Electronic Supplementary Information

Synthesis and characterization of a novel Au nanocatalyst
with increased thermal stability

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**Fig. S-1** TEM images of TiO$_2$/SiO$_2$ spheres with different thickness prepared by multiple sol-gel coating processes: (a) twice and (b) three times.

**Fig. S-2** TEM images after the deposition of Au on the surface of TiO$_2$/SiO$_2$ spheres without the modification of APTES.
**Fig. S-3** FTIR spectra of: (a) as-prepared TiO$_2$/SiO$_2$ nanoparticles, (b) TiO$_2$/SiO$_2$ nanoparticles functionalized with –NHNH$_2$ group.

**Fig. S-4** N$_2$ adsorption / desorption isotherms of the SiO$_2$/Au/TiO$_2$/SiO$_2$ samples after the etching treatment for 90 min. Insert shows the corresponding pore size distribution.