Electronic Supplementary Material (ESI) for Catalysis Science & Technology

Stabilizing Pd on the surface of hollow magnetic mesoporous spheres: a highly active and recyclable catalyst for hydrogenation and Suzuki coupling reaction

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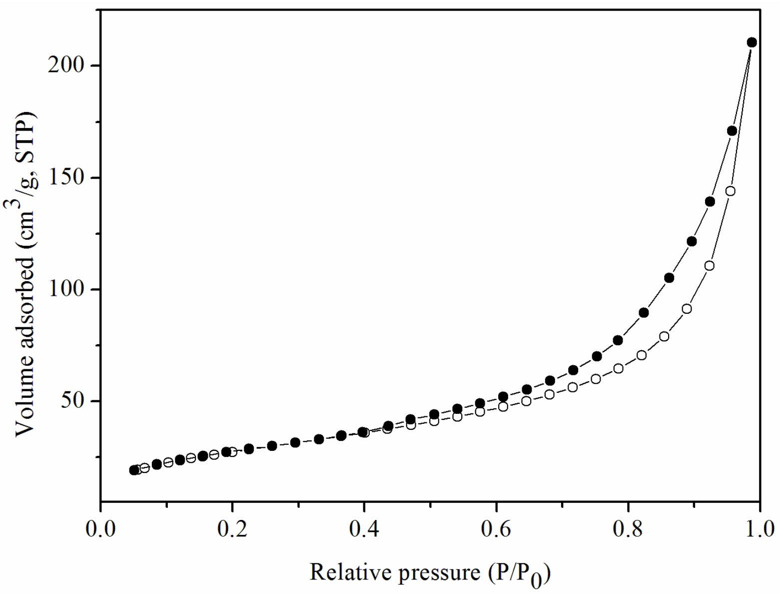


