supported AuPrs is a clear indication of the active role played by the TiO_2 surface on the thermal decomposition mechanism and the existence of a strong precursor/support interaction.

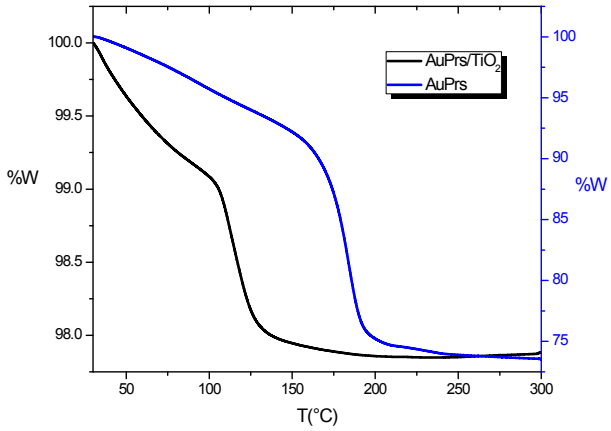

Fig. 2S Comparison between the thermal stability of supported and unsupported AuPrs thermally treated under H_2/Ar atmosphere.