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**Supporting Information**

# Facile 'Embedding' Au Nanocrystals into Silica Spheres with Controllable Quantity for Improved Catalytic Reduction of *p*-Nitrophenol

Shiqi Zhou,[a] Song Bai,*[ab] Erjian Cheng,[a] Ru Qiao,[a] Yi Xie,[b] and Zhengquan Li*[a]

[a]*Institute of Physical Chemistry and Department of Chemistry, Zhejiang Normal University, Jinhua, Zhejiang 321004, China. Tel: +86-579-8228-1128; E-mail: zqli@zjnu.edu.cn; songbai@zjnu.edu.cn*

[b]*Hefei National Laboratory for Physical Science at the Microscale, University of Science and Technology of China, Hefei, Anhui 230026, P. R. China*

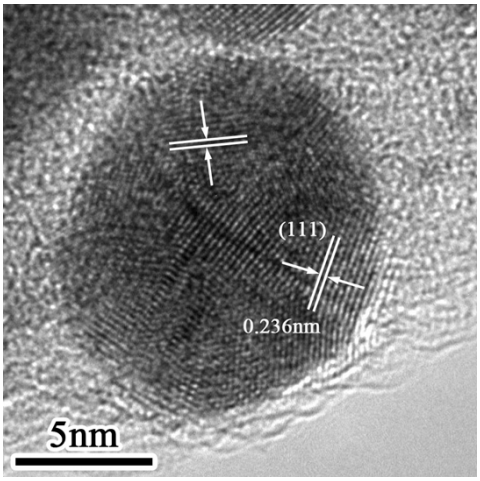


**Fig. S1** High-resolution TEM image of one single Au NC in the $SiO_2$@Au@r-$SiO_2$ NPs. Clear lattice fringes can be observed in the Au NC, revealing its high crystalline nature.

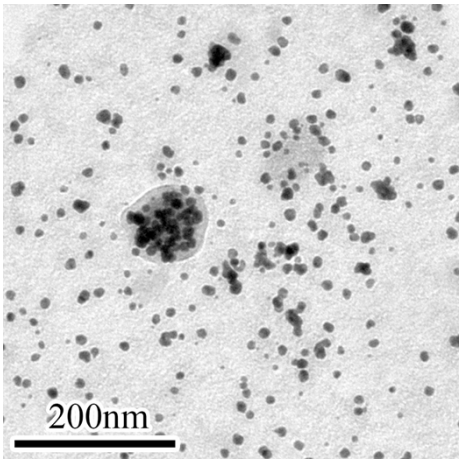


**Fig. S2** TEM image of sample prepared by direct adding $HAuCl_4$ solution at 80 ºC rather than at room-temperature. The sample consists of many free Au NCs and few $SiO_2$@Au@r-$SiO_2$ NPs, implying that the formation of Au seeds at room-temperature is much crucial for the preparation of uniform $SiO_2$@Au@r-$SiO_2$ NPs.

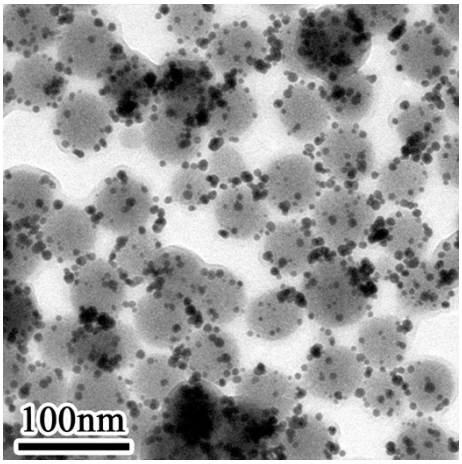


**Fig. S3** TEM image of samples prepared with surfactant CTAB instead of SDBS. This sample is similar to the sample prepared with SDBS except for the smaller size and lower particle density. This is probably resulted by the stronger absorption of CTAB on Au NCs which restrain the growth of Au NCs to some extent.

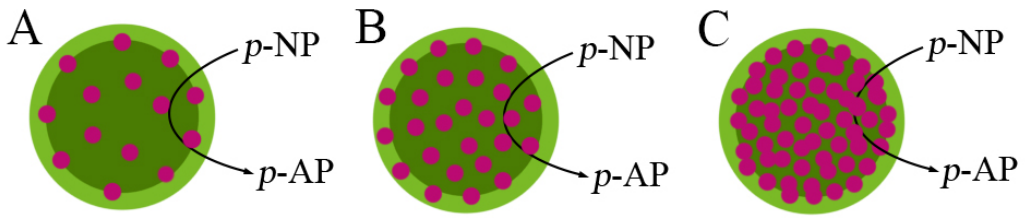


**Fig. S4** Schematic illustration of the catalytic reduction of *p*-NP on $SiO_2$@Au@r-$SiO_2$ NPs with different Au density. With low Au density, the effective surface of Au NCs increases along with the Au number. But the effective surface would reduce if plenty of Au NCs were combined together. At the same time, the flow of reactants toward inner Au NCs may be restrained due to the high Au density.

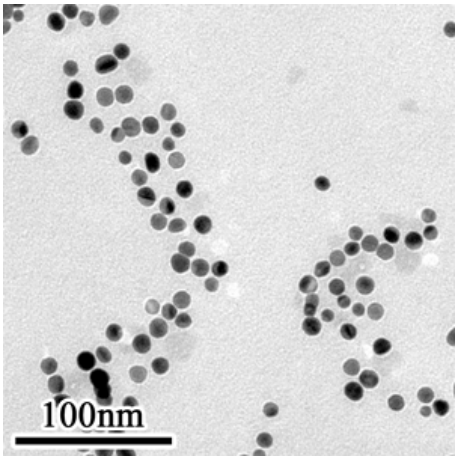


**Fig. S5** TEM images of free Au NPs prepared by reduction of $HAuCl_4$ with $NaBH_4$ under the assistance of CTAB. These Au NCs are about 5-8 nm in diameter, much similar to the Au NCs loaded in the $SiO_2$@Au@r-$SiO_2$ NPs.

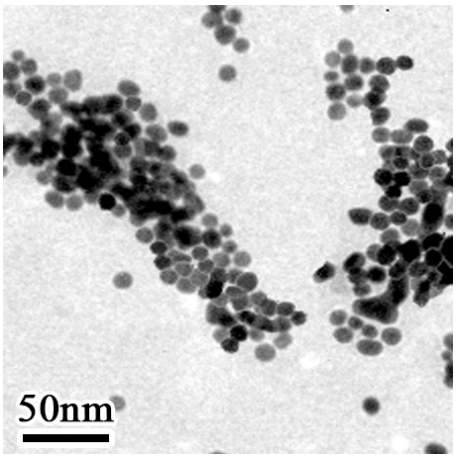


**Fig. S6** TEM image of the bare Au NCs collected from *p*-NP solution after the first run catalysis.