In Situ Decorated Palladium Nanoparticles on Chitosan Beads as a Catalyst for Coupling Reactions

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NMR analysis of prepared compound 3a

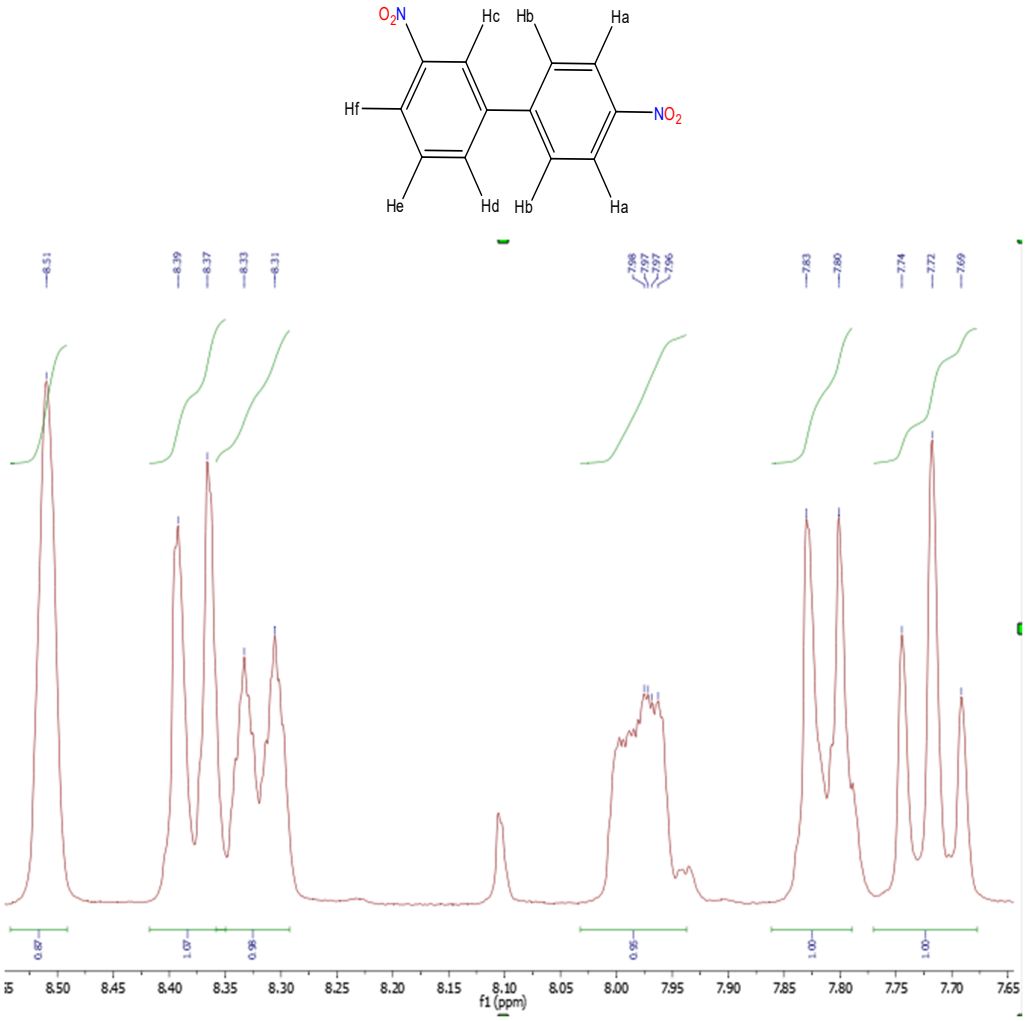


Figure S1. 1H NMR Spectrum of compound **3a**

Yellow solid, mp 134-136 °C, yield: **91%**, 1H NMR (300 MHz, $CDCl_3$) (δ ppm) :

8.51 (s ; 1H ; Hc), 8.37 (d; $3J_{Ha-Hb}$ = 9 Hz ; 2H ; Ha), 8.32 (d ; $3J_{Hf-He}$ = 9 Hz ; 1H ; Hf), 7.98 (d ; $3J_{Hd-He}$ = 9 Hz ; 1H ; Hd), 7.81 (d ; $3J_{Hb-Ha}$ = 9Hz ;2H ; Hb), 7.72 (t ; $3J_{He-Hd}$= 9 Hz ; $3J_{He-Hd}$= 15 Hz ; 1H ; He).

