Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A
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Electronic Supplementary Information

Unconventional Pd Nanoparticles' Growth Induced by Competitive Effect between Temperature-dependent Coordination and Reduction of Grafted Amino Ligands for Heck Reaction

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Figures and tables

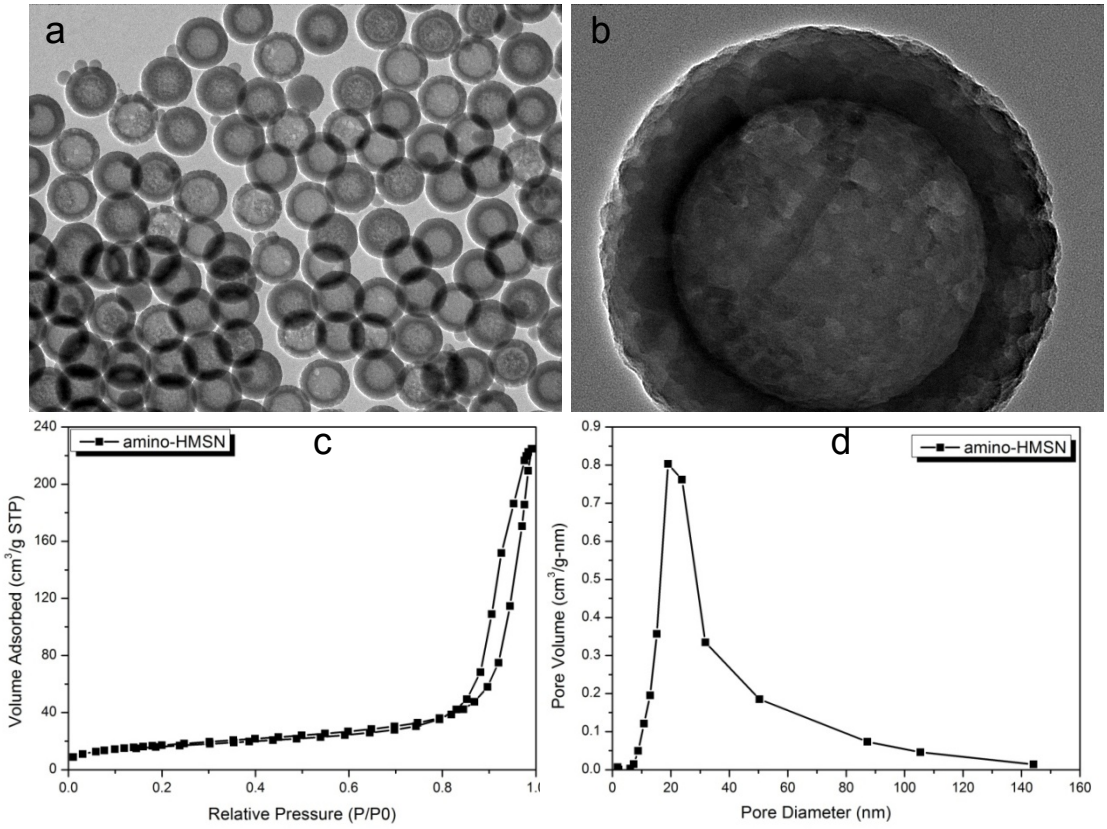

Figure S1. TEM images (a,b), N_2 adsorption and desorption isotherms (c) and pore diameter distributions (d) of amino-HMSNs.

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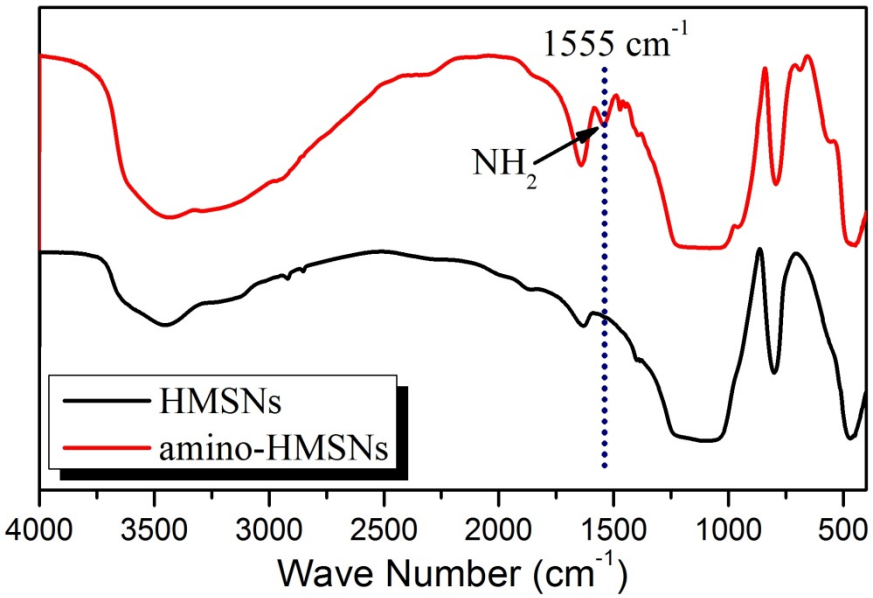

