

Supporting information

An efficient and reusable ionic liquid catalyst for the synthesis of 14-aryl-14H-dibenzo[a,j]xanthenes under solvent-free conditions

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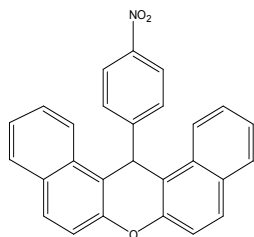
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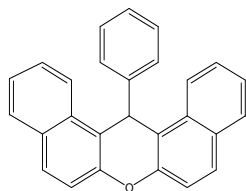
Part 1. NMR data for 14-aryl-14H-dibenzo[a,j]xanthenes

3a. 14-(4-Nitro-phenyl)-14H-dibenzo[a,j]xanthene



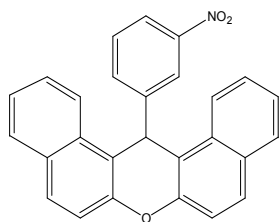
^1H NMR (400 MHz, CDCl_3): 6.61 (s, 1H), 7.42~7.46(t, $J=8.0$ Hz, 2H), 7.50~7.52 (d, $J=8.0$ Hz, 2H), 7.58~7.62(t, $J=8.0$ Hz, 2H), 7.67~7.69 (d, $J=8.0$ Hz, 2H), 7.83~7.87(m, 4H), 7.99~8.02(d, $J=12.0$ Hz, 2H), 8.28~8.30(d, $J=8.0$ Hz, 2H).

3b. 14-Phenyl-14H-dibenzo[a,j]xanthene



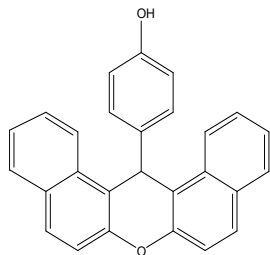
^1H NMR (400 MHz, CDCl_3): 6.49(s, 1H), 6.97~7.01 (t, $J=8.0$ Hz, 1H), 7.13~7.17 (t, $J=8.0$ Hz, 2H), 7.39-7.43 (t, $J=8.0$ Hz, 2H), 7.48~7.60 (m, 6H), 7.78~7.84(m, 4H), 8.39~8.41 (d, $J=8.0$ Hz, 2H).

3c. 14-(3-Nitro-phenyl)-14H-dibenzo[a,j]xanthene



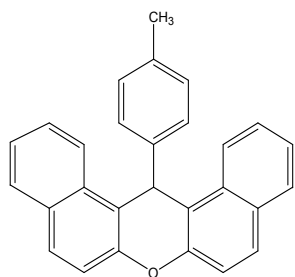
^1H NMR (400 MHz, CDCl_3): 6.60(s, 1H), 7.29~7.31(d, $J=8.0$ Hz, 1H), 7.42~7.46 (t, $J=8.0$ Hz, 2H), 7.50~7.52(d, $J=8.0$ Hz, 2H), 7.59~7.63(t, $J=8.0$ Hz, 2H), 7.80~7.86 (m, 6H), 8.29~8.31 (d, $J=8.0$ Hz, 2H), 8.42(s, 1H).

3d. 14-(4-Hydroxyl-phenyl)-14H-dibenzo[a,j]xanthene



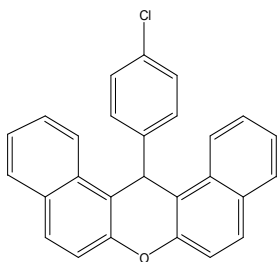
^1H NMR (400 MHz, CDCl_3): 6.56(s, 1H), 6.70~6.72 (d, $J=8.0$ Hz, 2H), 7.48~7.55 (m, 4H), 7.58~7.60(d, $J=8.0$ Hz, 2H), 7.68~7.71 (m, 3H), 7.89~7.96(dd, $J=8.0$ Hz, 4H), 8.47~8.49 (d, $J=8.0$ Hz, 2H).

3e. 14-(4-Methyl-phenyl)-14H-dibenzo[a,j]xanthene



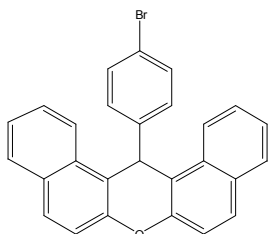
^1H NMR (400 MHz, CDCl_3): 2.13 (s, 3H), 6.46 (s, 1H), 6.94~6.96 (d, $J = 8.0$ Hz, 2H), 7.38~7.42 (t, $J = 8.0$ Hz, 4H), 7.47~7.49 (d, $J = 8.0$ Hz, 2H), 7.55~7.59 (t, $J = 8.0$ Hz, 2H), 7.77~7.83 (dd, $J = 8.0$ Hz, 4H), 8.38~8.40 (d, $J = 8.0$ Hz, 2H).