NMR analysis of prepared compound 3b

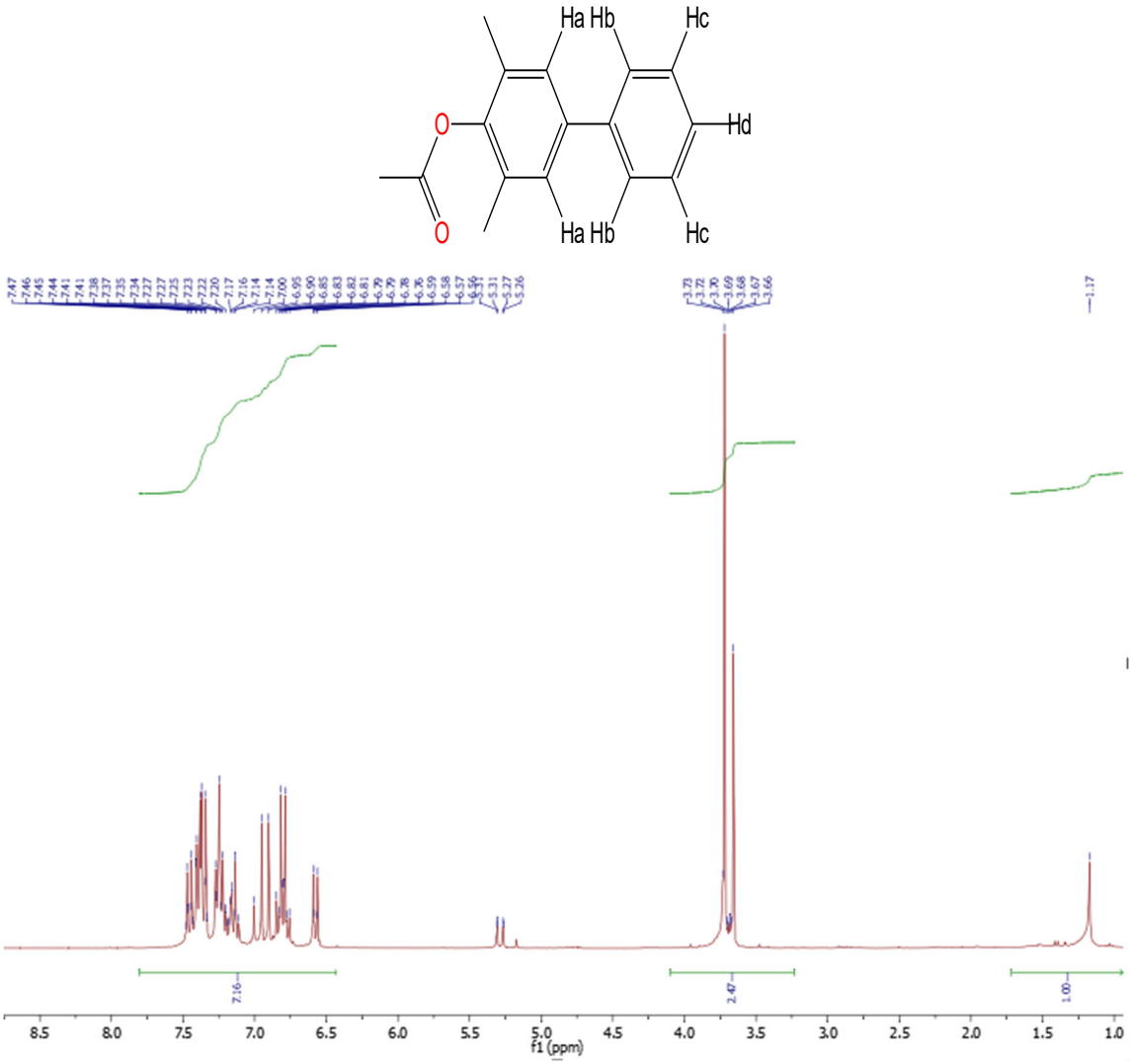


Figure S2. 1H NMR Spectrum of compound **3b**

Yellow solide, mp 122-123 °C, yield : **84%**, ^{1}H NMR (300 MHz, $CDCl_3$) (δ ppm):1.17-3.69 (s; 9H), 7.19 (d; $3J_{Hd-Hc}$= 7.5 Hz; Hb), 7.29 (dd; $3J_{Hc-Hb}$= 7.3 Hz; 1Hc), 7.5 (d; $3J_{Hc-He}$= 8.75 Hz; Hd).