Figure S2. FTIR spectra of HMSNs and amino-HMSNs, and at 1543 cm^{-1}, the characteristic peak of N-H was observed in amino-HMSNs, indicating the existence of amino groups.

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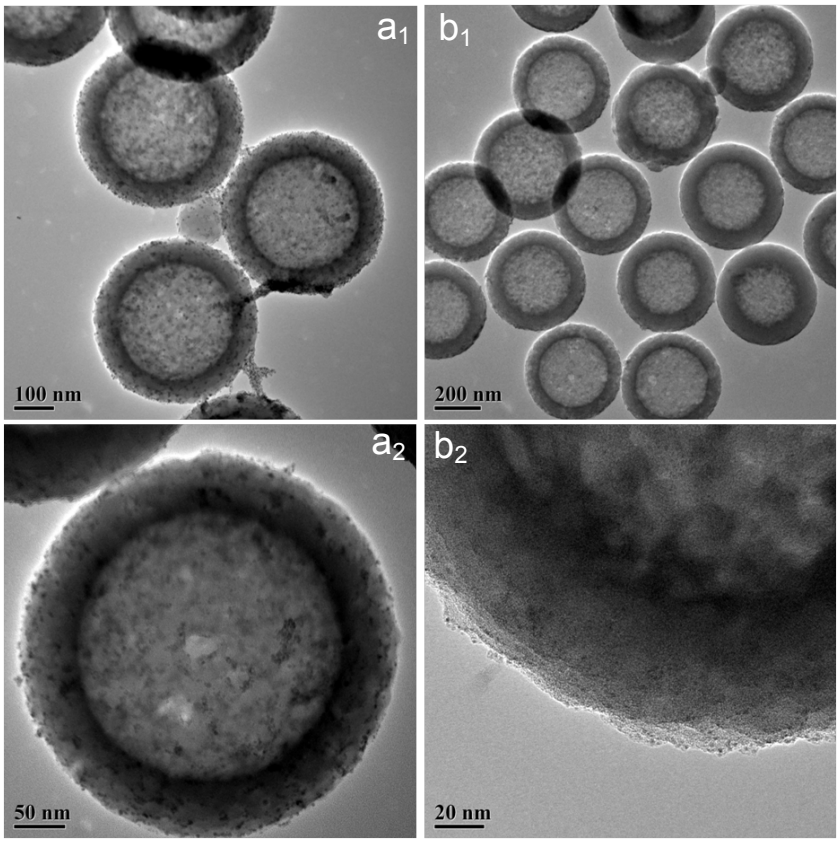

Figure S3. TEM images of amino-HMSN-Pd-30 (a_1,a_2) and amino-HMSN-Pd-90(b_1,b_2).