Fig.S1 N_2 sorption isotherms of HMMS-NH_2-Pd catalyst

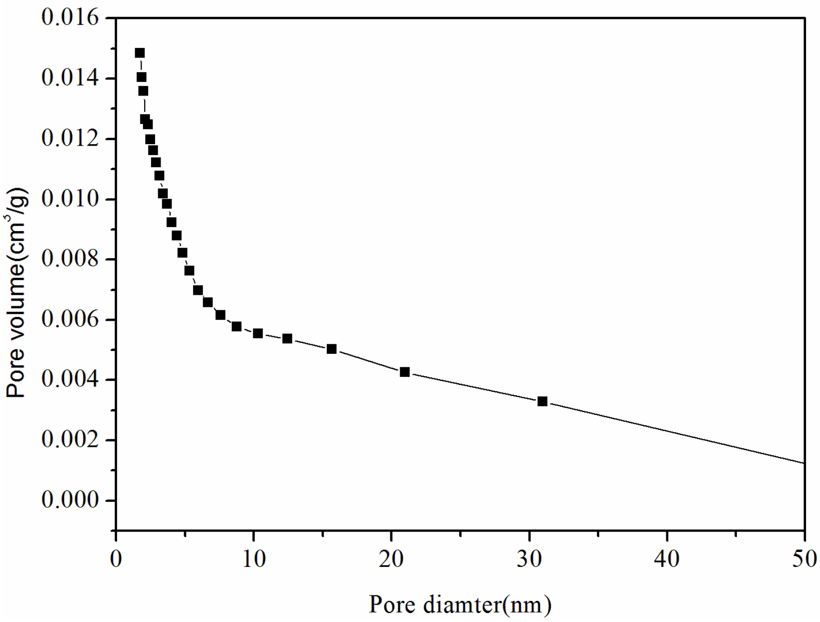


Fig. S2 The pore size distribution of HMMS-NH_2-Pd catalyst

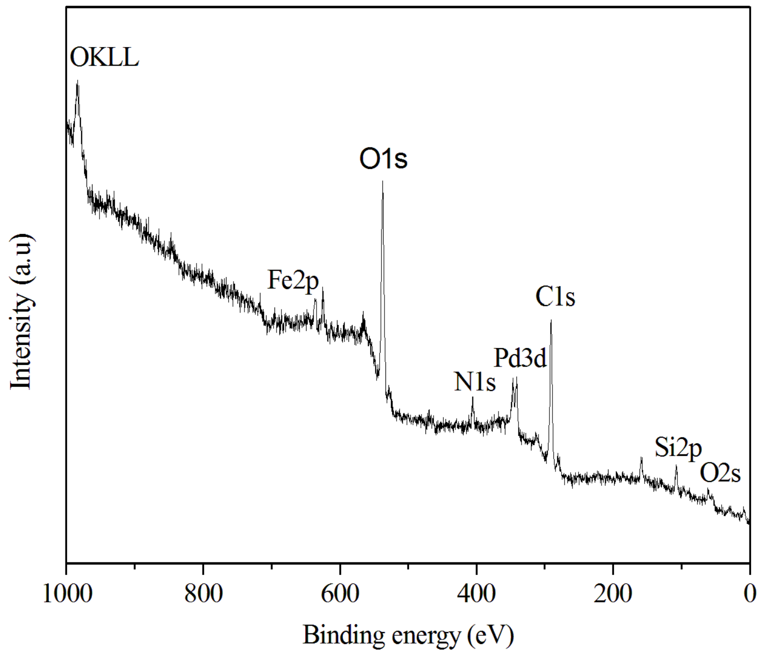


Fig. S3 XPS spectrum of the elemental survey scan of HMMS-NH_2-Pd

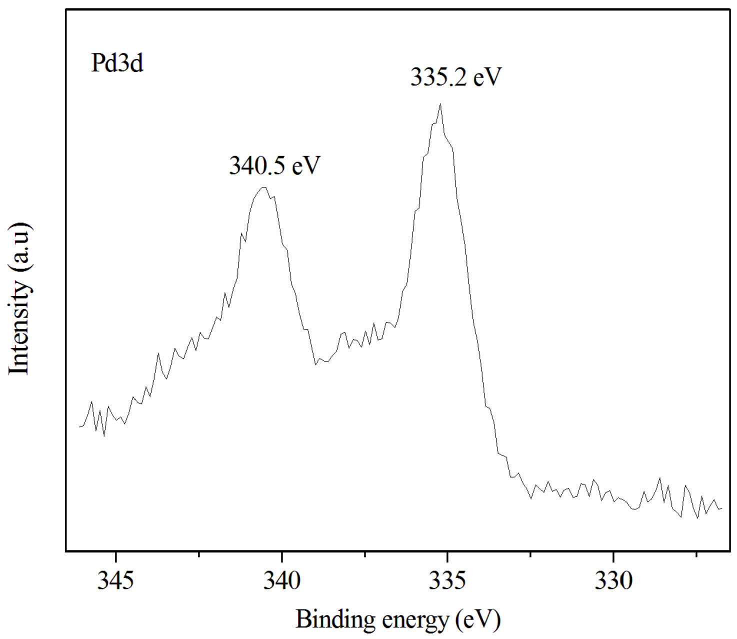


Fig. S4 XPS spectrum of the HMMS-NH_2-Pd showing Pd $3d_{5/2}$ and Pd $3d_{3/2}$ binding energies