NMR analysis of prepared compound 3c

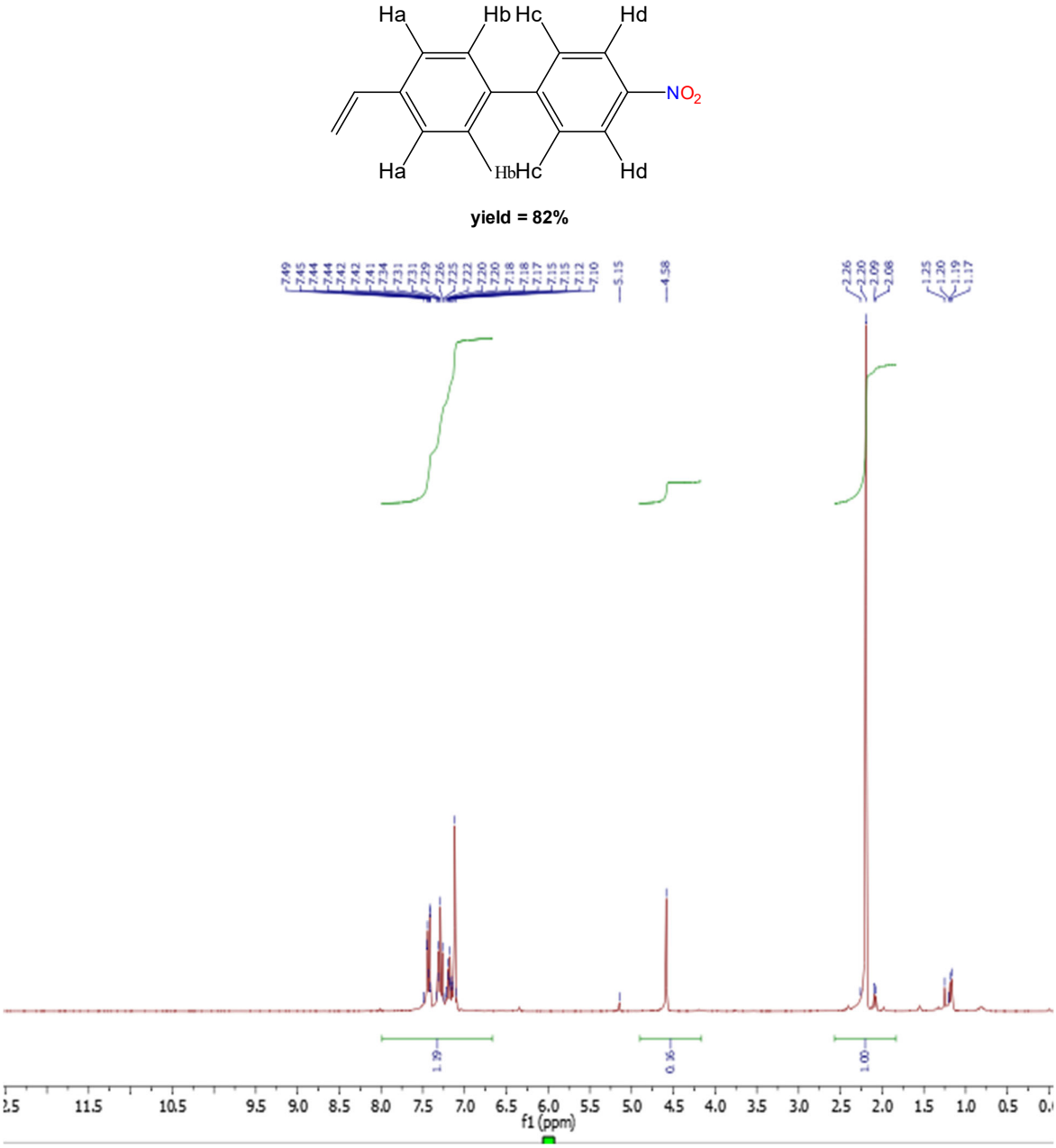


Figure S3. 1H NMR Spectrum of compound **3c**

Yellow solid, mp 109-110 °C ,yield : **82%,** ^{1}H NMR (300 MHz, $CDCl_3$) (δ ppm) : 3.66 (s ; 2H), 6.58 (d; $3J_{Ha-Hb}$ =8.9 Hz ; 2H ; Hd), 6.77 (d ; $3J_{Hf-He}$ = 6.5 Hz ; 1H ; Hb), 6.84 (d ; $3J_{Hd-He}$ = 6.5Hz ; 1H ; Ha),7.46 (d ; $3J_{He-Hd}$= 9 Hz ; 2Hc).