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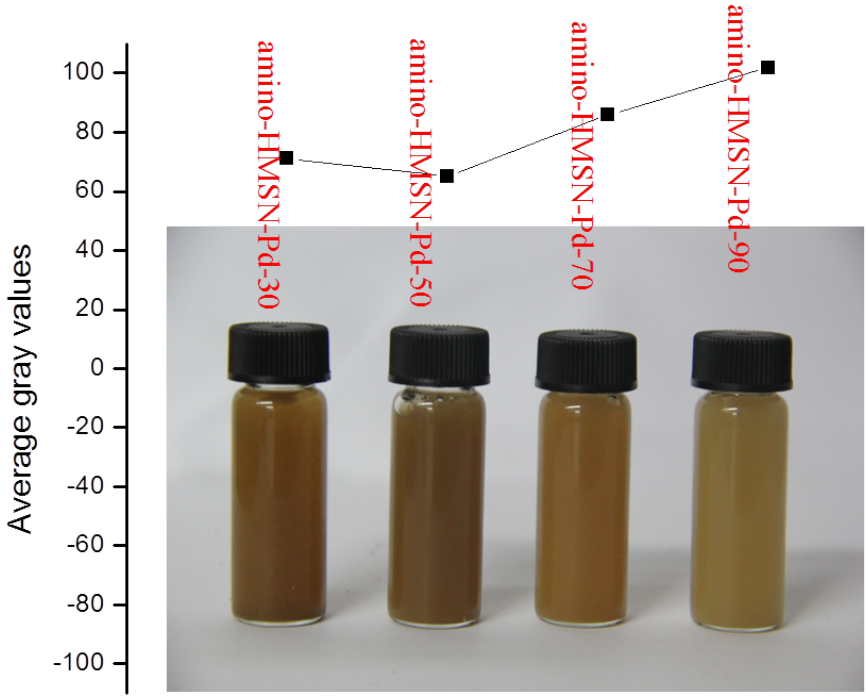

Figure S4. Digital photos and average gray values of amino-HMSN-Pd-30, amino-HMSN-Pd-50, amino-HMSN-Pd-70 and amino-HMSN-Pd-90. The average gray values can be measured *via* the software, SONOMATH developed by Chongqing AMBITION T.C.

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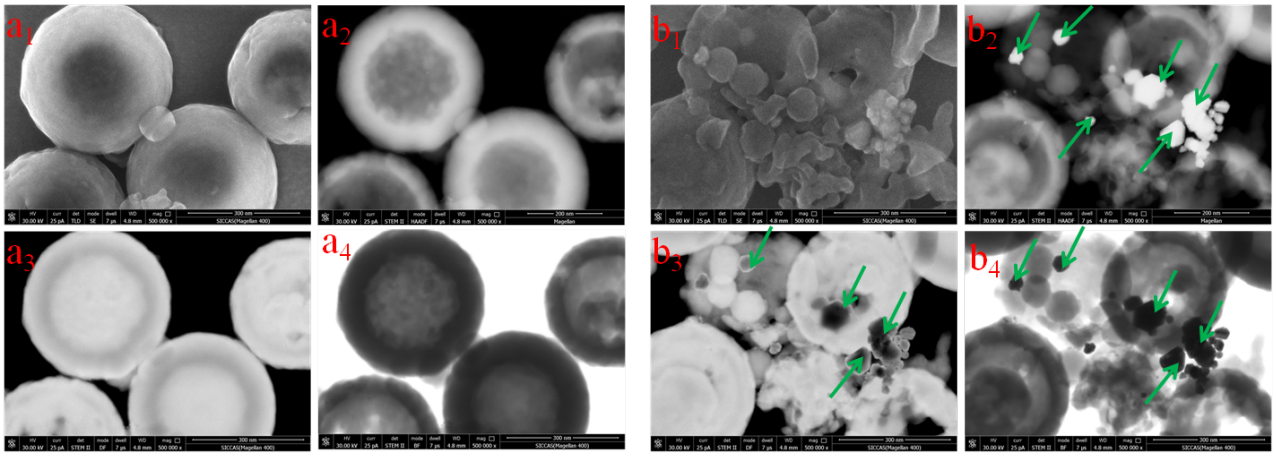

Figure S5. SEM, high angle annular dark field (HAADF), dark field (DF) and bright field (BF) images of cal-HMSNs after reacting with Pd precursors at 30 ℃ (a_1-a_4) and 90 ℃ (b_1-b_4).

