Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting Information

Preparation of Multifunctional Hollow Microporous Organic Nanospheres via One-pot Hyper-cross-linking Mediated Self-assembly Strategy

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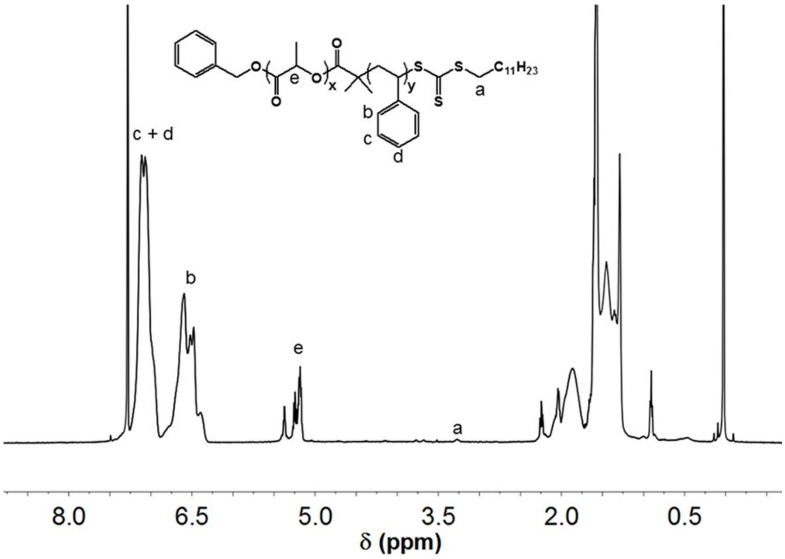


Fig. S1 ^{1}H NMR characterization of PLA-b-PS intermediate (x=60, y=264).

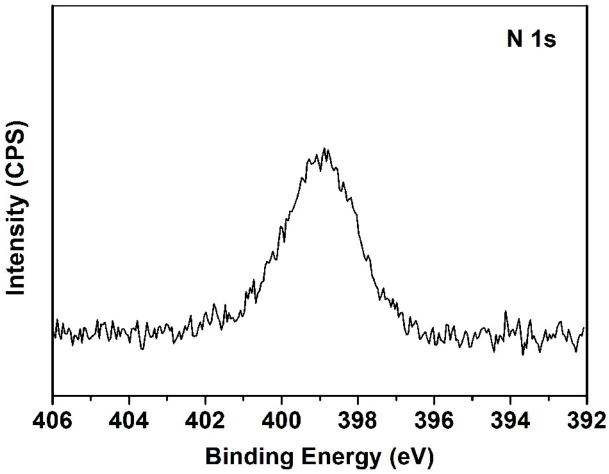


Fig. S2 XPS N 1s spectra of H-MONs-Ru.

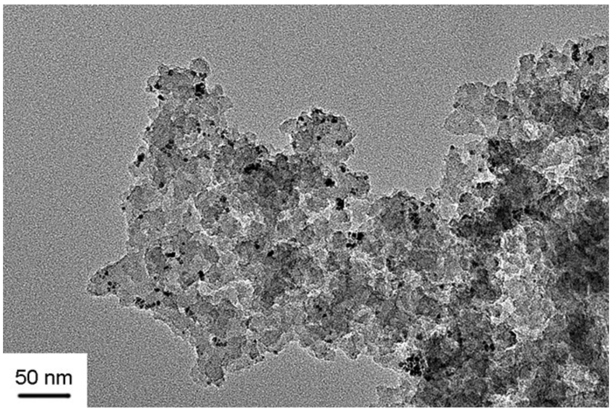


Fig. S3 TEM image for MOP-Ru.