NMR analysis of prepared compound 3d

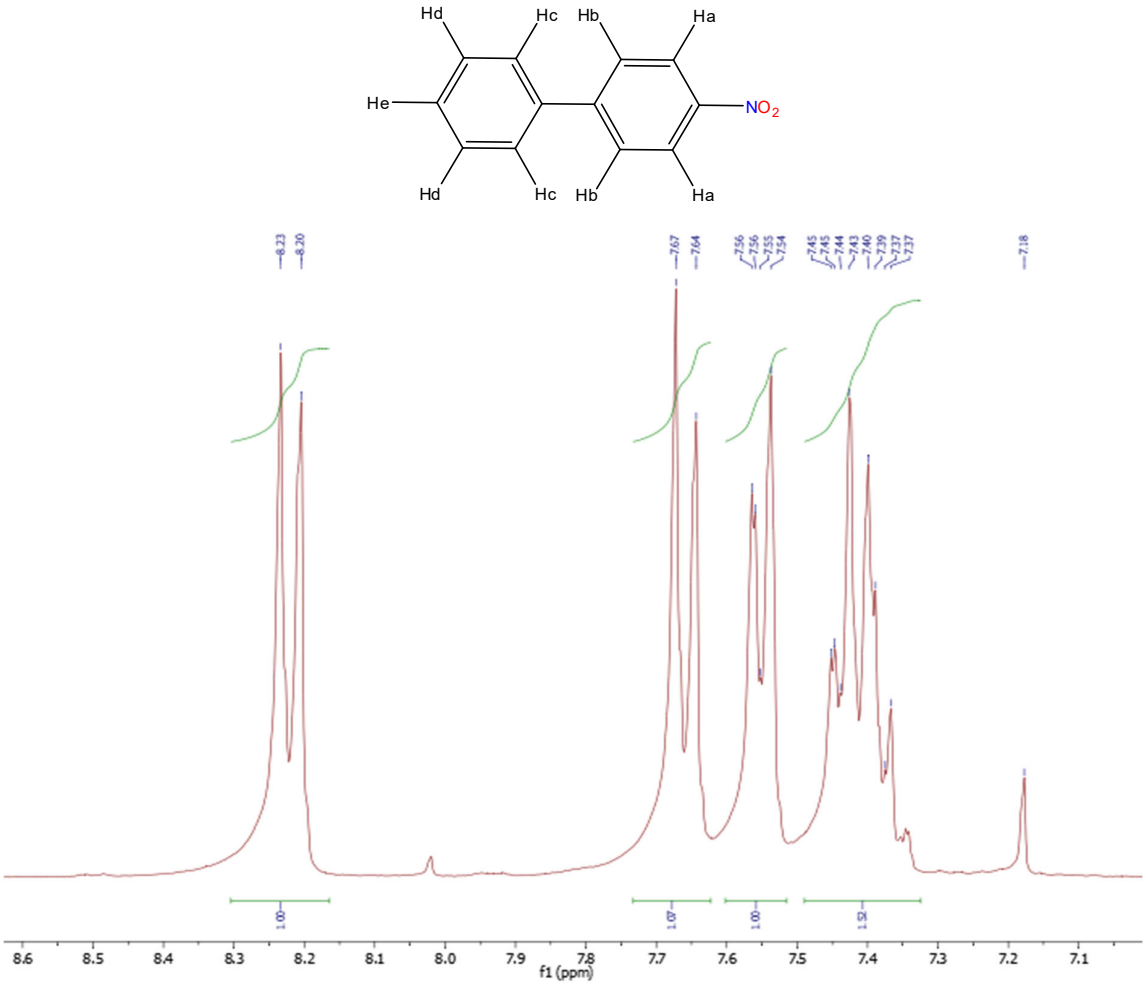


Figure S4. 1H NMR Spectrum of compound **3d**

Yellow solid, mp 112-113 °C, yield : **58%,** ^{1}H NMR (300 MHz, $CDCl_3$) (δ ppm) : 8.22 (d ; $3J_{Ha-Hb}$ = 9 Hz ; 2H ; Ha), 7.66 (d; $3J_{Hb-Ha}$ = 9 Hz ; 2H ; Hb), 7.55 (d ; $3J_{Hc-Hd}$ = 9 Hz ; 2H ; Hc), 7.41 (m ; Hd and He, 3H).

