One-pot synthesis L-dopa-functionalized water-dispersible magnetite nano-palladium catalyst and application in the Suzuki and Heck reactions in water: a novel and highly active catalyst

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1.Biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

δ 7.343 (t, 2H, J=7.2 Hz), 7.439 (t, 4H, J=7.6 Hz), 7.594 (d, 4H, J=4.0 Hz)

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

δ 2.376 (s, 3H, CH3), 7.230 (d, 2H, J=4.0 Hz), 7.302 (t, 1H, J=7.2 Hz), 7.405 (t, 2H, J=7.6 Hz), 7.468 (t, 2H, J=9.6 Hz), 7.564 (d, 2H, J=4.0 Hz)

3.4-Nitro-biphenyl. ^{1}H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)

δ 6.849 (d, 1H, J=8.8 Hz), 7.268 (t, 2H, J=7.6Hz), 7.402 (t, 2H, J=7.8 Hz), 7.478 (d, 2H, J=8.4 Hz), 7.566 (d, 2H, J=7.6 Hz)

4.4-methyl-4'-nitro-1,1'-biphenyl.^{1}H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)

δ 2.365 (s, 3H, CH_3), 7.336 (d, 2H, J=4.0 Hz), 7.685 (d, 2H, J=3.6 Hz), 7.928 (d, 2H, J=4.0 Hz), 8.275 (d, 2H, J=4.0 Hz)

5.4-Methoxylbiphenyl. ^{1}H NMR (400 MHz, $CDCl_3$)

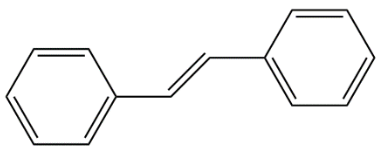
δ (ppm) = 7.52-7.57 (t, J = 8.6 Hz, 4H, ArH), 7.38-7.42 (t, J = 7.4 Hz, 2H, ArH), 7.29-7.32 (t, J = 7.0 Hz, 1H, ArH), 6.98-6.70 (d, J = 8.4 Hz, 2H, ArH), 3.87 (s, 3H, $-CH_3$)

6.3-Methylbiphenyl. ^{1}H NMR (400 MHz, $CDCl_3$)

δ (ppm) = 7.58-7.60 (m, 2H, ArH), 7.43-7.46 (m, 4H,ArH),7.33-7.37 (m,2H, ArH),7.17-7.19 (d, J = 6.4 Hz, 1H, ArH), 2.44 (s, 3H, CH_3)

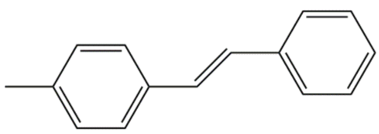
7.2-Nitrobiphenyl.^{1}H NMR (400 MHz, $CDCl_3$)

δ (ppm) = 7.88-7.90 (dd, J = 8 Hz, J = 0.8 Hz, 1H, ArH), 7.62-7.66 (m, 1H, ArH), 7.44-7.54 (m, 5H, ArH), 7.35-7.37 (m, 2H, ArH)



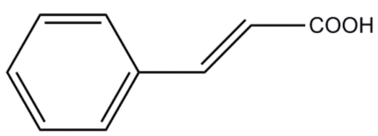
Trans-1, 2-diphenylethene

^{1}H NMR (400 MHz, $CDCl_3$): δ (ppm) = 7.57 (d, J = 7.2 Hz, 4H, ArH), 7.33-7.37 (t, J = 7.6 Hz, 4H, ArH), 7.22-7.27 (m, 2H, ArH), 7.10 (s, 2H, =CH)



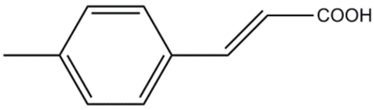
(E)-4-Methyl Stilbene

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) = 7.49(d, 2H, J= 7.17 Hz, ArH),2.34 (s, 3H), δ = 7.16 (d, 2H, J = 7.8 Hz, ArH), δ = 7.25 (t, 1H, J= 7.29 Hz, ArH), δ = 7.25 (t, 2H, J= 7.7 Hz, ArH), δ = 7.41 (d, 2H,J= 8.07 Hz, ArH), δ = 7.50 (d, 2H, J= 7.17 Hz, ArH), δ =7.06 (s, 2H, Vinylic-H).



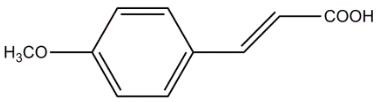
***trans*-Cinnamic acid**

^{1}H NMR (400 MHz, $CDCl_3$): δ (ppm) = 12.1 (s, 1H, -COOH), 7.79-7.83 (d, J = 16.0 Hz, 1H, =CH), 7.55-7.58 (m, 2H, ArH), 7.41-7.43 (t, J = 3.0 Hz, 3H, ArH), 6.45-6.49 (d, J = 16.0 Hz, 2H, =CH);



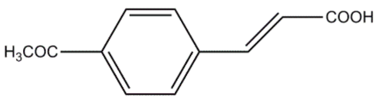
***trans*-*p*-Methylcinnamic acid**

^{1}H NMR (400 MHz, $CDCl_3$): δ (ppm) = 7.76-7.80(d, J =15.6 Hz, 1H, =CH), 7.46-7.48 (d, J = 8.1 Hz, 2H, ArH), 7.22-7.24 (d, J = 8 Hz, 2H, ArH), 6.40-6.44 (d, J = 16.0 Hz, 1H, =CH), 2.40 (s, 3H, CH_3)



***trans*-*p*-Methoxycinnamic acid**

^{1}H NMR (400 MHz, DMSO-d_6): δ (ppm) = 12.26 (s, 1H, -COOH), 7.75 (s, 2H, ArH), 7.52-7.54 (d, J = 15.2 Hz,1H, =CH),6.94 (s, 2H, ArH), 6.36-6.40 (d, J = 15.2 Hz, 1H, =CH), 3.86 (s, 3H, -OCH_3)



***trans*-*p*-Carboxycinnamic acid**

^{1}H NMR (400 MHz, DMSO-d_6): δ (ppm) = 12.60 (s, 1H, -COOH), 7.96-7.80 (d, J = 6.0 Hz, 2H, ArH), 7.82-7.85 (d, J =6.0 Hz, 2H, ArH), 7.63-7.67 (d, J = 16.0 Hz, 1H, =CH), 6.65-6.69 (d, J = 16.0 Hz, 1H, =CH), 2.60 (s, 3H, -CH_3)