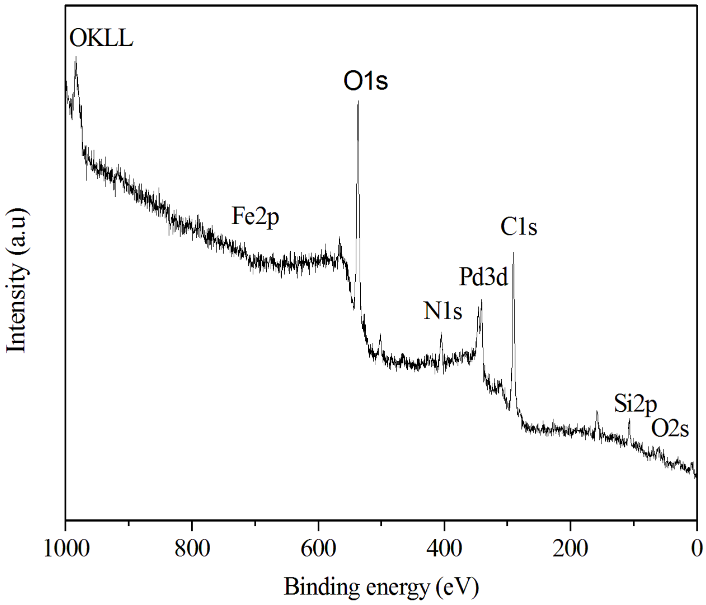


Fig. S5 XPS spectrum of the elemental survey scan of reused HMMS-NH_2-Pd

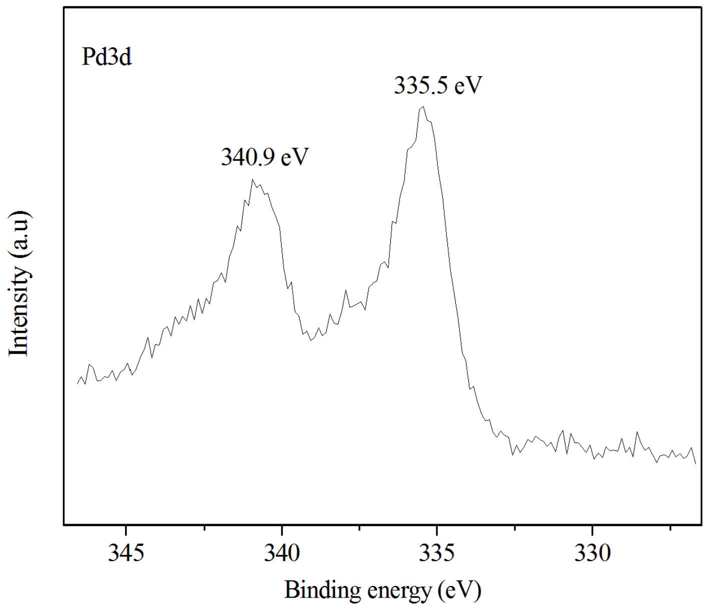
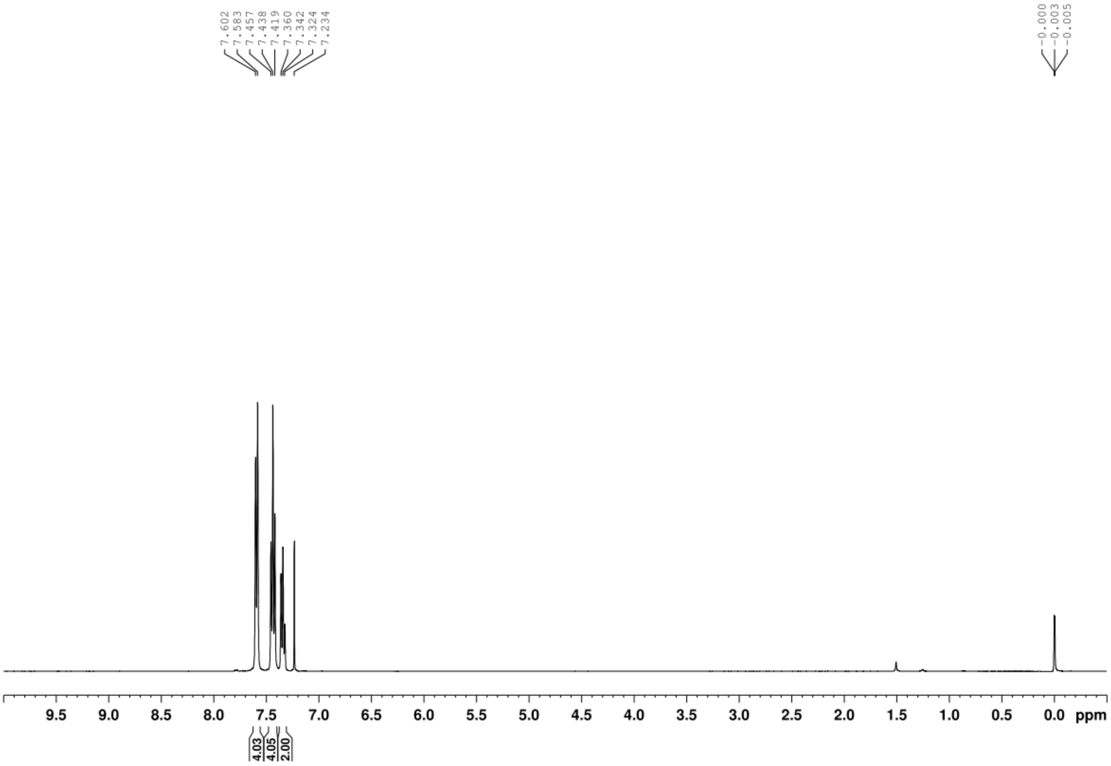


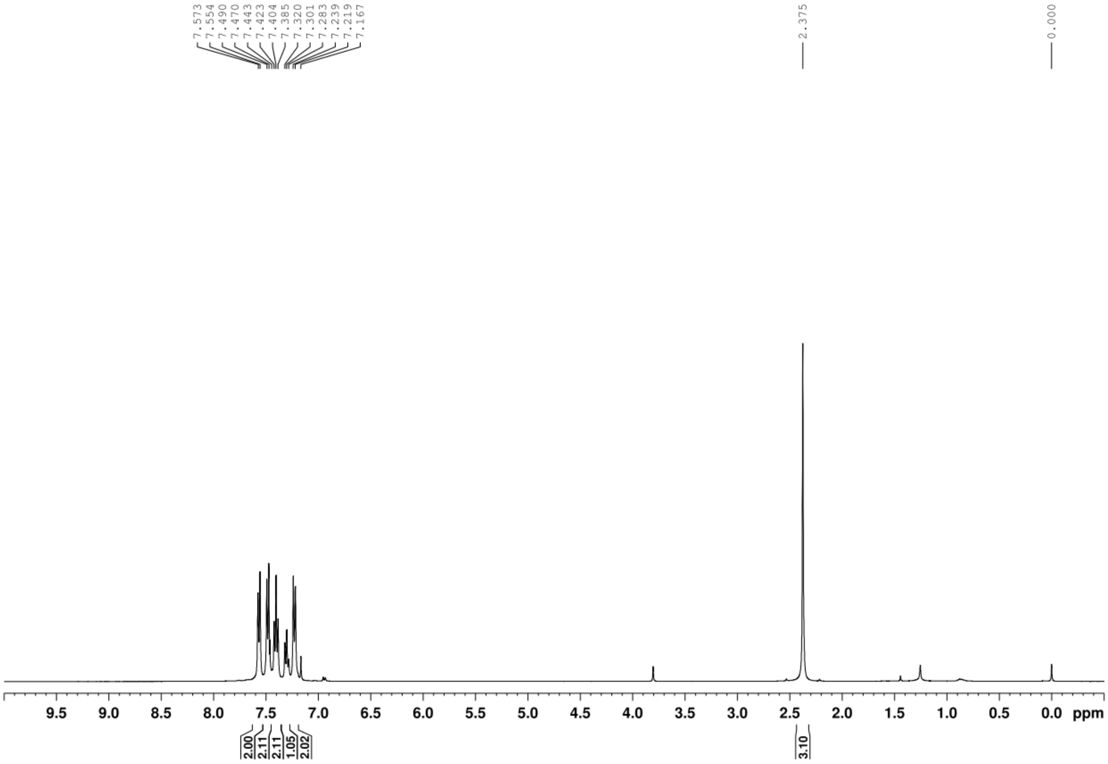
Fig. S6 XPS spectrum of the reused HMMS-NH_2-Pd showing Pd $3d_{5/2}$ and Pd $3d_{3/2}$ binding energies

1. Biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 7.342 (t, 2H, $^3J_{HH}$=7.2 Hz), 7.438 (t, 4H, $^3J_{HH}$=7.6 Hz), 7.593 (d, 4H, $^2J_{HH}$=4.0 Hz)

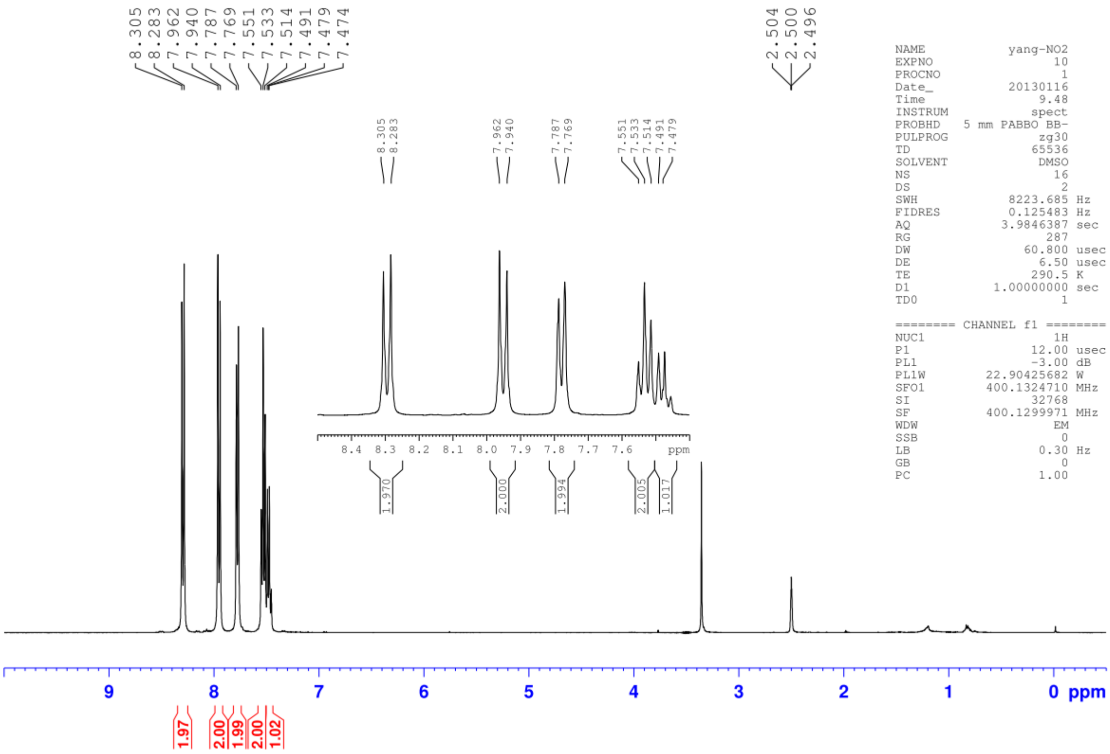


2. 4-methyl-biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

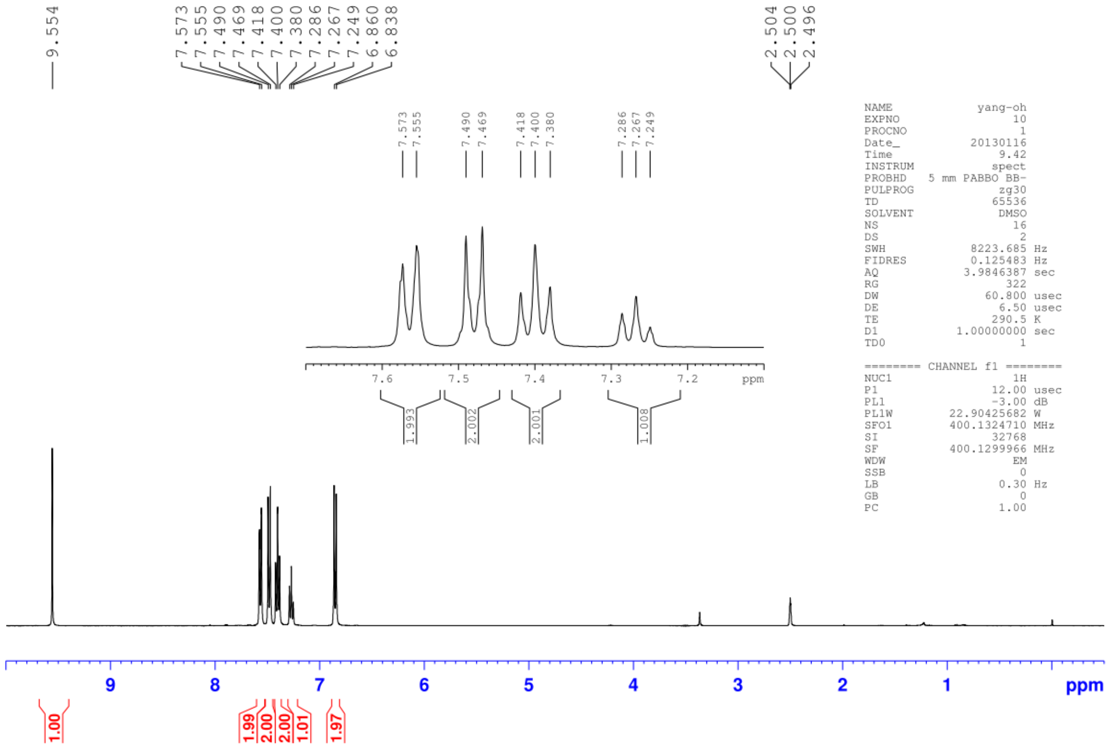
δ 2.375 (s, 3H, CH_3), 7.229 (d, 2H, $^{2}J_{HH}$=4.0 Hz), 7.301 (t, 1H, $^{3}J_{HH}$=7.2 