NMR analysis of prepared compound 3e

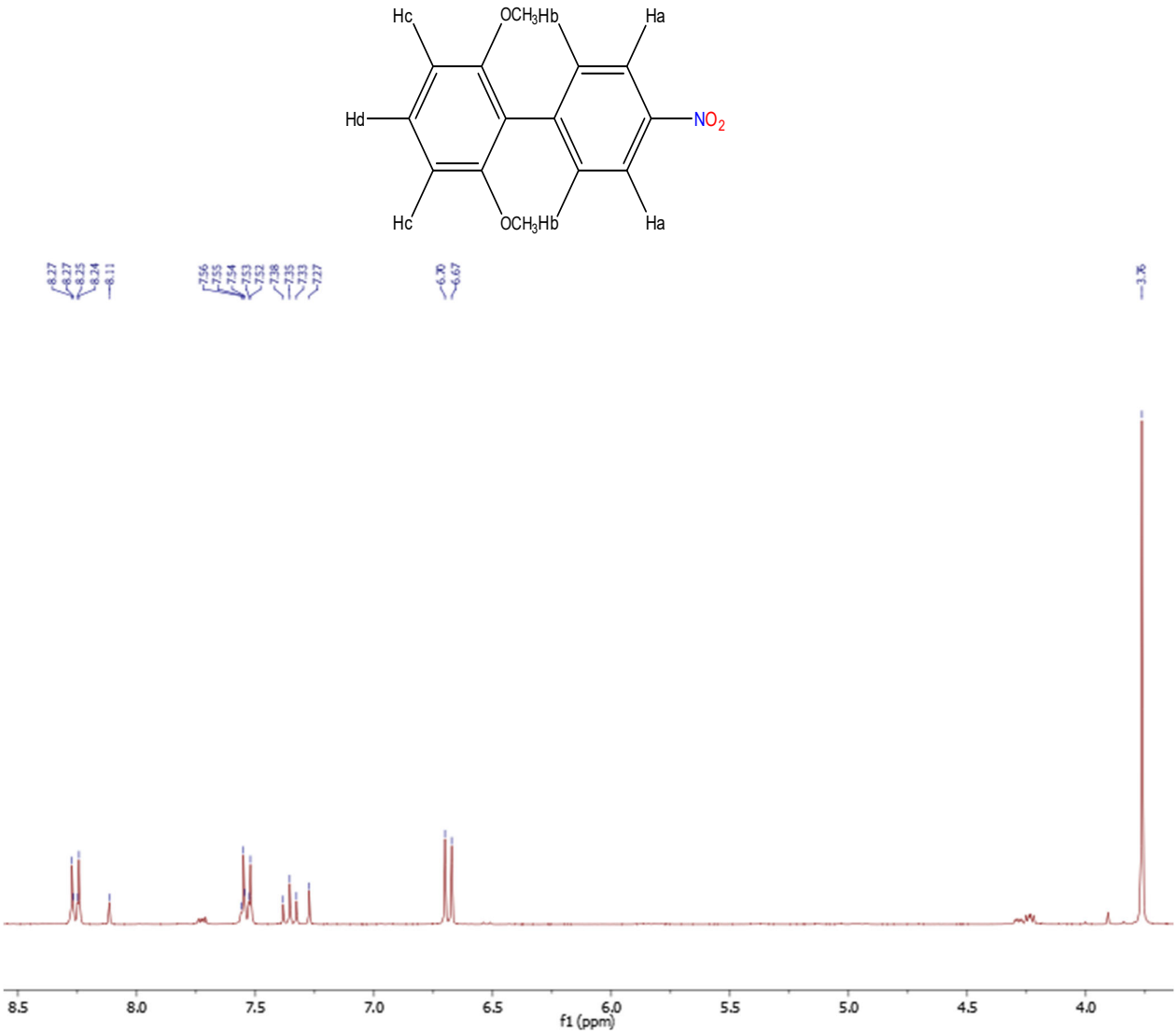


Figure S5. 1H NMR Spectrum of compound **3e**

Pale yellow powder, mp 132-133 °C, yield : **66%**, ^{1}H NMR (300 MHz, $CDCl_3$) (δ ppm) : 8.26 (d; $3J_{Ha-Hb}$ = 9 Hz ; 2H ; Ha), 7.54 (d ; $3J_{Hb-Ha}$ = 9 Hz ; 2H ; Hb), 7.35 (t ; $3J_{Hd-Hc}$= 9 Hz ; $3J_{Hd-Hc}$= 15 Hz ; 1H ; Hd) , 6.68 (d ; $3J_{Hc-Hd}$= 9 Hz ; 2H ; Hc), 3.76 (s ;6H).

NMR analysis of prepared compound 3f

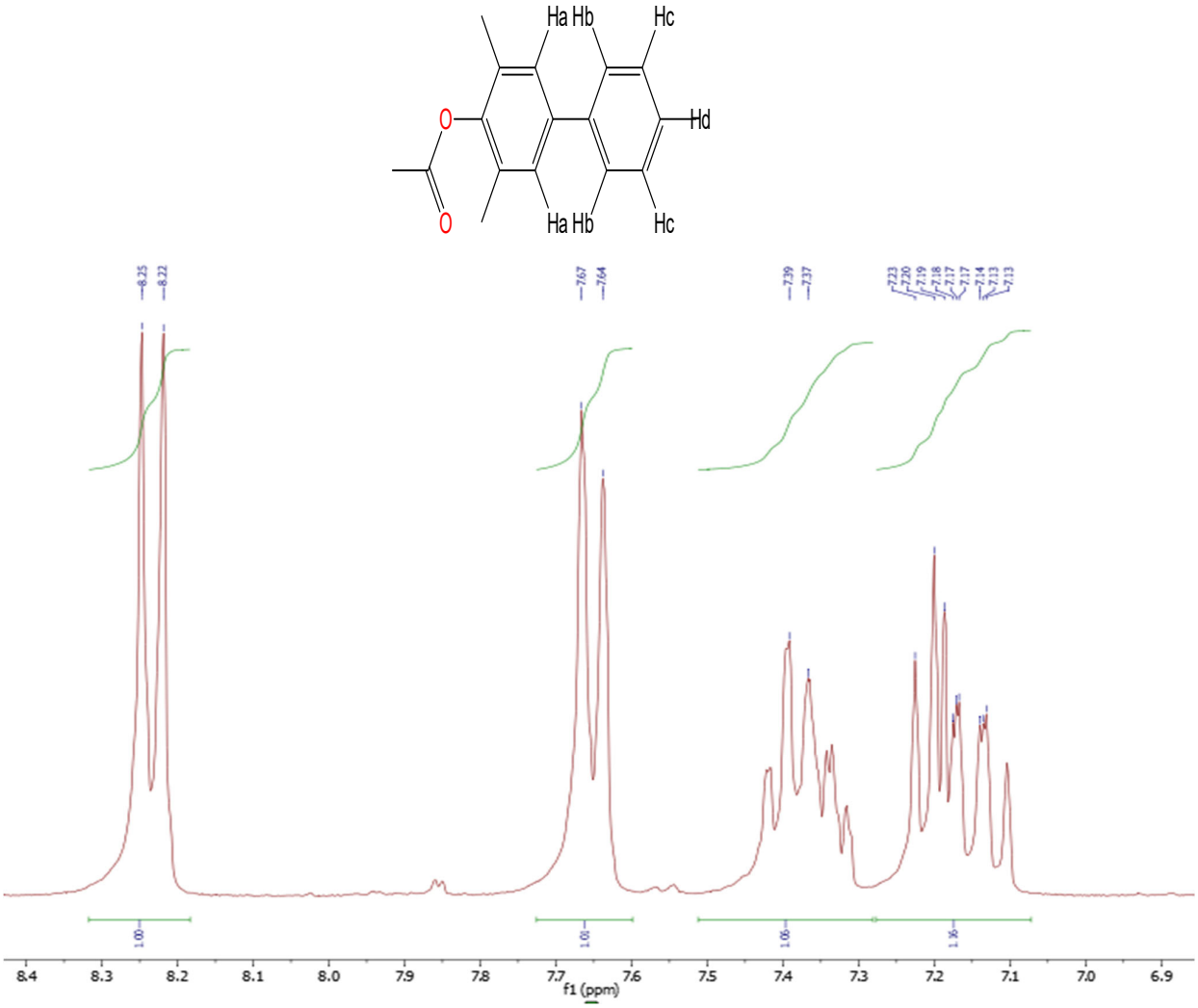
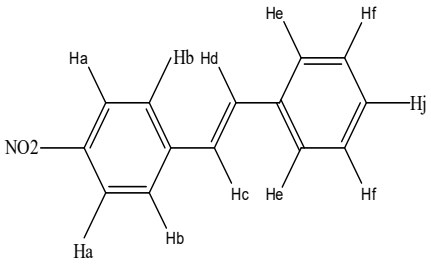


