Supporting Information

Hybrid Nanorattles of Metal Core and Stimuli-Responsive Polymer Shell for Confined Catalytic Reactions

[1]Guo Liang Li, [1]Chin An Tai, [1]K. G. Neoh, [1]E. T. Kang* and [2]Xinlin Yang

[1]Department of Chemical & Biomolecular Engineering,
National University of Singapore, Kent Ridge, Singapore 119260

[2]Key Laboratory of Functional Polymer Materials, Ministry of Education
Institute of Polymer Chemistry, Nankai University, Tianjin 300071, P. R. China

* To whom correspondence should be addressed
E-mail: cheket@nus.edu.sg

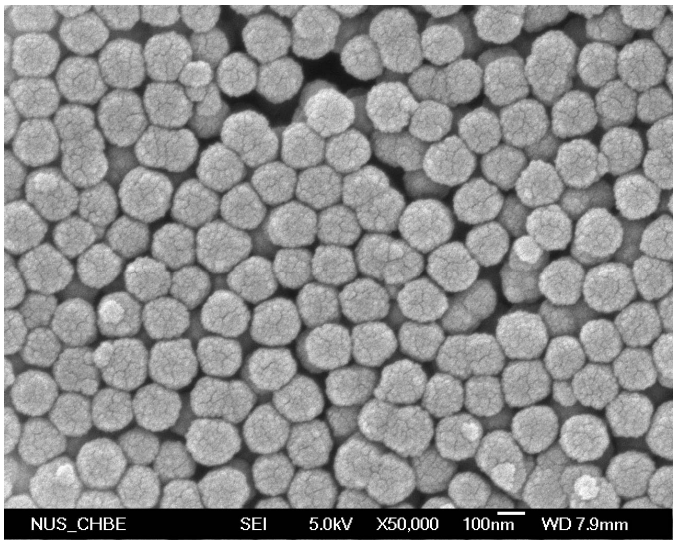
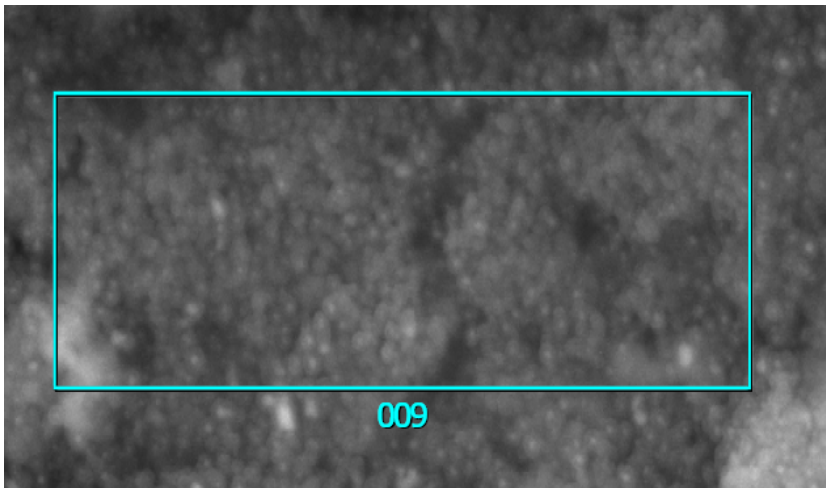
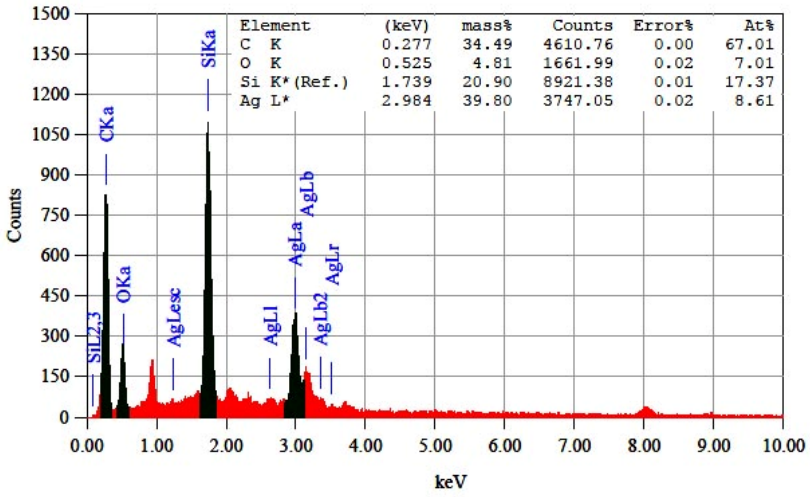


Figure S1 FESEM micrograph of the Ag@SiO_2@PMAA core-double shell-2 hybrid NPs of Table 1.