3f. 14-(4-Chloro-phenyl)-14H-dibenzo[a,j]xanthene



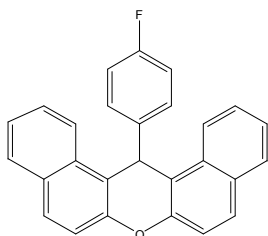
^1H NMR (400 MHz, CDCl_3): 6.47 (s, 1H), 7.10~7.12(d, $J = 8.0$ Hz, 2H), 7.41~7.50 (m, 6H), 7.57-7.61(t, $J = 8.0$ Hz, 2H), 7.79~7.85 (m, 4H), 8.31~8.33 (d, $J = 8.0$ Hz, 2H).

3g. 14-(4-Bromo-phenyl)-14H-dibenzo[a,j]xanthene



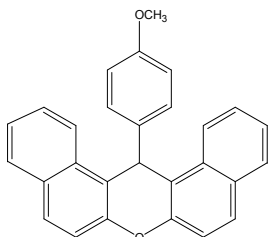
^1H NMR (400 MHz, CDCl_3): 6.46 (s, 1H), 7.25~7.27 (m, 2H), 7.38~7.49 (m, 6H), 7.56~7.60 (t, $J = 8.0$ Hz, 2H), 7.79~7.85 (dd, $J = 8.0$ Hz, 4H), 8.30~8.32 (d, $J = 8.0$ Hz, 2H).

3h. 14-(4-Fluoro-phenyl)-14H-dibenzo[a,j]xanthene



^1H NMR (400 MHz, CDCl_3): 6.47 (s, 1H), 6.79~6.84(m, 2H), 7.40~7.48 (m, 6H), 7.56-7.60(t, $J = 8.0$ Hz, 2H), 7.78~7.84 (m, 4H), 8.32~8.34 (d, $J = 8.0$ Hz, 2H).

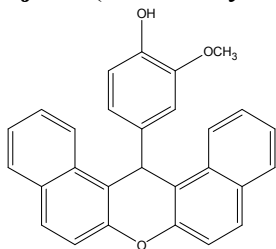
3i. 14-(4-Methoxy-phenyl)-14H-dibenzo[a,j]xanthene



^1H NMR (400 MHz, CDCl_3): 3.61(s, 3H), 6.45(s, 1H), 6.66~6.68(d, $J = 8.0$ Hz, 2H), 7.39~7.43 (m, 4H), 7.46~7.48 (d, $J = 8.0$ Hz, 2H), 7.56~7.59 (m, 2H), 7.77~7.83 (dd,

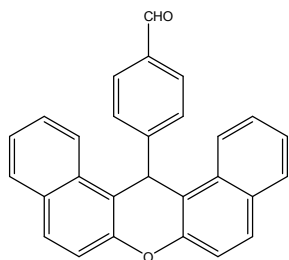
$J = 8.0$ Hz, 2H), 8.37~8.39(d, $J = 8.0$ Hz, 2H).