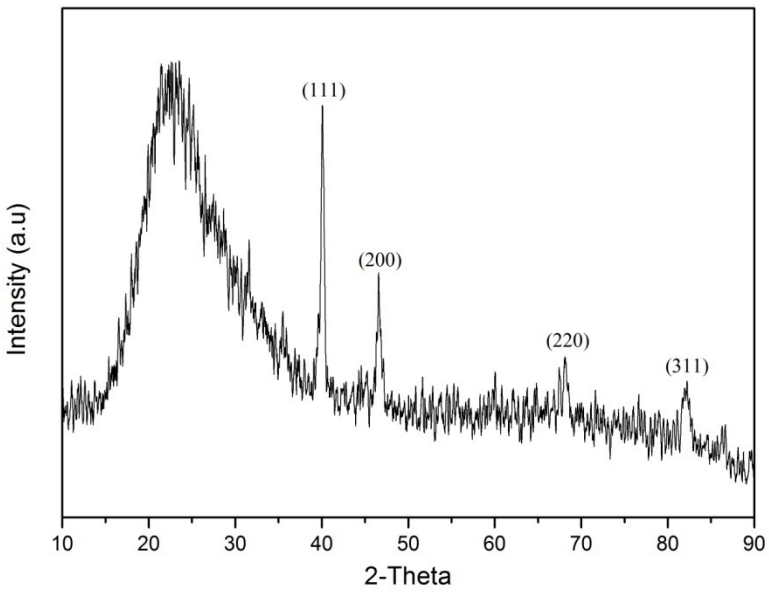

Figure S6. Powder X-ray diffraction of cal-HMSNs treated with Pd precursors at 90 ℃.

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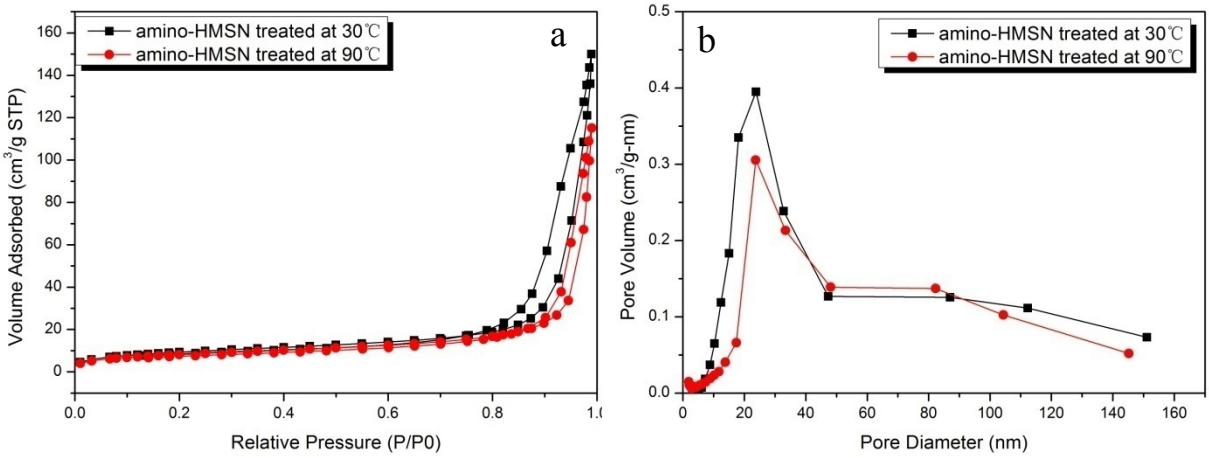

Figure S7. N_2 isotherms (a) and pore diameter distribution (b) of amino-HMSN after hydrothermal treat at 30 ℃ and 90 ℃ for 4h; BET Surface Area: 34 m^2/g, Pore volume: 0.23 cm^3/g and Pore diameter : 14.5 nm for amino-HMSN treated at 30℃, but for amino-HMSN treated at 90 ℃, BET Surface Area: 35 m^2/g, Pore volume: 0.21 cm^3/g and pore diameter: 13.9 nm. So no prominent variations of BET surface area, pore diameter, and pore volume between amino-HMSNs treated at 30 ℃and 90 ℃ emerged.

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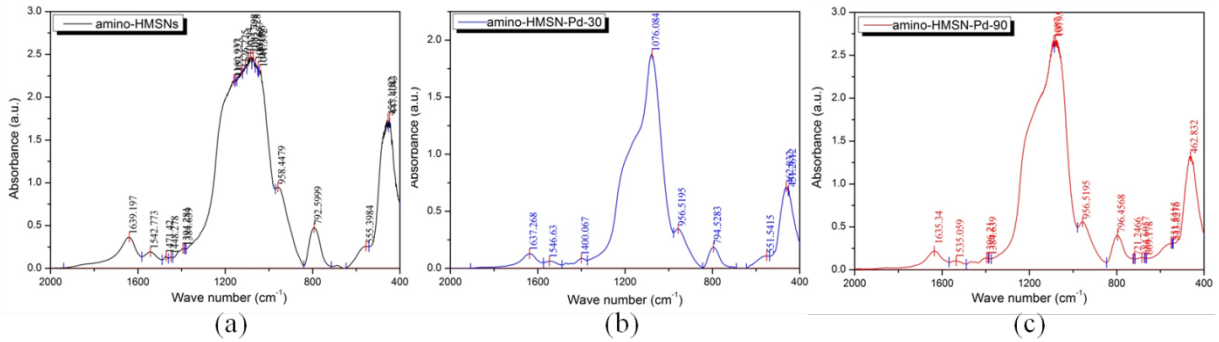

Figure S8. (a-c) FTIR absorbance spectra of amino-HMSNs (a), amino-HMSN-Pd-30 (b) and amino-HMSN-Pd-90 (c).