Figure S6. 1H NMR Spectrum of compound **3f**

Yellow powder, mp 114-115 °C ,yield : **44%,** ^{1}H NMR (300 MHz, $CDCl_3$) (δ ppm) 8.22 (d ; $3J_{Ha\text{-}Hb}$ = 9 Hz ; 2H ; Ha), 7.65 (d; $3J_{Hb\text{-}Ha}$ = 9 Hz ; 2H ; Hb), 7.37 (m ; F, He and Hf ; 2H ; F), 7.16 (m ; Hc, Hd and Hf, 3H).

NMR analysis of prepared compound 5a



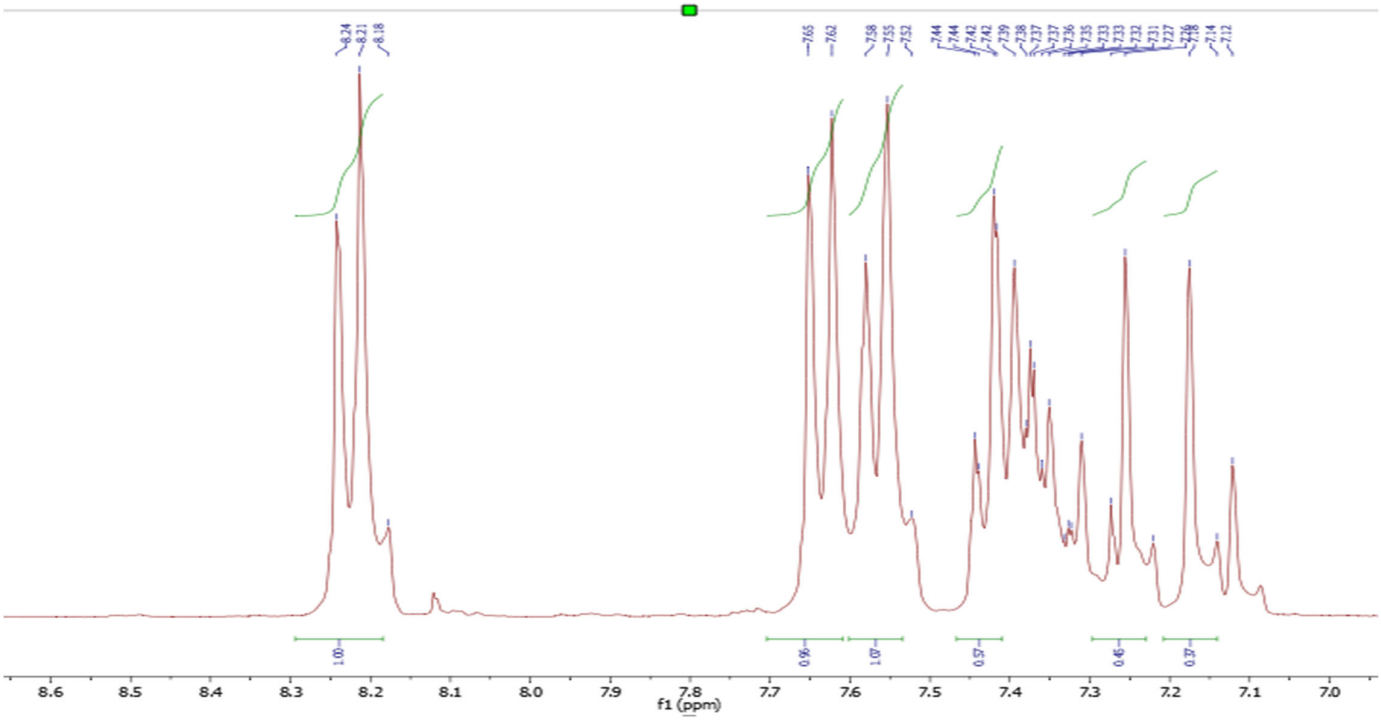


Figure S7. 1H NMR Spectrum of compound **5a**