3j. 14-(3-Methoxy-4-hydroxyl-phenyl)-14H-dibenzo[*a,j*]xanthene



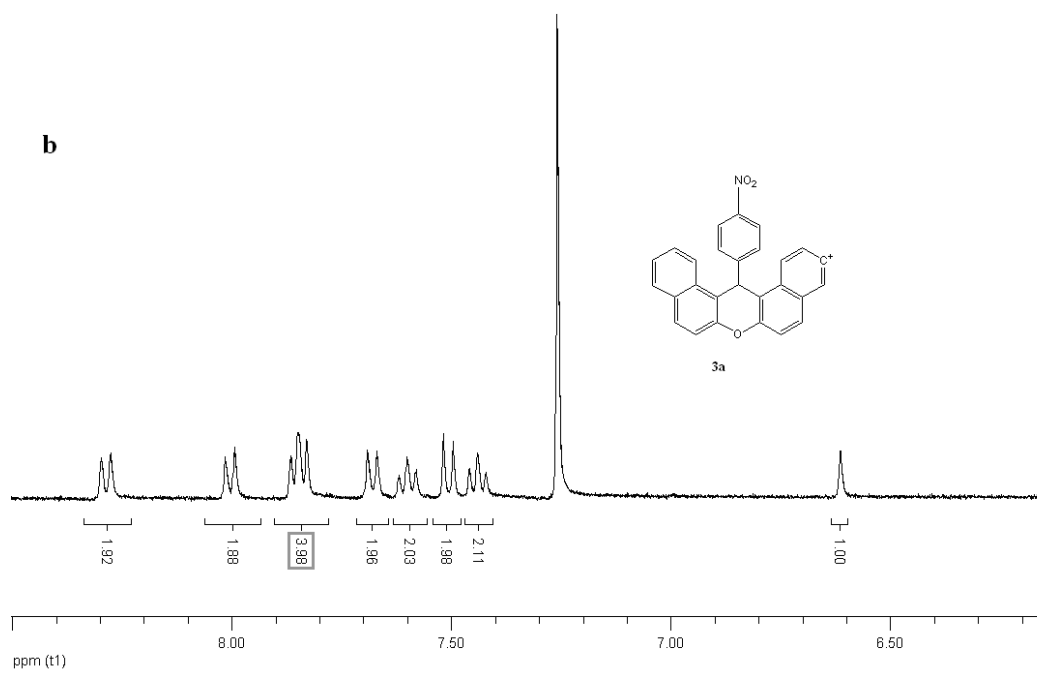
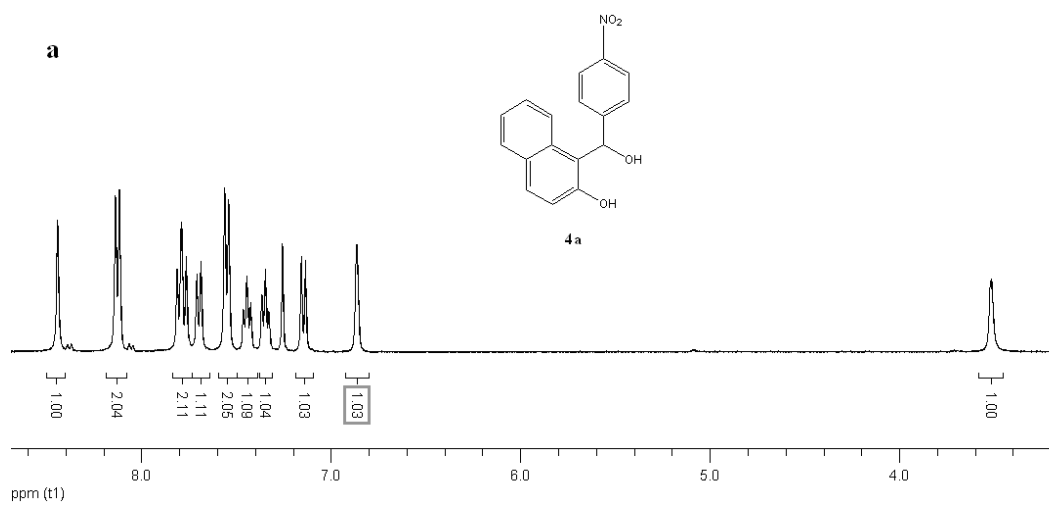
^1H NMR (400 MHz, CDCl_3): 3.66 (s, 3H), 6.44 (s, 1H), 6.71~6.73 (d, $J = 8.0$ Hz, 1H), 6.84 (s, 1H), 7.14~7.16 (d, $J = 8.0$ Hz, 1H), 7.40~7.49 (m, 4H), 7.56~7.60 (t, $J = 8.0$ Hz, 2H), 7.78~7.84 (dd, $J = 8.0$ Hz, 4H), 8.39~8.41 (d, $J = 8.0$ Hz, 2H); ^{13}C NMR: δ 37.59, 55.69, 110.72, 113.73, 121.01, 122.73, 124.26, 126.74, 128.77, 131.12, 131.46, 137.11, 144.12, 146.71, 148.73. HRMS (ESI) calcd for $\text{C}_{28}\text{H}_{21}\text{O}_3^+$ 405.1485, found: 405.1479 for $[\text{M}+\text{H}]^+$.

