

Supporting Information

Synthesis of hierarchical $\text{SiO}_2/\text{Au}/\text{CeO}_2$ rod-like nanostructure for high catalytic activity and recyclability

Table S1. Characteristics of BET of the SiO_2/Au and $\text{SiO}_2/\text{Au}/\text{CeO}_2$.

Samples	BET surface area (m^2/g)	Pore diameter (nm)	Pore volume (cm^3/g)
SiO_2/Au	21	18.53	0.18
$\text{SiO}_2/\text{Au}/\text{CeO}_2$	110	5.03	0.14

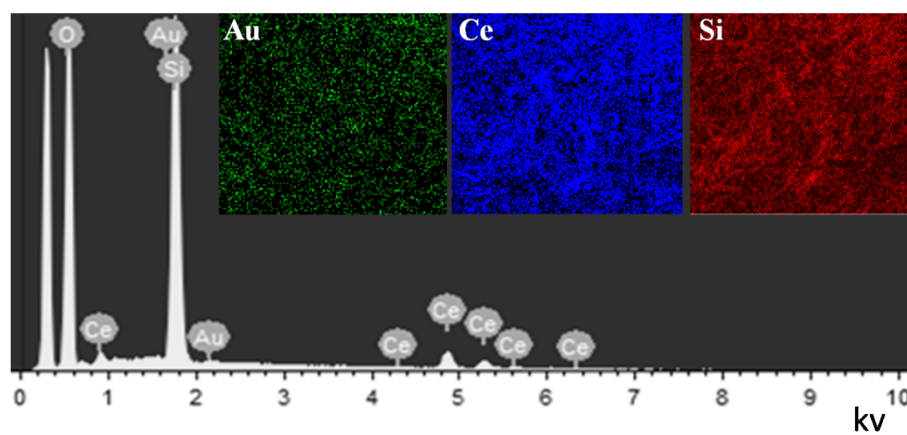


Fig. S1 EDX analysis of $\text{SiO}_2/\text{Au}/\text{CeO}_2$ and the inset are the EDX mapping analysis of the Au, Ce and Si.

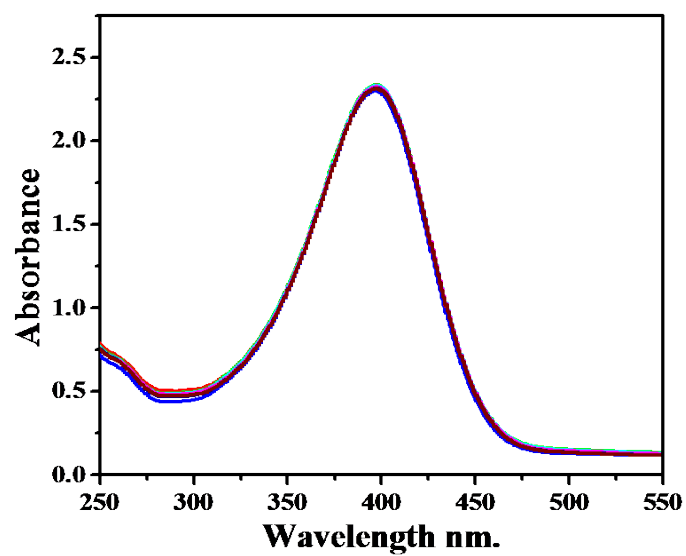


Figure S2. The solution without catalyst.

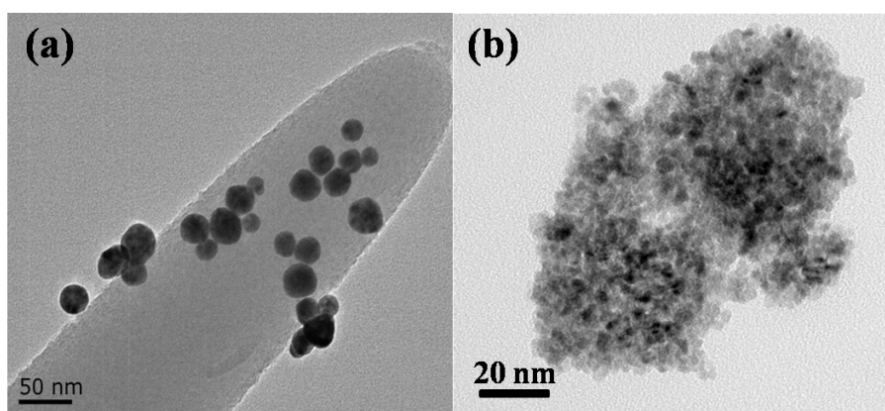


Figure S3. (a) TEM image of SiO₂/Au after calcination progress, (b) traditional noble metal supported CeO₂/Au catalyst.

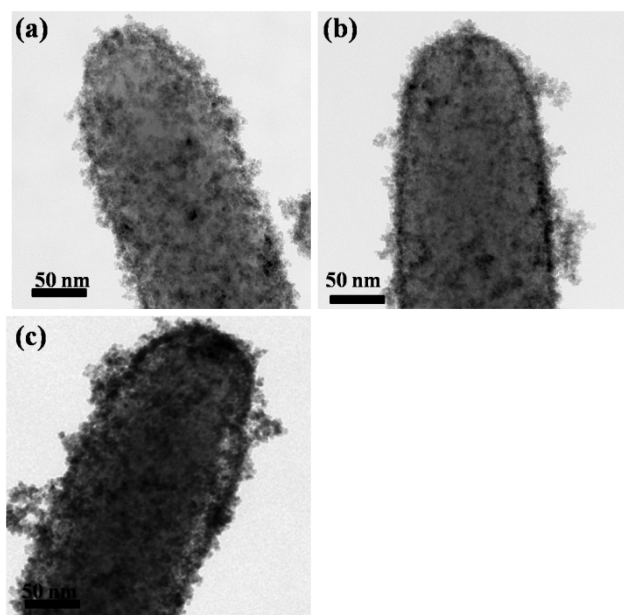


Figure S4. TEM image of (1) $\text{SiO}_2/\text{Au}/\text{CeO}_2$ (0.05) (2) $\text{SiO}_2/\text{Au}/\text{CeO}_2$ (0.1) (3) $\text{SiO}_2/\text{Au}/\text{CeO}_2$ (0.15).

Fig. S4a indicated that when $\text{Ce}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ feeding amount about 0.05g, there have many small nanoparticles attached on the surface of the spheres and the surface was covered but not entirely covered with CeO_2 nanoparticles. They are coexistence in the surface of SiO_2/Au side by side. With increasing the feeding amount, the TEM image in Fig. S4b and c shows that Au/SiO_2 rode was coated by a dense CeO_2 layer and metal nanocatalysts are covered by porous shells, the layer coated on CeO_2 spheres becomes thicker with increasing the amount of $\text{Ce}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$. However, too much CeO_2 nanoparticles will affect the diffusion of reactant in the macroporous materials and may influence the reaction activity.