Hz), 7.404 (t, 2H, $^{3}J_{HH}$=7.6 Hz), 7.467 (t, 2H, $^{3}J_{HH}$=9.6 Hz), 7.563 (d, 2H, $^{2}J_{HH}$=4.0 Hz)



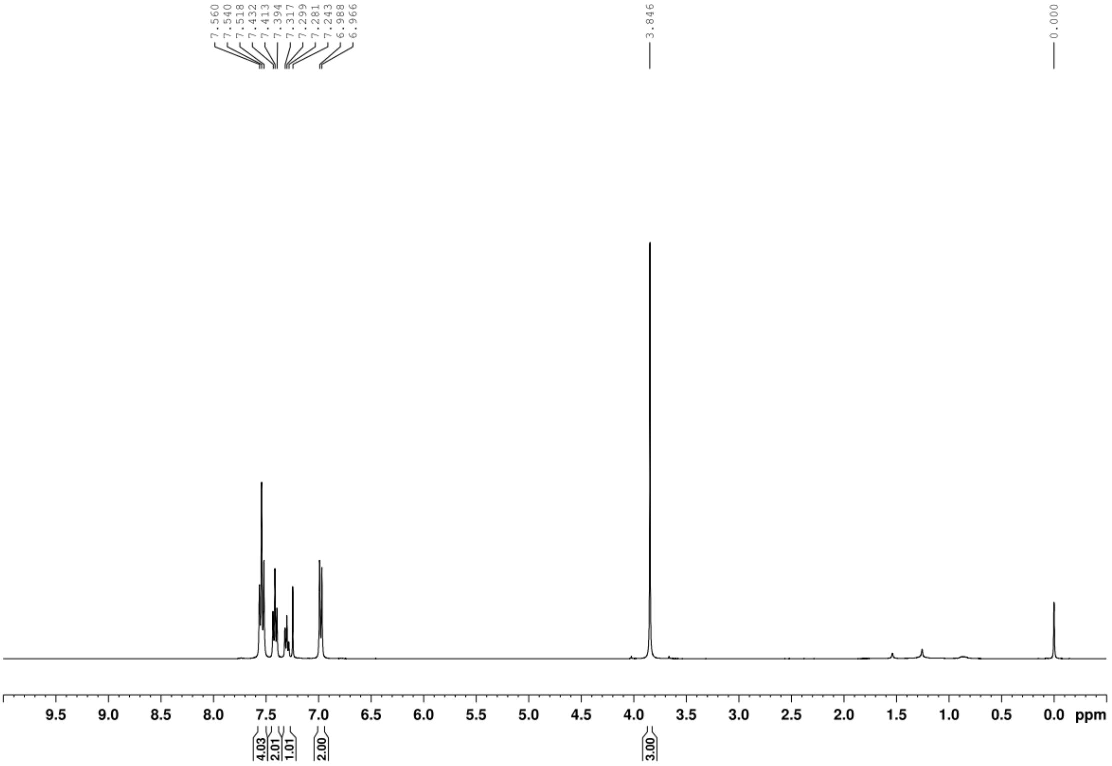
3. 4-Nitro-biphenyl. [1]H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)
δ 6.849 (d, 1H, $^2J_{HH}$=8.8 Hz), 7.267 (t, 2H, $^3J_{HH}$=7.6Hz), 7.400 (t, 2H, $^3J_{HH}$=7.8 Hz), 7.479 (d, 2H, $^2J_{HH}$=8.4 Hz), 7.564 (d, 2H, $^2J_{HH}$=7.6 Hz)



