

Supporting Information

Preparation of $\text{TiO}_2\text{-ZrO}_2/\text{Au}/\text{CeO}_2$ hollow sandwich-like nanostructure

for excellent catalytic activity and thermal stability

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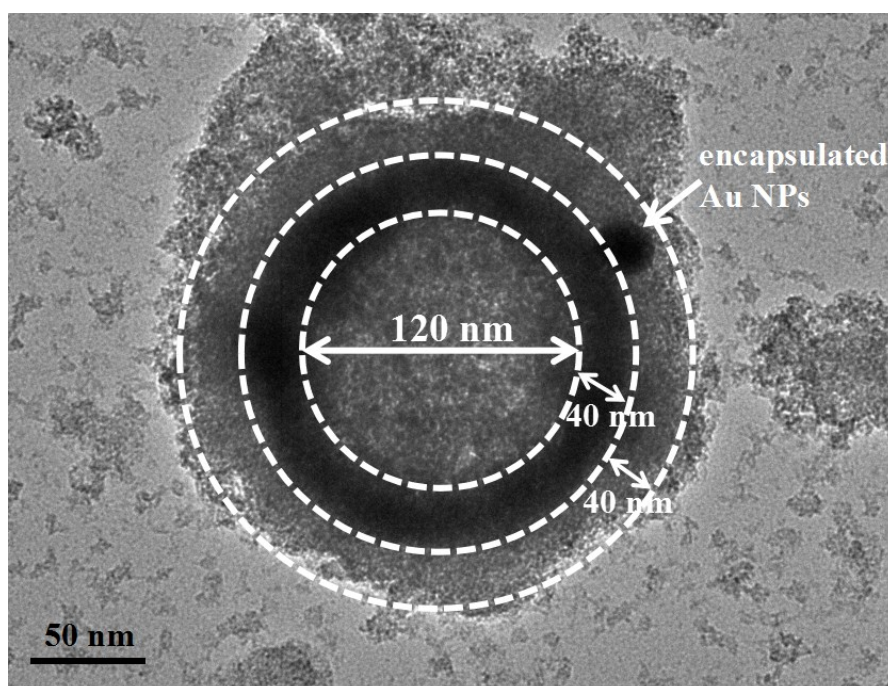
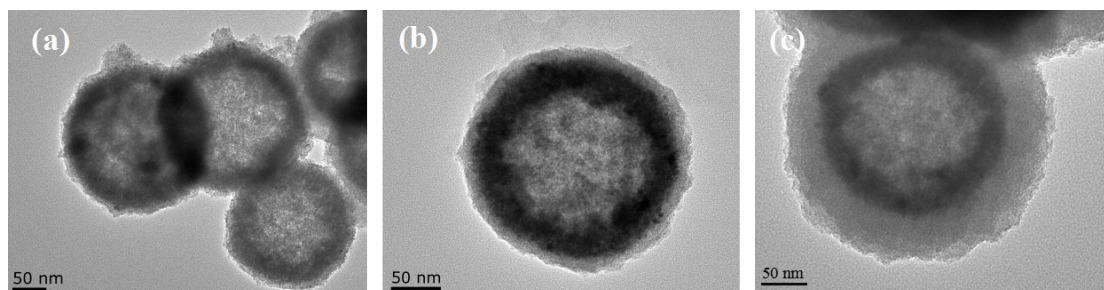


Fig. S1. TEM image of $\text{TiO}_2\text{-ZrO}_2/\text{Au}/\text{CeO}_2$ sample with sintered Au NPs.



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Fig. S2. TEM images of $\text{TiO}_2\text{-ZrO}_2/\text{Au}/\text{CeO}_2$ with distinct thickness $\text{TiO}_2\text{-ZrO}_2$ layer.