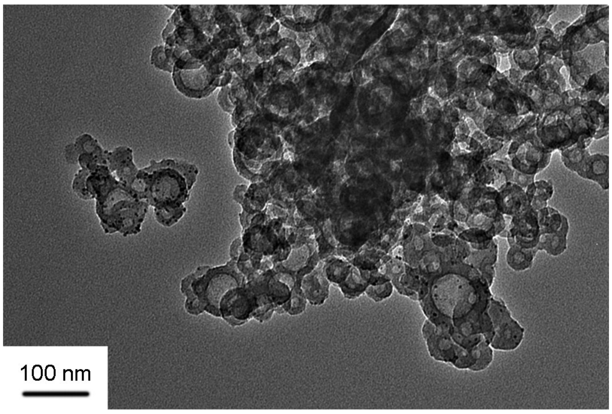


Fig. S4 TEM image for H-MONs-Ru after six runs.

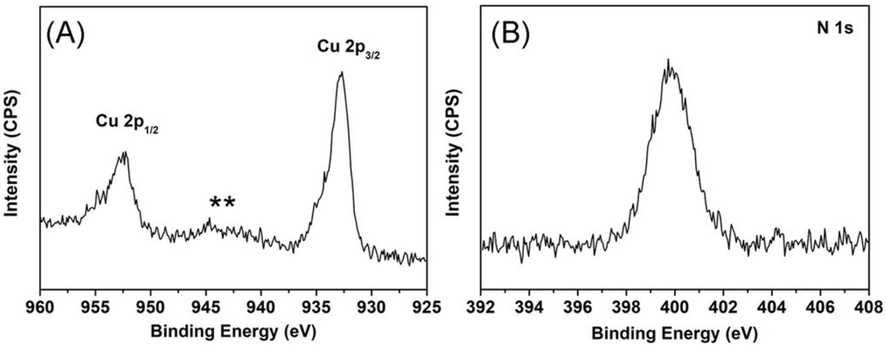


Fig. S5 XPS (A) Cu 2p and (B) N 1s spectra of H-MONs-Cu. The Cu 2p XPS spectrum of H-MONs-Cu showed shakeup satellite peaks at 942-945 eV, which confirmed the presence of Cu(II) species. Two intense peaks at 932.6 eV and 952.4 eV were attributable to Cu^{2+} $2p^{3/2}$ and Cu^{2+} $2p^{1/2}$, respectively.[1] In addition, the binding energy of the N 1s peak was shifted toward higher binding energy (at around 400 eV), which can be attributed to a decrease in the electron density of the N atom by the coordination between the N atoms in H-MONs-Cu and immobilized Cu atoms.[2]

Fig. S6 Iodine vapor adsorption apparatus set-up.

Table S1. Comparison of catalytic efficiency for the CTH of nitrobenzene with various catalysts.

We compared H-MONs-Ru with various catalysts reported in the literature for the CTH of nitrobenzene. Though in different reaction conditions, such as hydrogen-donor reagents, catalyst amount, and reaction conditions, as-prepared H-MONs-Ru catalyst shows good catalytic activity.

Catalyst	H_2 source	Amount of cat.	Time/yield	Ref.
Ru-BBA-1[a)]	$NaBH_4$	0.17 mol%	30 min/100%	3
Rh NPs/SBA-NH_2[b)]	N_2H_4	10 mg	5 min/100%	4
Ru/CMK-3[c)]	N_2H_4	20.9 mg	60 min/58%	5
Ni-PVAm/SBA-15[d)]	$NaBH_4$	0.12 g	20 min/98%	6
AuNPs-sPSB[e)]	$NaBH_4$	0.1 mol%	60 min/99%	7
Cu(10%)-Meso-PANI[f)]	$NaBH_4$	50 mg.	3 h/100%	8
Re/OMC[g)]	$NaBH_4$	0.02 mg	25 s/98%	9
Au/rutile[h)]	FA	1 mol%	0.67 h/99%	10
O-MoS_2[i)]	N_2H_4	20 mg	60 min/99%	11
H-MONs-Ru	$NaBH_4$	0.025 mol%	45 min/100%	This work

[a)] Reaction conditions: 0.5 mmol of nitrobenzene, 2.5 mmol of $NaBH_4$, THF/H_2O (1:3, v/v), RT.