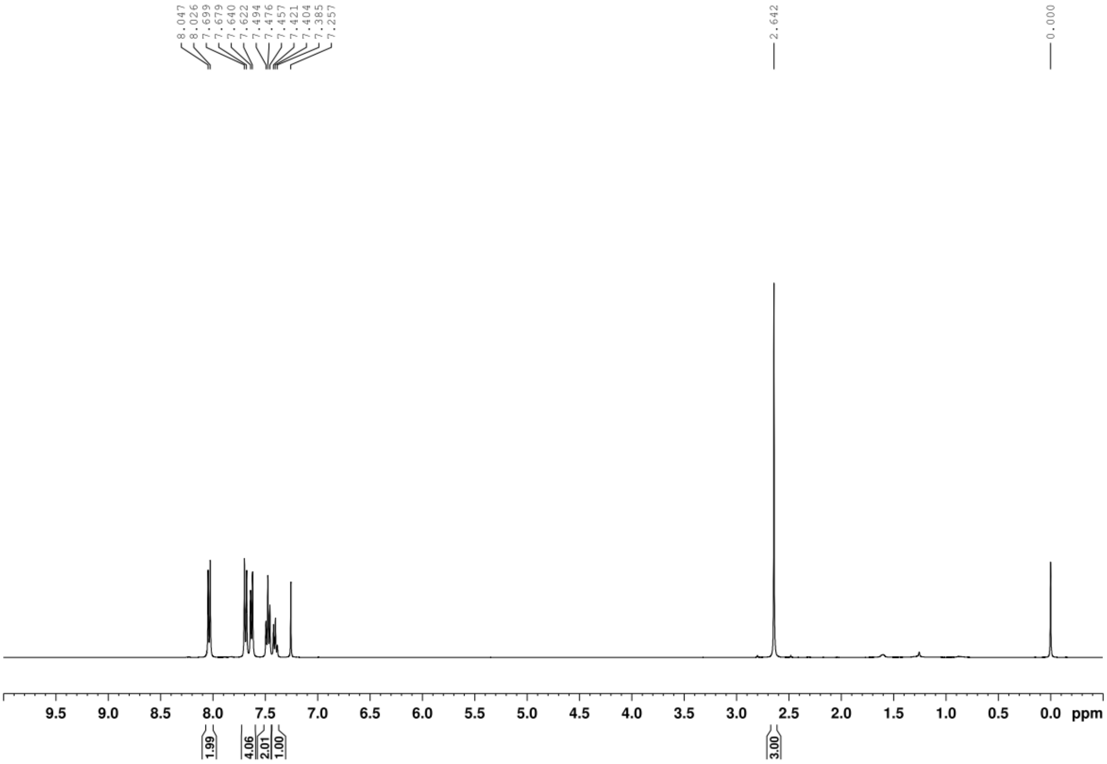
4. Biphenyl-4-ol. ^{1}H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)
δ 6.845 (d, 2H, $^{2}J_{HH}$=4.8 Hz), 7.267 (t, 1H, $^{3}J_{HH}$=7.6 Hz), 7.400 (d, 2H, $^{2}J_{HH}$=7.2 Hz), 7.469 (d, 2H, $^{2}J_{HH}$=8.8 Hz), 7.555 (d, 2H, $^{2}J_{HH}$= 8.8 Hz), 9.554 (s, 1H, OH)