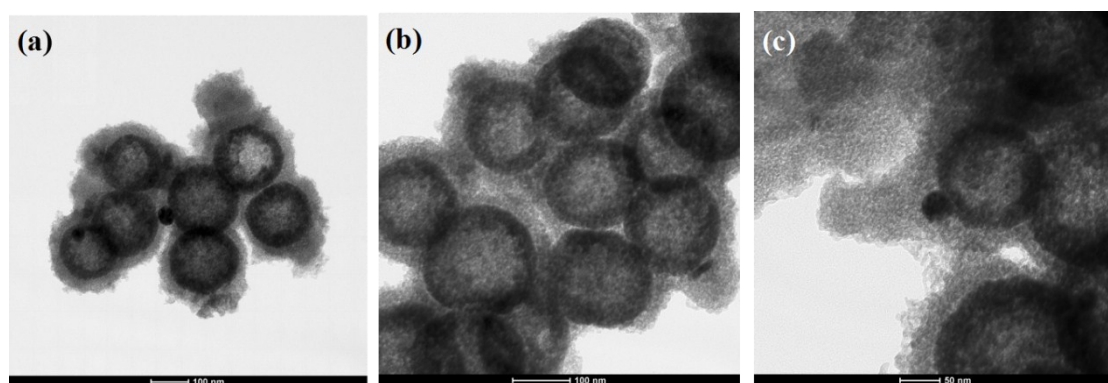


Fig. S3. TEM images of $\text{TiO}_2\text{-ZrO}_2/\text{Au}/\text{CeO}_2$ with distinct thickness $\text{TiO}_2\text{-ZrO}_2$ layer after calculation.

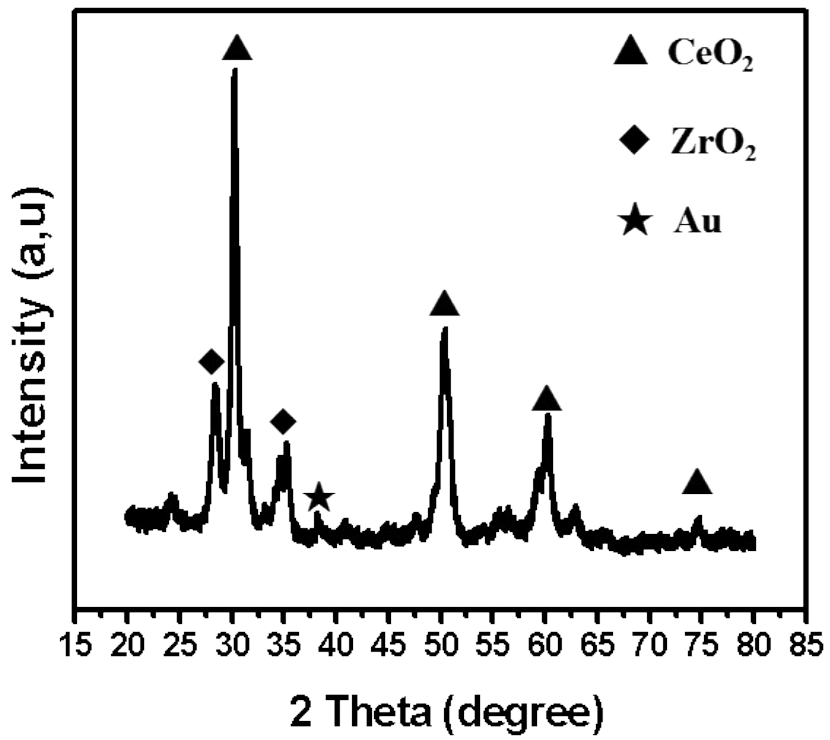


Fig. S4. X-ray diffraction patterns of calcined ZrO₂/Au/CeO₂ at 1000 °C.

