

Electronic Supplementary Information

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**A Facile *in-situ* Hydrophobic Layer Protected Selective Etching Strategy for the Synchronous Synthesis/Modification of Hollow or Rattle-type Silica Nanoconstruct**

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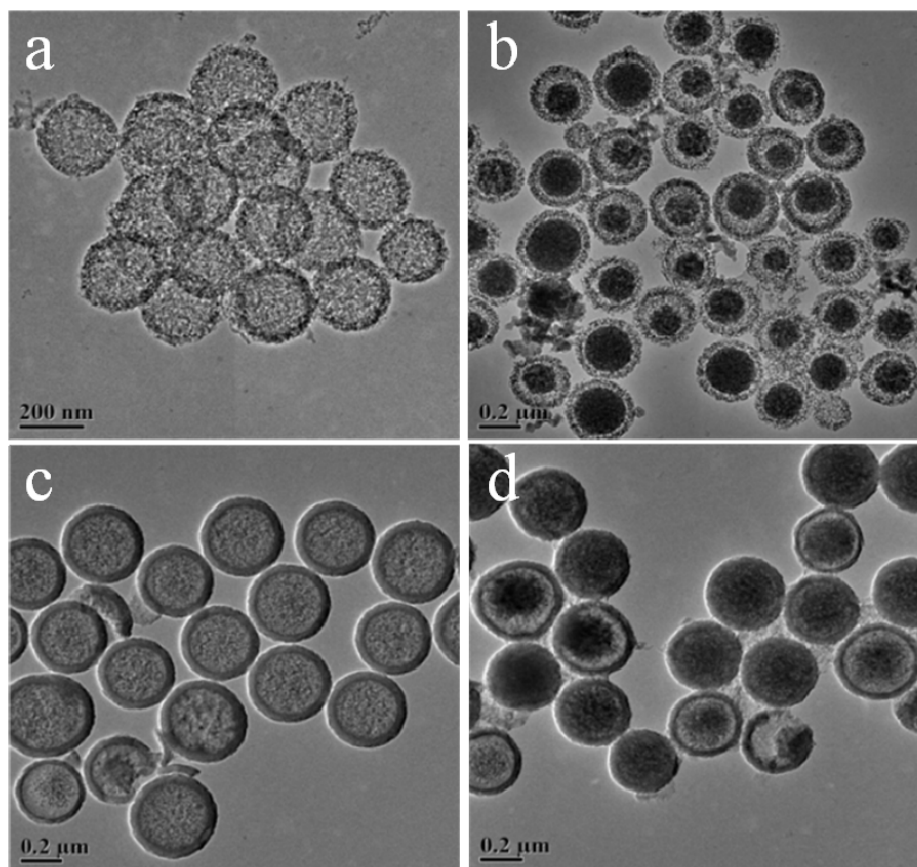
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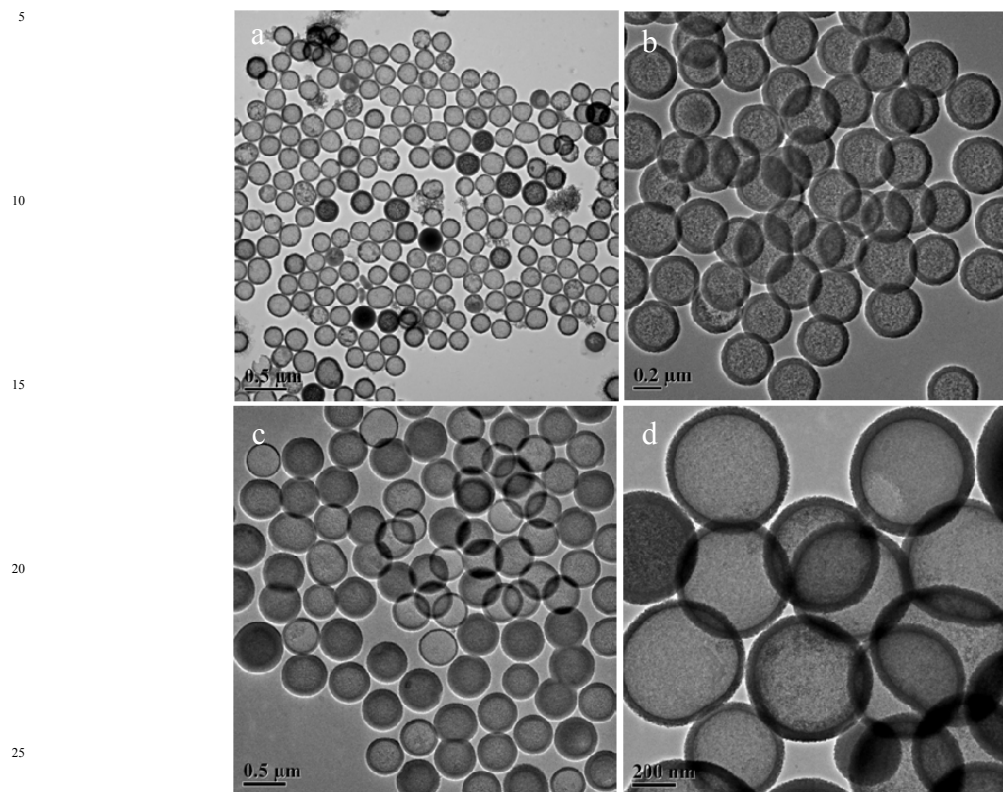
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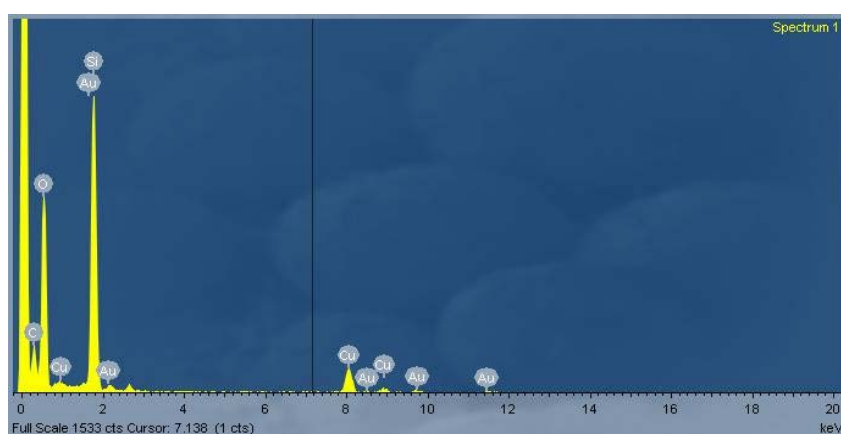