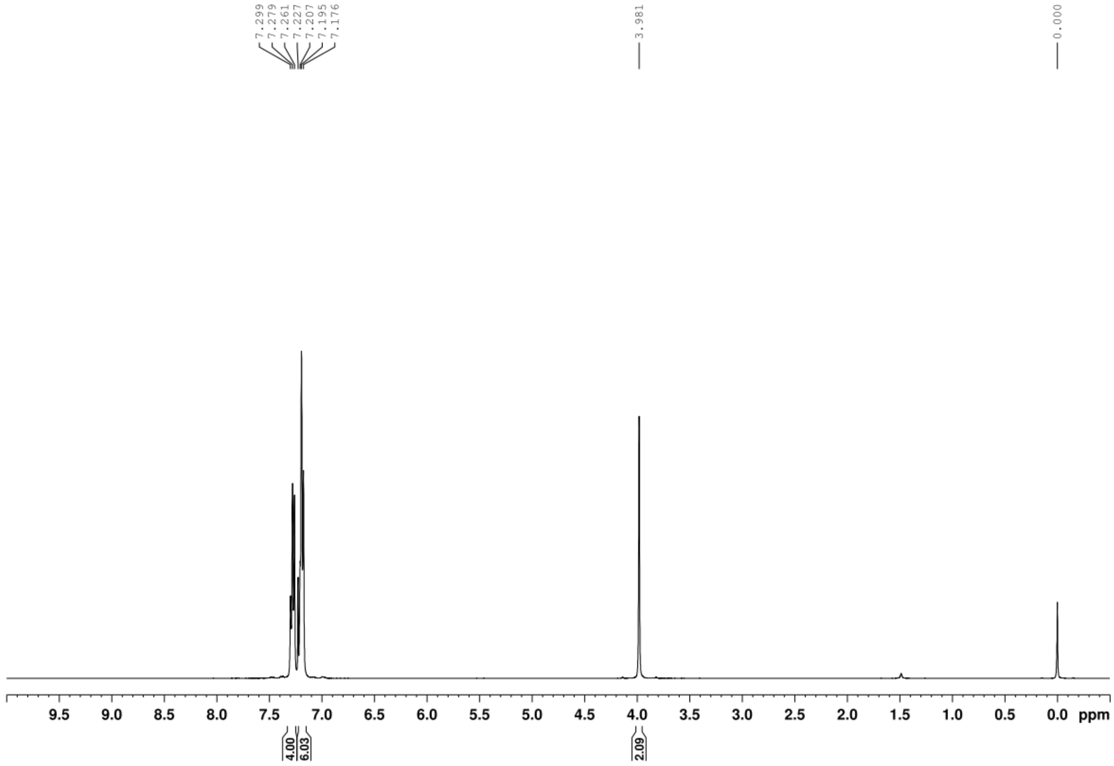
5. 4-Methoxy-biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 3.846 (s, 3H, OCH_3), 6.977 (d, 2H, $^{2}J_{HH}$=4.4 Hz), 7.299 (t, 1H, $^{3}J_{HH}$=7.2 Hz), 7.413 (t, 2H, $^{3}J_{HH}$=7.6 Hz), 7.541 (t, 4H, $^{3}J_{HH}$=7.6 Hz)



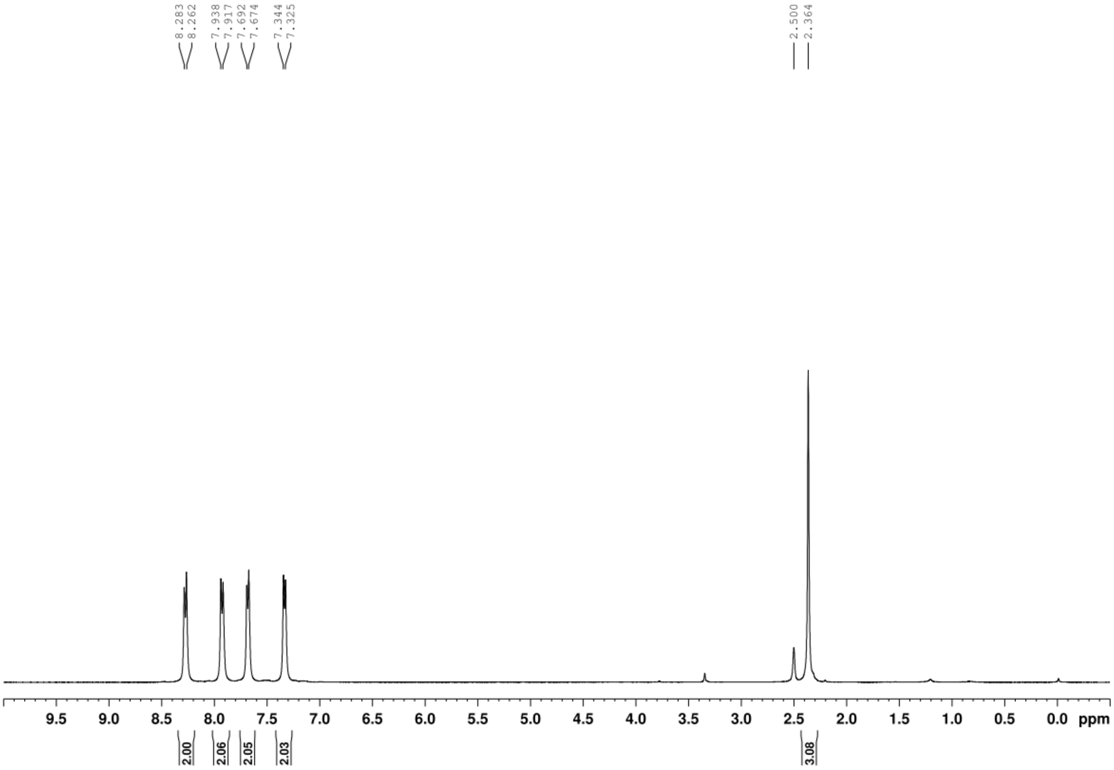
6. 1-biphenyl-4-yl-ethanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 2.642 (s, 3H, COCH_3), 7.403 (t, 1H, $^3J_{HH}$=7.2 Hz), 7.476 (t, 2H, $^3J_{HH}$=7.6 Hz), 7.631 (d, 2H, $^2J_{HH}$=3.6 Hz), 7.689 (d, 2H, $^2J_{HH}$=4.0 Hz), 8.037 (d, 2H, $^2J_{HH}$=4.0 Hz)