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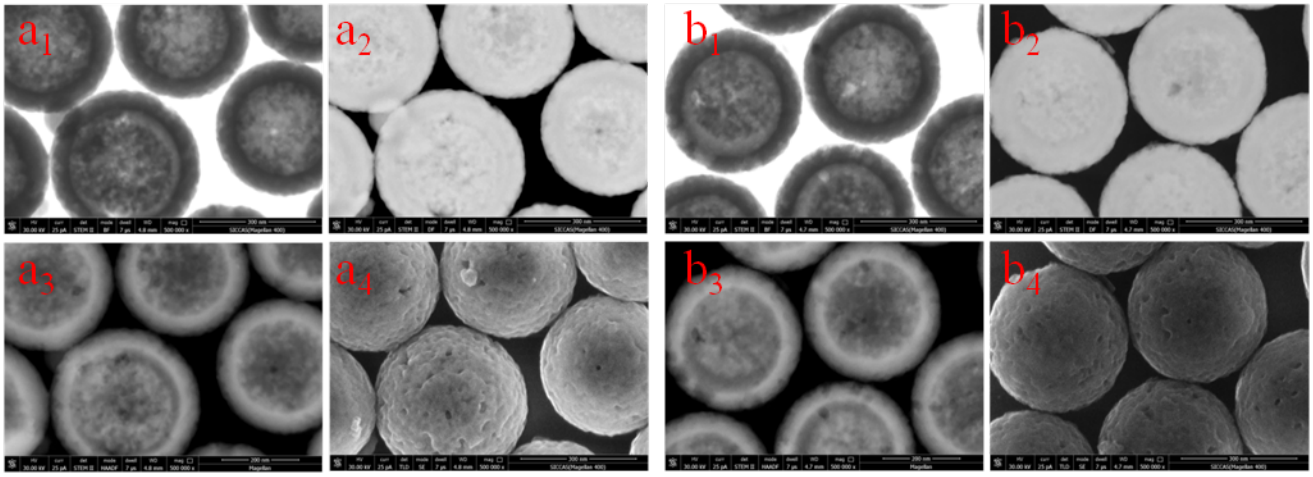

Figure S9. SEM and STEM images after amino-HMSNs after reacting with Pt precursors at 30 ℃ (a_1-a_4) and 90 ℃ (b_1-b_4).

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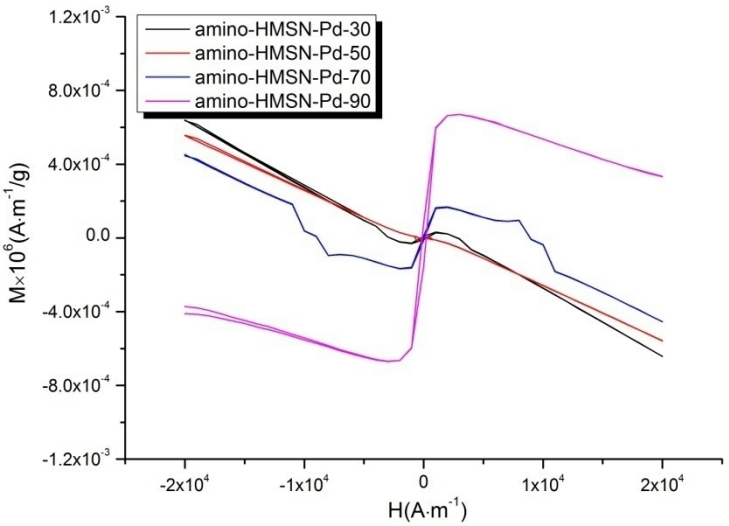

Figure S10. The magnetizing curves of amino-HMSN-Pd-30, amino-HMSN-Pd-50, amino-HMSN-Pd-70 and amino-HMSN-Pd-90 at different measurement temperatures (30 ℃ for amino-HMSN-Pd-30，50 ℃ for amino-HMSN-Pd-50, 70 ℃for amino-HMSN-Pd-70 and 90 ℃ for amino-HMSN-Pd-90).

