Supporting Information

Nanoparticle synthesis via bubbling vapor precursors in bulk liquids

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Figure S1. Vapor pressure of styrene, TEOS and TNB as function of temperature corresponding to Antoine Equation.
Figure S2. Size distribution and polydispersity of PS NPs as function of time and concentration of initiator. (a) $1.84 \times 10^{-4}$ mol/L of initiator, (b) $1.84 \times 10^{-5}$ mol/L of initiator.

Figure S3. TEM images of SiO2@PS NP with different reaction temperature, (a) TEM image of SiO2@PS NP at 40 °C for 60 min, (b) TEM image of SiO2@PS NP at 80 °C for 60 min. The scale bar is 40 nm.
Figure S4. TEM images of solution based SiO$_2$@PS NP with different styrene concentration.

Figure S5. TEM images of PS@SiO$_2$ NPs with different vapor supply time corresponding in Figure 4a. The scale is 20 nm.
Figure S6. TEM images of HM-SiO$_2$ NPs and their pore size. (a) the structure of HM-SiO$_2$ NPs, (b) the size measurement of HM-SiO$_2$ NPs. The scale bar are 20 and 10 nm, respectively.

Figure S7. The TEM images of nanoparticles and its crystallography. (a) PS NP, (b) TiO$_2$ NPs, (c) the results of XRD.
Figure S8. TEM image and the results of EDS of PS@SiO$_2$ and PS-TiO$_2$ composite NPs. TEM images indicated different color gradient because of different electron density.
Figure S9. The low magnification of SEM and TEM images of PS NPs, PS@SiO$_2$ NPs, and HM-SiO$_2$ NPs. The scale is 1 µm and 100 nm.