3k. 14-(4-Formyl-phenyl)-14H-dibenzo[*a,j*]xanthenes

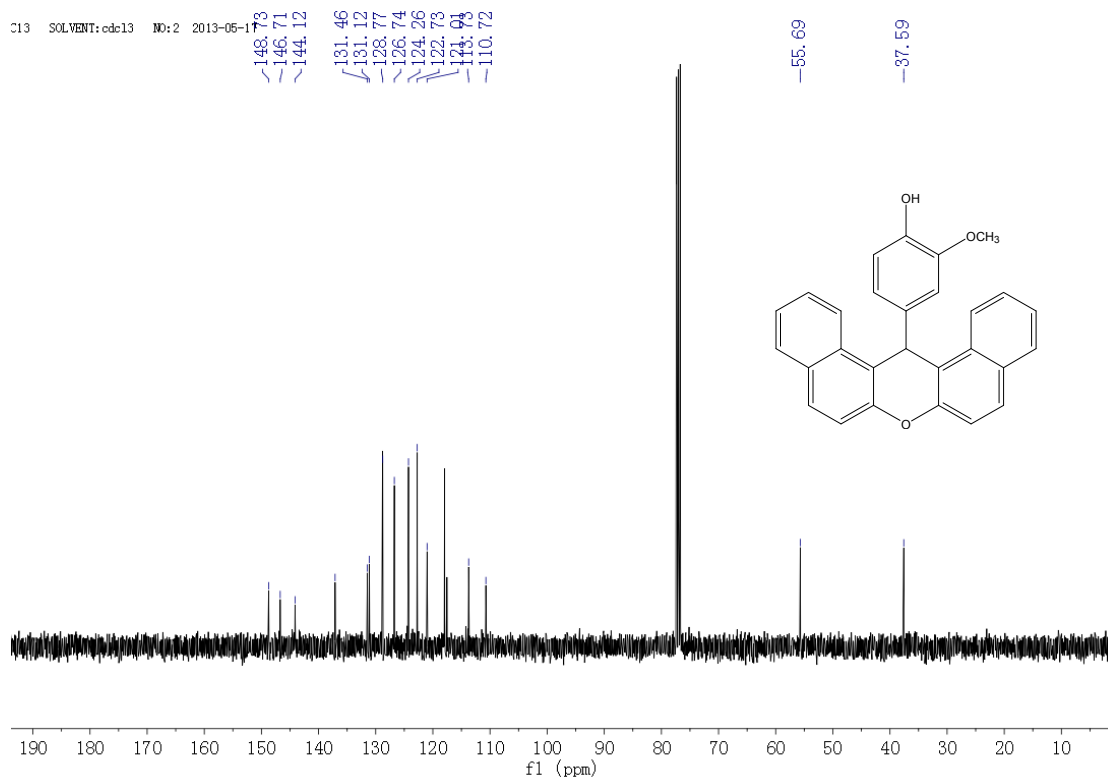
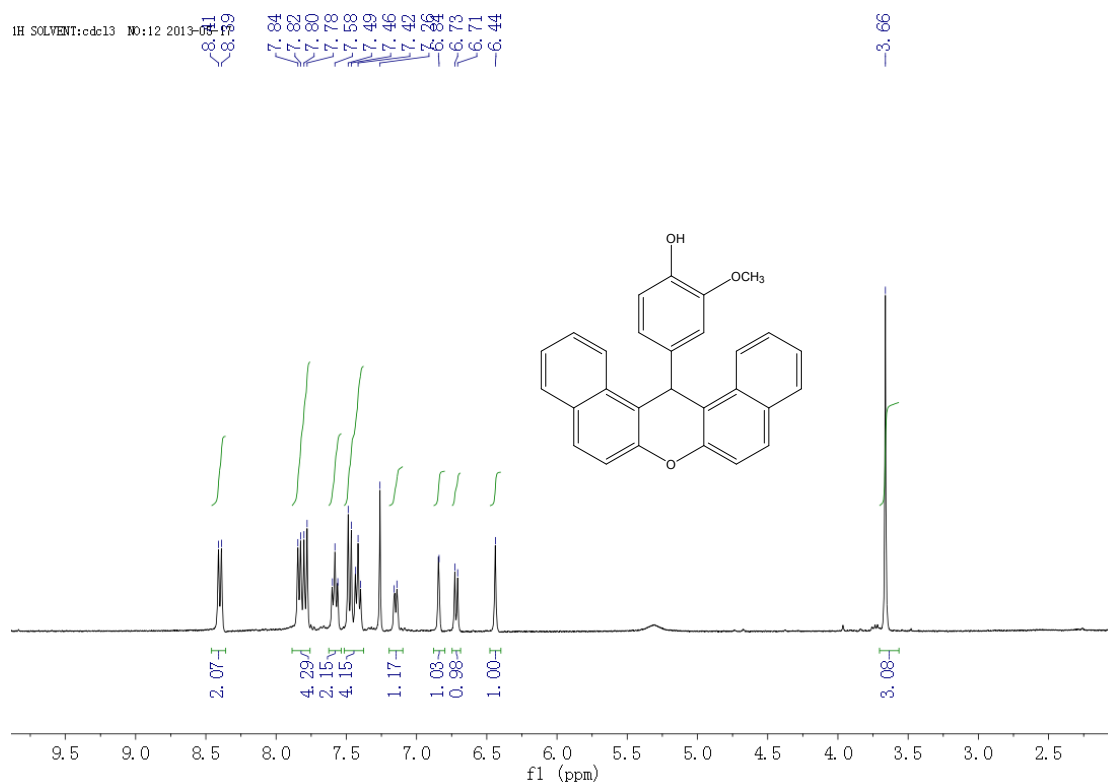