[b)] Reaction conditions: 1.0 mmol of nitrobenzene, 2.0 mmol of N_2H_4, H_2O (3.0 mL), RT.

[c)] Reaction conditions: 8.1 mmol of nitrobenzene, 1.0 mL of N_2H_4, H_2O (1.0 mL), 30 ^oC.

[d)] Reaction conditions: 2.0 mmol of nitrobenzene, 8.0 mmol of $NaBH_4$, H_2O (3.0 mL), RT.

[e)] Reaction conditions: 2.54 mmol of nitrobenzene, 15.24 mmol of $NaBH_4$, methanol (6.0 mL), 25 ^oC.

[f)] Reaction conditions: 1.0 mmol of nitrobenzene, 5.0 mmol of $NaBH_4$, ethanol/H_2O (1:1, 10 mL), 40 ^oC.

[g)] Reaction conditions: nitrobenzene (1.8 mL, 0.1mM), $NaBH_4$ (0.5 mL, 0.1M), H_2O (3.0 mL), RT.

[h)] Reaction conditions: 1.0 mmol of nitrobenzene, 3.0 mmol of FA, toluene (5.0 mL), N_2 (1 bar), 60 ^oC.

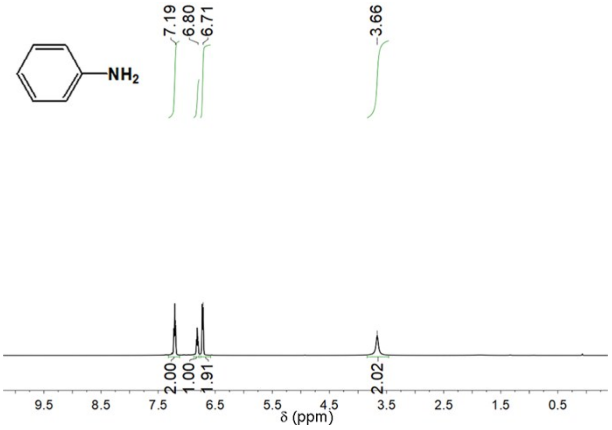
[i)] Reaction conditions: 0.5 mmol of nitrobenzene, 1.5 mmol of N_2H_4, ethanol (2.0 mL), 50 ^oC.

Table S2. Comparison of I_2 Adsorption data in various adsorbents.

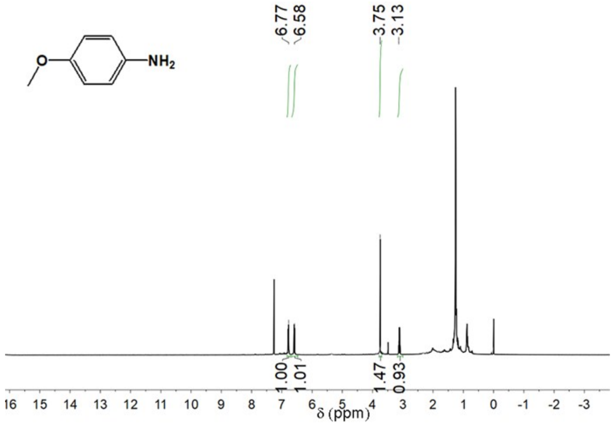
Adsorbent	Temperature (°C)	Pressure	Iodine Capacity (mg I_2/g)	Ref.
MFM-300(Sc)	80	N_2 atmosphere	1540	[12]
SCMPs	75	1 bar	2220	[13]
NTP	75	1 bar	1800	[14]
PAF-1	25	40 bar	1860	[15]
JUC-Z2	25	40 bar	1400	[15]
ZIF-8	75	1 bar	1200	[16]
Activated carbon	75	1 bar	300	[14]
Ag@Zeolite Mordenites	95	1 bar	275	[17]
Ag@Mon-POF	70	1 bar	250	[18]
CC3	20	1 bar	364	[19]
H-MONs-TA	75	1 bar	1300	This work
H-MONs-CZ	75	1 bar	1100	This work

Analytical data for compounds of the CTH of nitroarenes.