Yellow solid, mp 156-157 °C, yield: **82%**, 1H NMR (300 MHz, CDCl3) (δ ppm) : 8.14 (d; $^3J_{Ha\text{-}Hb}$ = 9 Hz ; 2H ; Hd), 7.55 (d; $^3J_{Hb\text{-}Ha}$ = 9 Hz ; 2H ; Hb) , 7.47 (d ; 3JHe-Hf = 9 Hz ; 2H ; He) , 7.30 (m ; 3H ; 2Hf , Hj) , 7.20 (d ; $^3J_{Hc\text{-}Hd}$ = 16.5 ; 1 H ; Hc), 7.07 (d ; $^3J_{Hd\text{-}Hc}$ = 16.5 Hz ; 1H ; Hd), 5.28 (d ; $^3J_{He\text{-}Hj}$ = 10.8 Hz ; 2H ; He).

NMR analysis of prepared compound 5b

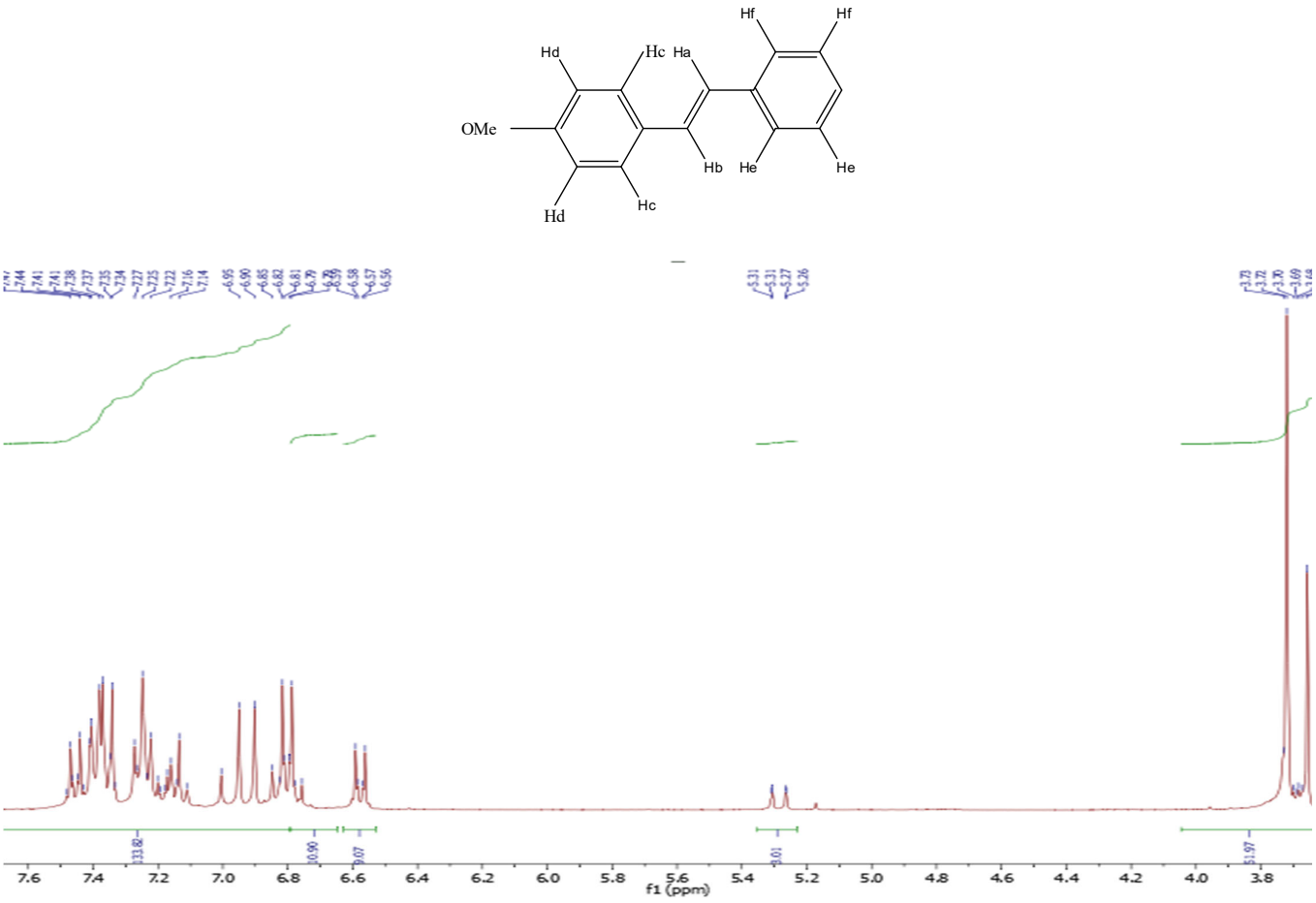
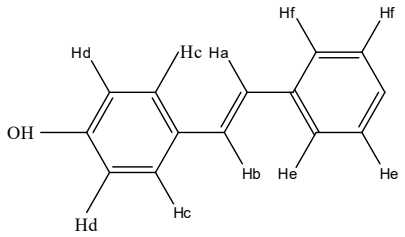