**Figure S1.** a, b) TEM images of HMSNs and RMSNs obtained from PDES, respectively; c, d) TEM images of HMSNs and RMSNs obtained from TSD, respectively.

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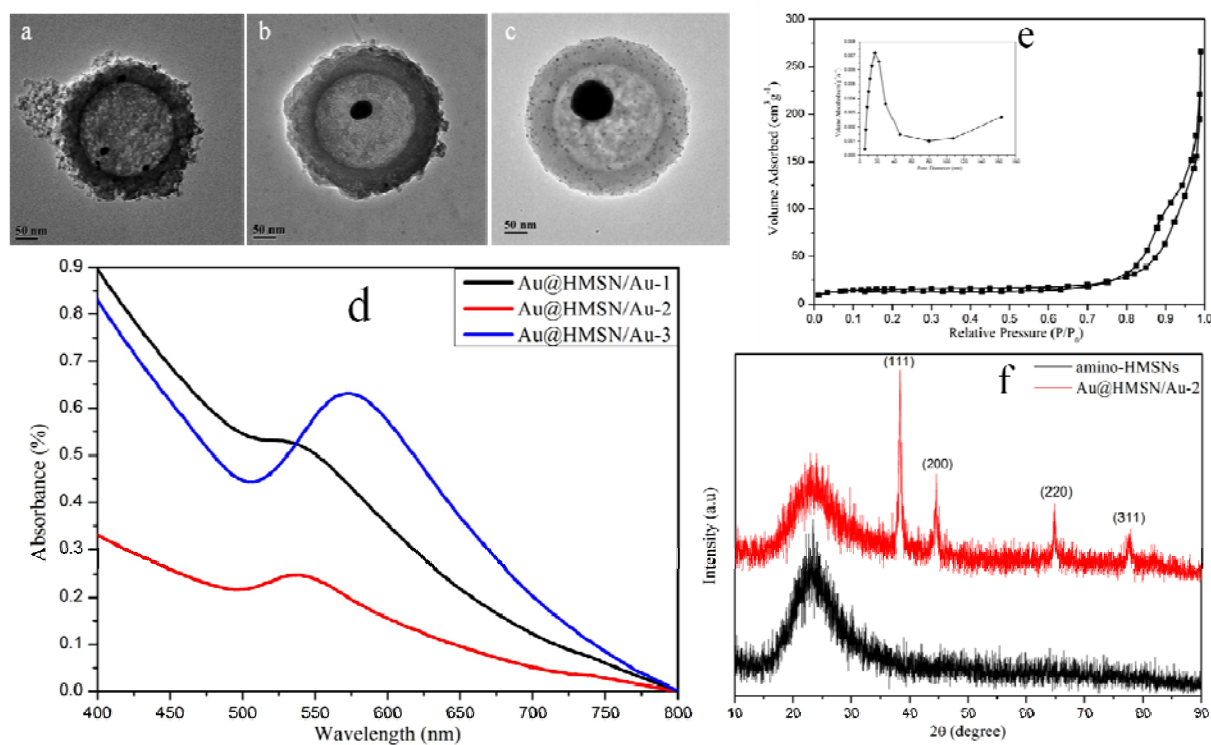
**Figure S2.** TEM images of HMSNs with a series of different particles size and with their shell functionalized with amino groups from TSD by tuning the adding method and reaction time in initially added TEOS: (a) dropwise adding and for 10min, (b) one-pot adding and for 23min, (c) twice-step adding with 8min interval and for 18min, (d) twice-step adding with 13min interval and for 30min.