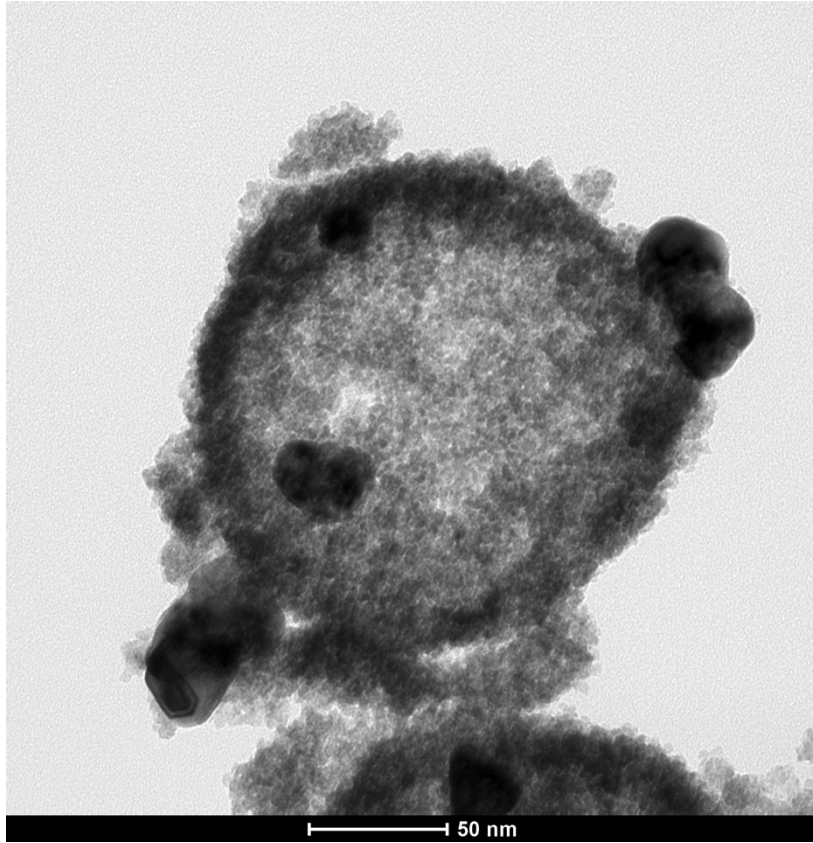


Fig. S5. TEM images of Au/CeO₂ after calcination at 550 °C.

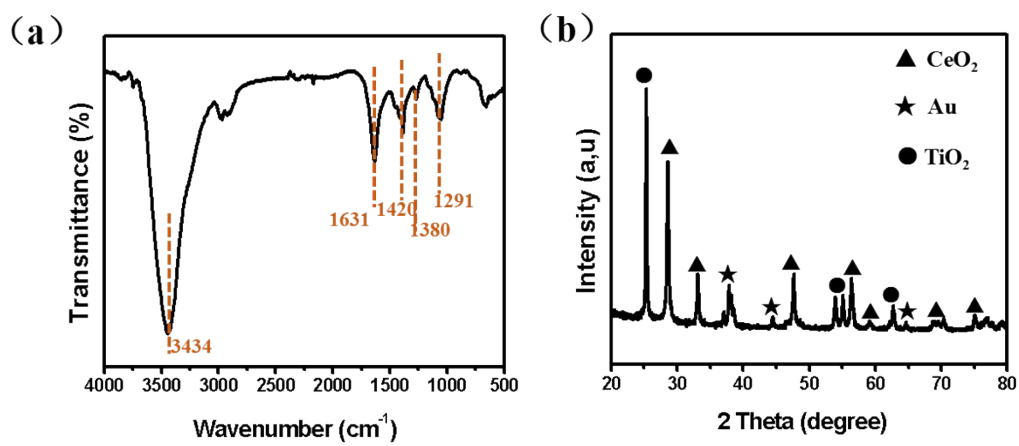


Fig. S6. (a) FTIR patterns and (b) XRD pattern of TiO₂-ZrO₂/Au/CeO₂ after reduction of 4-nitrophenol.

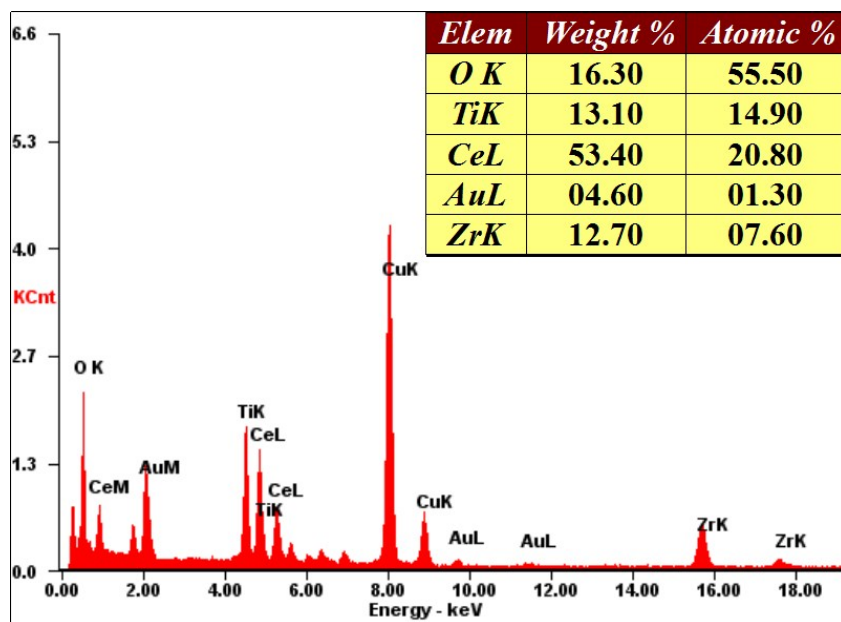


Fig. S7. The EDX analysis of $\text{TiO}_2\text{-ZrO}_2/\text{Au}/\text{CeO}_2$ after reduction of 4-nitrophenol.