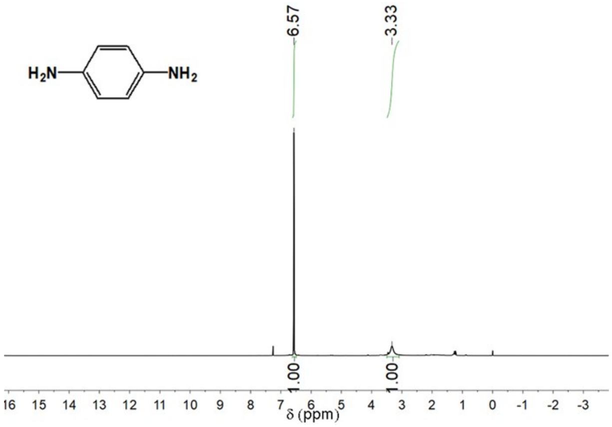
Aniline. ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.19 (t, J = 8.0 Hz, 2H); 6.80 (t, J = 7.5 Hz, 1H); 6.71 (d, J = 7.5 Hz, 2H); 3.66 (s, 2H).



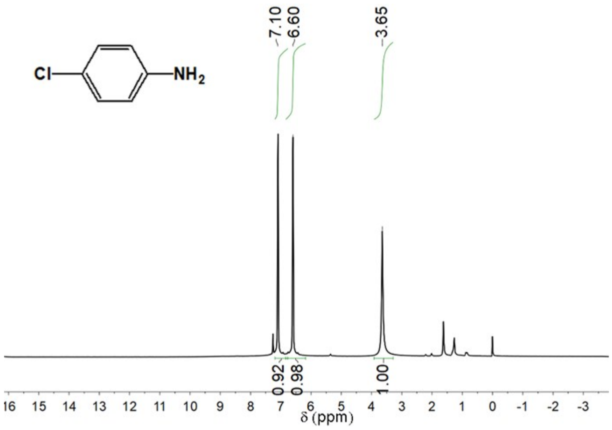
4-Aminoanisole. ^{1}H NMR (500 MHz, $CDCl_3$): δ 6.77 (d, J = 8.0 Hz, 2H); 6.58 (d, J = 8.0 Hz, 2H); 3.75 (s, 3H); 3.13 (bs, 2H).



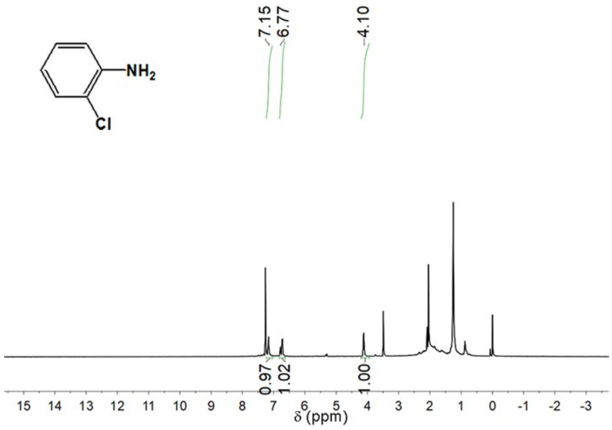
1, 4-Phenylenediamine. ^{1}H NMR (500 MHz, $CDCl_3$): δ 6.57 (s, 4H); 3.33 (s, 4H).



4-Chloroaniline. ^{1}H NMR (500 MHz, CDCl$_3$): δ 7.10 (d, J = 6.5 Hz, 2H); 6.60 (d, J = 6.5 Hz, 2H); 3.65 (s, 2H).



2-Chloroaniline. ^{1}H NMR (500 MHz, CDCl$_3$): δ 7.15 (m, 2H); 6.77 (d, J = 7.5 Hz, 2H); 4.10 (bs, 2H).



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