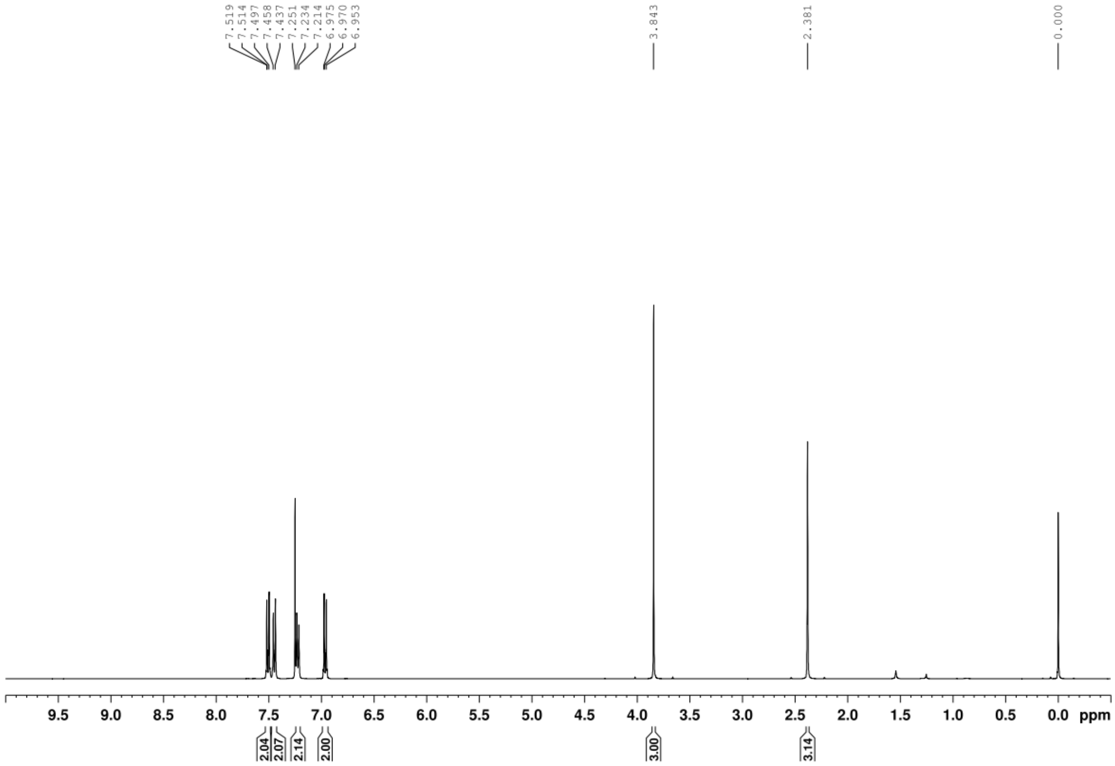
7. Diphenylmethane. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 3.981 (s, 2H, CH_2), 7.201 (m, 6H), 7.279 (t, 4H, $^{3}J_{HH}$=7.6 Hz)



8. 4-methyl-4'-niro-biphenyl. ^{1}H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)
δ 2.364 (s, 3H, CH_3), 7.334 (d, 2H, $^{2}J_{HH}$=4.0 Hz), 7.683 (d, 2H, $^{2}J_{HH}$=3.6 Hz), 7.927 (d, 2H, $^{2}J_{HH}$=4.0 Hz), 8.273 (d, 2H, $^{2}J_{HH}$=4.0 Hz)



9. 4'-methoxy-4-methyl-biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 2.381 (s, 3H, CH_3), 3.843 (s, 3H, OCH_3), 6.966 (t, 2H, $^3J_{HH}$=5.2 Hz), 7.232 (t, 2H, $^3J_{HH}$=7.6 Hz), 7.448 (d, 2H, $^2J_{HH}$ =4.0 Hz), 7.510 (t, 2H, $^3J_{HH}$=5.2 Hz)



10. 4,4'-dimethyl-biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 2.380 (s, 6H, CH_3), 7.229 (d, 4H, $^{2}J_{HH}$ =7.6 Hz), 7.472 (d, 4H, $^{2}J_{HH}$ =8.0 Hz)