**Figure S3.** EDS spectra of Au@HMSN/Au on the Cu plate without gold sputtering

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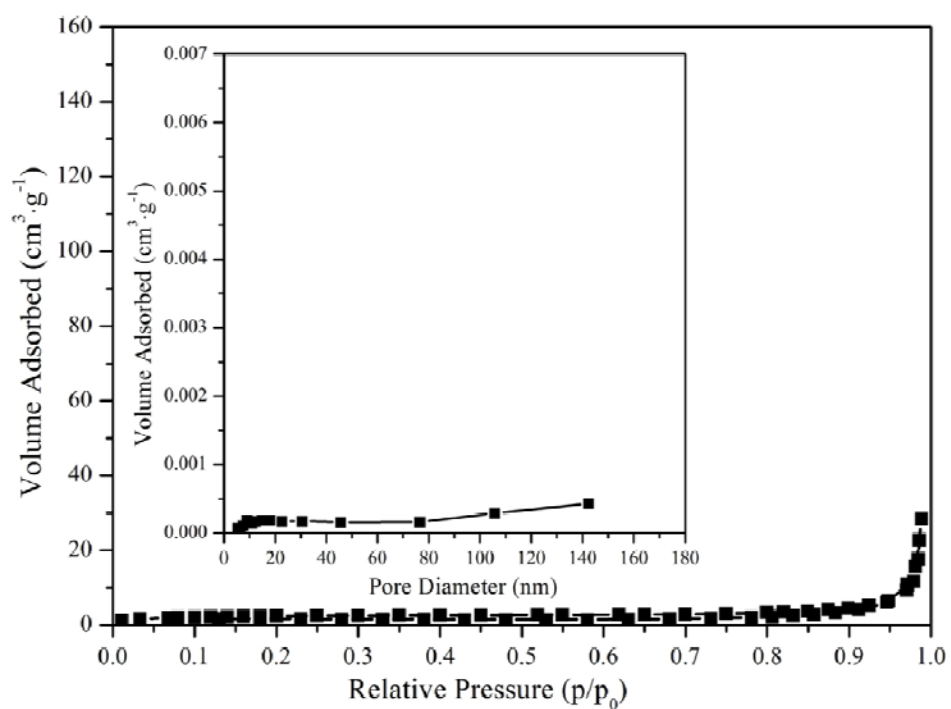


**Figure S4.** TEM images of Au@HMSN/Au nanoparticles with different sizes of Au nanoparticles, (a) Au@HMSN/Au-1 obtained under 100 mg of amino-HMSNs reacting with 10ml of HAuCl<sub>4</sub> (0.0125 M) for 1 h; (b) Au@HMSN/Au-2 nanoparticles obtained under 100mg of amino-HMSNs reacting with 15 ml of HAuCl<sub>4</sub> (0.025 M) for 1 h; (c) Au@HMSN/Au-3 nanoparticles obtained under 400 mg amino-HMSNs reacting with 15ml of HAuCl<sub>4</sub> (0.05 M) for 2 h; (d) UV-vis absorption spectra of Au@HMSN/Au-1, Au@HMSN/Au-2 and Au@HMSN/Au-3; (e) N<sub>2</sub> adsorption-desorption isotherms of Au@HMSN/Au-2, and the inset representing the corresponding pore size distributions of Au@HMSN/Au-2; (f) Wide-angle XRD patterns of Au@HMSN/Au-2 nanoparticles and amino-HMSNs

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15 **Figure S5.** N<sub>2</sub> adsorption-desorption isotherms of s-SiO<sub>2</sub>/h-SiO<sub>2</sub>, and its pore size distribution (the inset) without any dissolution of solid silica inner core (s-SiO<sub>2</sub>) inner core.