Figure S8. 1H NMR Spectrum of compound **5b.** White solid, mp 136-137°C, yield: **90%,** 1H NMR (300 MHz, $CDCl_3$) (δ ppm) : 3.66 (s ; 3H), 6.58 (d; $^3J_{Hb-Ha}$ = 9 Hz ; Hd) , 6.77 (d ; $^3J_{He-Hf}$ = 9 Hz ; Hb) , 6.84 (d ; $^3J_{Hb-Ha}$ = 6.5 Hz; Ha) , 7.10-7,16 (m ; $^3J_{Hc-Hd}$ = 16.5 ; 3Hf), 7.39 (d ; $^3J_{Hd-Hc}$ = 7.6 Hz ; 2He), 7.46 (d ; $^3J_{He-Hj}$ = 9 Hz ; 2Hc).

NMR analysis of prepared compound 5c



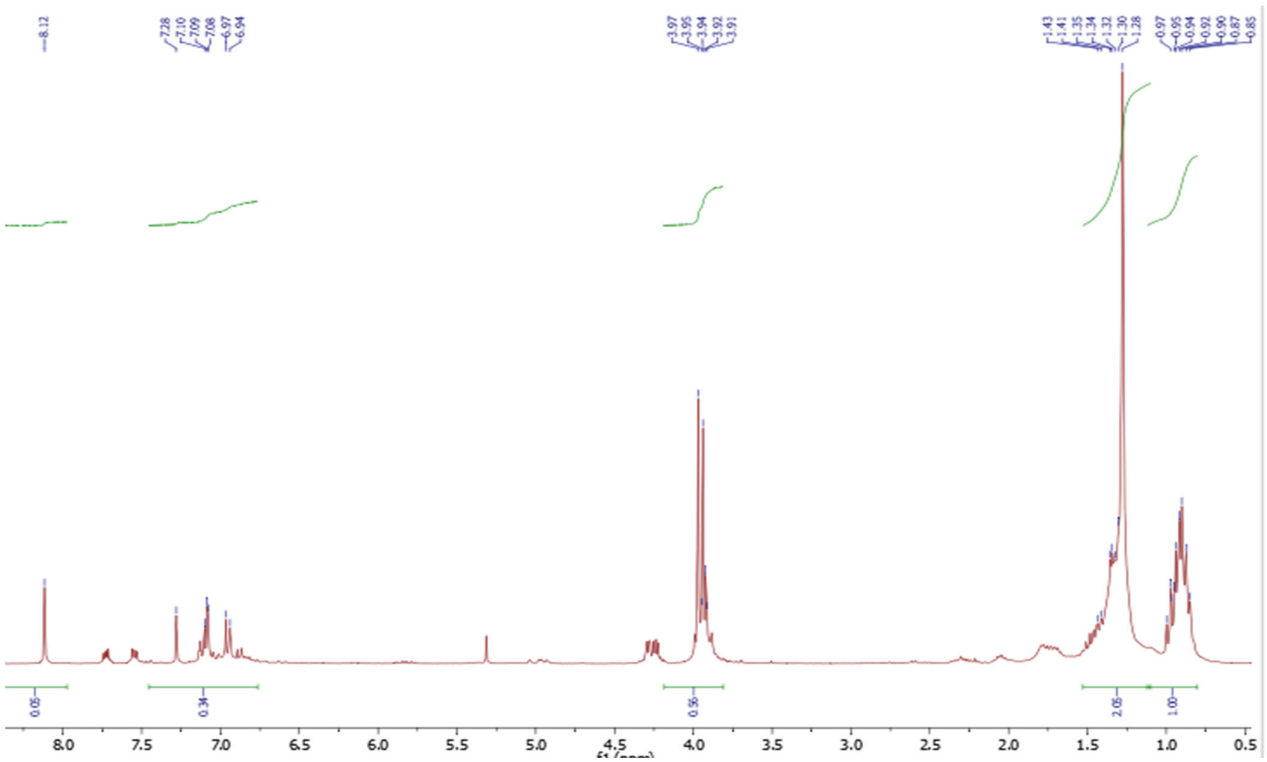


Figure S9. 1H NMR Spectrum of compound **5c**

White solid, mp 132-133 °C, yield: **76%,** 1H NMR (300 MHz, $CDCl_3$) (δ ppm) : 1.28 (s ; 3H), 3.92 (d; $3J_{Hb-Ha}$ = 9 Hz ; Hd) , 3.95 (d ; $3J_{He-Hf}$ = 9 Hz ; Hb) , 6.84 (d ; $3J_{Hb-Ha}$ = 6.5 Hz; Ha) , 6.94-7,28(m ; $3J_{Hc-Hd}$ = 16.5 ; 3Hf), 8.12 (S; $3J_{He-Hj}$ = 9 Hz ; 2Hc).