Synthesis of bis- and tris(indolyl)methanes catalyzed by an inorganic nano-sized catalyst followed by dehydrogenation to hyperconjugated products

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CHARACTERIZATION DATA FOR THE PRODUCTS **2g** AND **2h**

*3-[(2-Chlorophenyl)-(2-methyl-3*H-*indol-3-ylidene)methyl]-2-methyl-1*H-*indole (2g)*. Dark red solid; m.p.: 189–191 °C; Anal. Calcd. for $C_{25}H_{19}ClN_2$: C, 78.42; H 5.00, N 7.32 %. Found: C 78.39, H 4.92, N 7.39 %. IR (KBr, cm^{-1}): 3427, 2096, 1630, 1482, 1442, 1386, 1328, 1223, 1178, 1102, 877, 753; ^{1}H--NMR (400 MHz, DMSO-d_6, δ / pm): 2.08 (3H, *s*, CH$_3$), 2.07 (3H, *s*, indole CH$_3$), 6.64 (1H, *d*, *J* = 7.6 Hz, indole H4), 6.71 (1H, *d*, *J* = 8.0 Hz, indole H4′), 6.98–7.06 (2H, *m*), 7.22–7.28 (2H, *m*), 7.49–7.56 (4H, *m*), 7.66–7.69 (2H, *m*); ^{13}C-NMR (100 MHz, DMSO-d_6, δ / ppm): 15.87, 16.02, 60.20, 98.69, 114.38, 116.31, 121.02, 124.37, 125.75, 127.14, 127.24, 128.10, 131.11, 139.03, 140.14, 141.24, 144.72.

*2-Methyl-3-[(2-methyl-3*H-*indol-3-ylidene)(4-nitrophenyl)methyl]-1*H-*indole (2h)*. Dark red solid; m.p.: 119–123 °C; Anal. Calcd. for $C_{25}H_{19}N_3O_2$: C, 76.32; H, 4.87; N, 10.68 %. Found: C, 76.41; H, 4.92; N, 10.64 %; IR (KBr, cm^{-1}): 3408, 2923, 1566, 1521, 1423, 1100, 853, 750; ^{1}H-NMR (400 MHz, DMSO-d_6, δ / ppm): 2.08 (3H, *s*, CH$_3$), 2.10 (3H, *s*, CH$_3$), 6.65 (2H, *d*, *J* = 8.0 Hz, indole H4,4′), 7.12 (2H, *t*, *J* = 7.6 Hz, indole H5,5′), 7.28 (2H, *t*, *J* = 7.6 Hz, indole H6,6′), 7.57 (2H, *d*, *J* = 8.0 Hz, indole H7,7′), 7.80 (2H, *d*, *J* = 8.4 Hz, phenyl H), 8.40 (2H, *d*, *J* = 8.4 Hz, phenyl H); ^{13}C-NMR (100 MHz, DMSO-d_6, δ / ppm): 15.67, 15.81, 60.23, 98.92, 114.54, 116.80, 120.95, 125.78, 127.64, 128.32, 131.01, 139.41, 140.67, 142.16, 150.84.

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