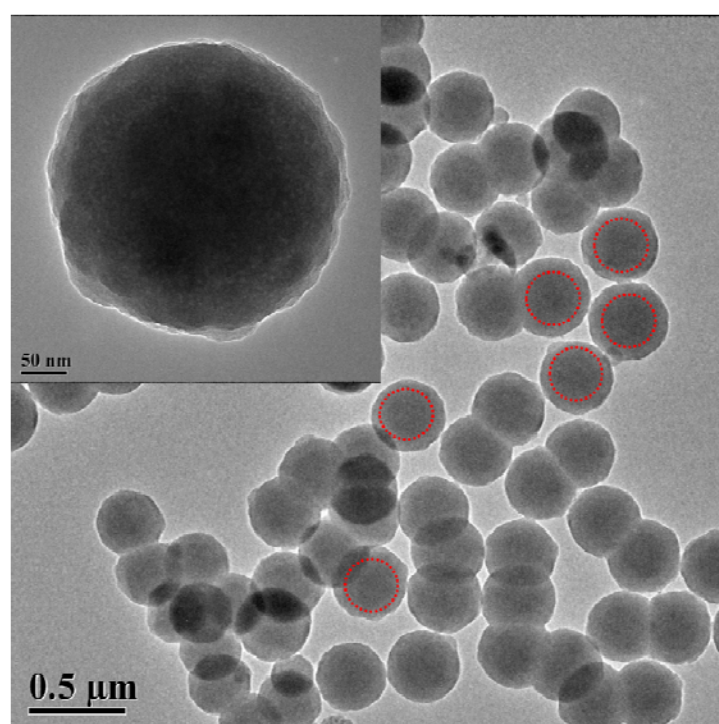
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**Figure S6.** TEM images of  $s\text{-SiO}_2/h\text{-SiO}_2$  without any dissolution of solid silica inner core ( $s\text{-SiO}_2$ ) ; the size of inner core is  $280 \pm 10$  nm. The inner core was indicated with red dotted line-labeled circles.

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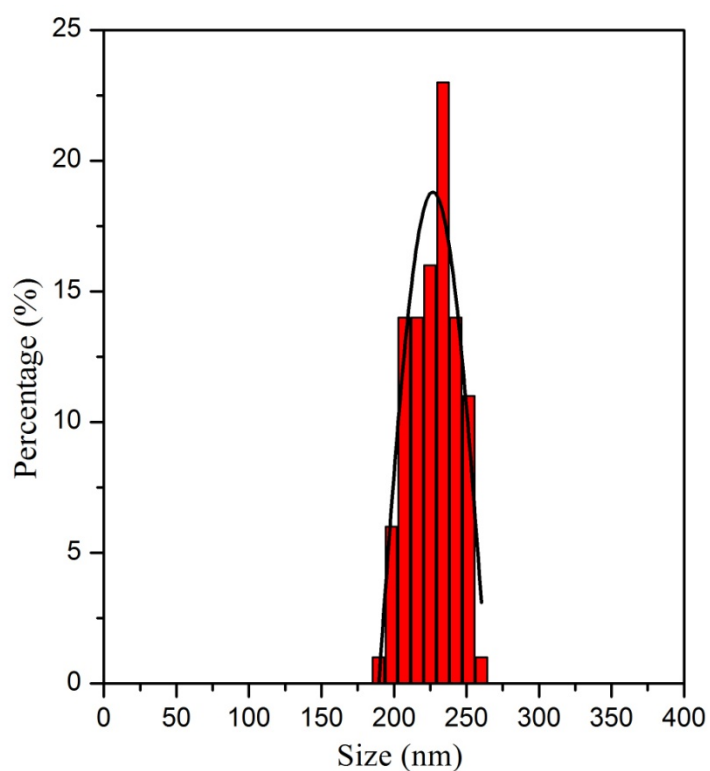


Figure S7. Size distribution of inner core in RMSNs obtained by measuring the inner core sizes of 100 nanoparticles in RMSN TEM images.