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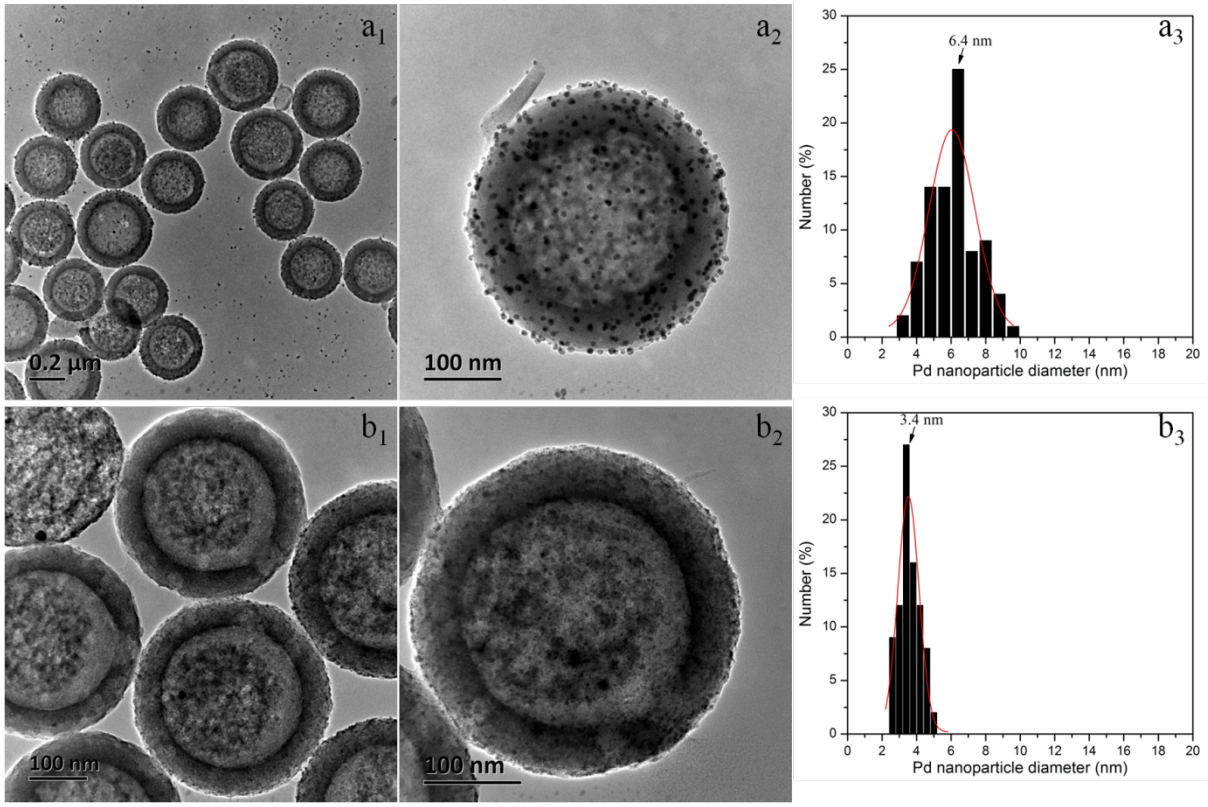

Figure S11. TEM images of amino-HMSN-Pd-30 (a_1,a_2) and amino-HMSN-Pd-90 (b_1,b_2) dispersed in deionized water after 2 months at room temperature; (a_3,b_3) Corresponding Pd size distributions in amino-HMSN-Pd-30 (a_3) and amino-HMSN-Pd-90 (b_3)

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Table S1. Peak area ratios of different samples between at 795 cm^{-1} and 1555 cm^{-1}.

Samples	**Peak area ratio between at around 795 cm^{-1} and 1555 cm^{-1}**
Amino-HMSN	2.037
Amino-HMSN-Pd-30	2.525
Amino-HMSN-Pd-50	3.143
Amino-HMSN-Pd-70	3.104
Amino-HMSN-Pd-90	2.362

Table S2. Pt atom mass percentages coordinated with amino-HMSNs at 30 ℃, 50 ℃, 70 ℃ and 90 ℃.

Temperature (℃)	Pt content (%)
30	0.194
50	0.552
70	1.974
90	4.572