^1H NMR (400 MHz, CDCl_3): 6.58 (s, 1H), 7.41~7.44 (t, $J = 6.0$ Hz, 2H), 7.49~7.52 (d, $J = 12.0$ Hz, 2H), 7.57~7.61 (t, $J = 8.0$ Hz, 2H), 7.65~7.71 (q, $J = 8.0$ Hz, 4H), 7.81~7.85 (t, $J = 8.0$ Hz, 4H), 8.32~8.34 (d, $J = 8.0$ Hz, 2H), 9.79 (s, 1H); ^{13}C NMR: δ 38.23, 116.23, 118.04, 122.26, 124.45, 127.03, 128.95, 128.87, 129.34, 130.04, 131.17, 131.07, 148.79, 191.26. HRMS (ESI) calcd for $\text{C}_{28}\text{H}_{19}\text{O}_2^+$ 387.1380, found 387.1377 for $[\text{M}+\text{H}]^+$.

Part 2. ^1H NMR for intermediate **4a** and target compound **3a**

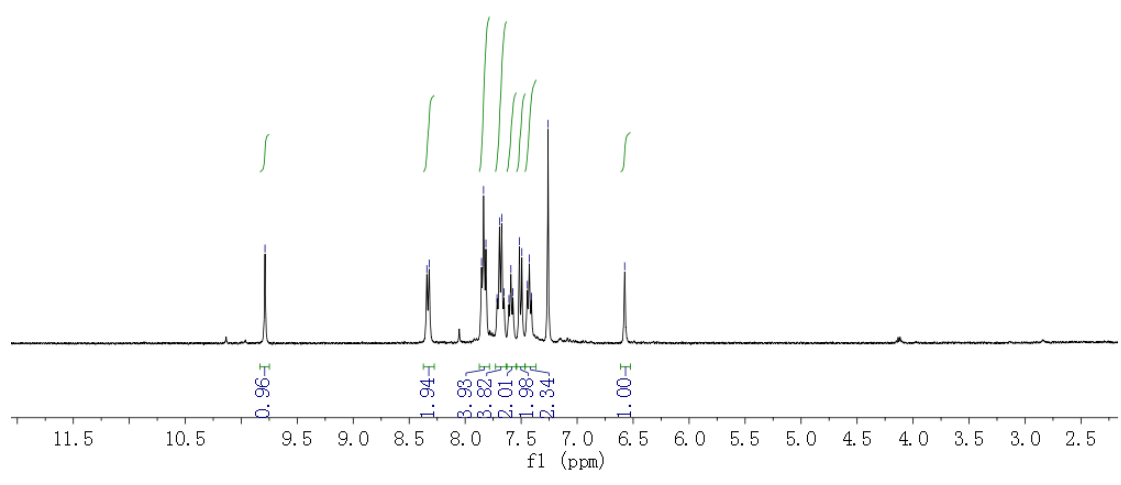
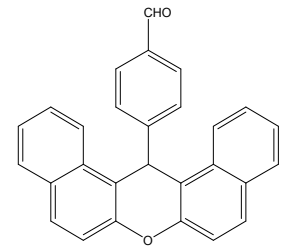


Part 3. Selected NMR spectra for the 14-aryl-14H-dibenzo[a,j]xanthenes



1H SOLVENT:cdcl3 NO:12 2013-05-23

9.79
8.34
8.32
7.84
7.81
7.69
7.67
7.52
7.49
6.98



13 SOLVENT:cdcl3 NO:1 2013-05-23

148.10
142.66
135.29
131.48
131.10
129.20
128.80
128.78
128.12
126.77
124.22
122.74
118.02
117.47

37.65
20.91