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Mag            : x 15,000
Date           : 2010/01/06
Pixel          : 512 x 384
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Acquisition Parameter
Instrument    : 6700F
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Probe Current: 1.00000 nA
PHA mode      : T3
Real Time     : 35.11 sec
Live Time     : 30.00 sec
Dead Time     : 16 %
Counting Rate: 2813 cps
Energy Range :  0 - 20 keV
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Figure S2 EDX spectrum of the Ag@SiO_2@PMAA core-double shell-3 hybrid NPs of Table 1.

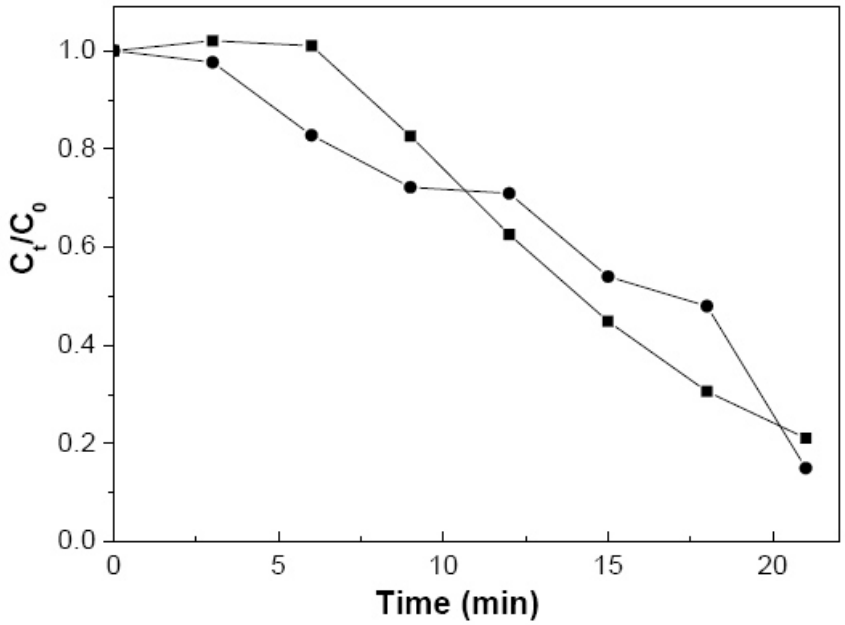

Figure S3 Reaction kinetics of *p*-nitrophenol reduction by the Ag NPs in the absence (square symbol) and presence (circle symbol) of F^- ions effect. For the effect of F^- ions on the catalytic reaction, the Ag@SiO_2 core-shell 2 NPs of Table 1 was etched by HF to obtain the silver NPs, followed by evaluating the catalytic activity of the resulting Ag NPs. In comparison with the pritine Ag NPs, the Ag NPs from HF etching of the Ag@SiO_2 core-shell 2 NPs still retain the catalytic activity. It should be noted that in the absence of PMAA outer shell (unlike the case of Ag@SiO_2@PMAA core-double shell NPs), HF etching of the Ag@SiO_2 core-shell NPs proceeded very quickly and should be performed in diluted HF solution (5 wt%) only briefly ($\leq$ 10 min). Otherwise, the silver nanocores may also be etched after the dissolution of silica shell. The reactions of HF with silica and Ag NPs proceed as: (1) $SiO_2+4HF=SiF_4+2H_2O$ and (2) $2Ag + 2HF = 2AgF + H_2$.

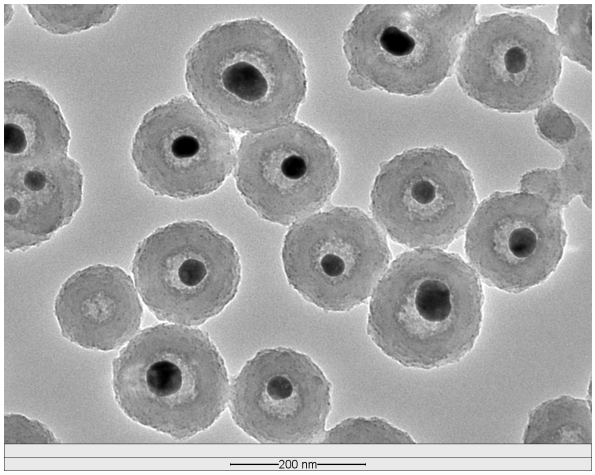

Figure S4 TEM image of the Ag@air@Polymer hybrid nanorattles (PMAA shell thickness of 67 nm) recycled from the reaction solution after the catalytic reaction