Electronic Supplementary Information (ESI) for

Highly Efficient and Regiospecifical Photocyclization of 2,2'-Diacylbixanthenylidenes

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I. Synthesis and Characterization Data of New Compounds

2-Fluoroxanthone (4b): *p*-Fluorophenol (1.29 g, 11.5 mmol), *o*-chlorobenzoic acid (1.80 g, 11.5 mmol), K_2CO_3 (2.29 g, 16.6 mmol), Cu powder (200 mg) and CuI (200 mg) were added into anisole (20 mL), and stirred at reflux temperature for 5h under nitrogen protection. After cooling, the solvent was removed in vacuo, and concentrated H_2SO_4 (10 mL, 98%) was added, and then the mixture was stirred for 1h at room temperature. The reaction was terminated by pouring the mixture into cold water (~100 mL). The crude product was extracted with chloroform (3×50 mL) and the insoluble was removed by filtering. The combined organic layers were dried with $MgSO_4$, and concentrated in vacuo. The resulting residue was then purified by chromatography on silica gel with CH_2Cl_2 as the eluent to give **4b** as white solid (1.75 g, 71%). R_f = 0.40 (petroleum ether/ethyl acetate 15:1); m.p. 286-287˚C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.34 (dd, J = 8.0, 1.7 Hz, 1H; H_{Ar}), 7.98 (dd, J = 8.2, 2.9 Hz, 1H; H_{Ar}), 7.78-7.72 (m, 1H; H_{Ar}), 7.54-7.38 (m, 4H; H_{Ar}); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 160.3, 157.0, 156.0, 135.0, 126.6, 124.1, 123.0, 122.7, 120.0, 119.9, 117.9, 111.5, 111.2; IR (KBr, cm^{-1}): 1664 (s), 1612 (m), 1319 (s), 1261 (m), 1136 (m), 868 (m), 825 (m), 757 (m); TOFMS (EI): calcd for (M^+) $C_{13}H_7FO_2$: 214.0430, found = 214.0433.

2-Methoxyxanthone (4d): Synthesis from *p*-methoxyphenol (1.43 g, 11.5 mmol) by the same procedure, purification of **4d** was performed with chromatography on silica gel with petroleum ether/ethyl acetate (6:1) as the eluent to give **4d** as white solid (1.69 g, 65%). R_f = 0.29 (petroleum ether/ethyl acetate 15:1); m.p. 129-130˚C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.36 (dd, J = 7.8, 0.9 Hz, 1H; H_{Ar}), 7.74-7.69 (m, 2H; H_{Ar}), 7.51-7.31 (m, 4H; H_{Ar}), 3.93 (s, 3H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 156.0, 134.5, 126.7, 124.8, 123.7, 121.3, 119.4, 118.0, 105.9, 55.9 (CH_3); IR (KBr, cm^{-1}): 1650 (s), 1617 (s), 1490 (s), 1467 (s), 1318 (s), 1212 (m), 1143 (m), 1025 (m), 777 (m); TOFMS (EI) calcd for (M^+) $C_{14}H_{10}O_3$: 226.0630, found = 226.0625.

2-Ethylxanthone (4e): Synthesis from *p*-ethylphenol (1.40 g, 11.5 mmol) by the same procedure, the residue was subjected to chromatography on silica gel with petroleum ether/ethyl acetate (10:1)

as the eluent to yield **4e** as white solid (1.60 g, 62%). R_f = 0.43 (petroleum ether/ethyl acetate 15:1); m.p. 72-73˚C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.35 (dd, *J* = 7.9, 1.5 Hz, 1H; H_{Ar}), 8.16 (d, *J* = 1.8 Hz, 1H; H_{Ar}), 7.75-7070 (m, 1H; H_{Ar}), 7.58 (dd, *J* = 8.6, 2.3 Hz, 1H; H_{Ar}), 7.51-7.35 (m, 3H; H_{Ar}), 2.78 (q, *J* = 7.5 Hz, 2H; CH_2), 1.31 (t, *J* = 7.5 Hz, 3H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 176.9 (C=O), 155.7, 154.1, 139.6, 134.7, 134.2, 126.3, 124.4, 123.3, 121.4, 121.1, 117.6, 117.5, 27.9 (CH_2), 15.2 (CH_3); IR (KBr, cm^{-1}): 2963 (w), 1661 (s), 1609 (s), 1492 (s), 1466 (s), 1322 (s), 1219 (s), 1145 (m), 1121 (m), 756 (s); TOFMS (EI) calcd for (M^+) $C_{15}H_{12}O_2$: 224.0837, found = 224.0834.

Xanthone-2-carbonitrile (4f): Under nitrogen protecting, 2-bromoxanthone (0.27 g, 1.0 mmol), CuCN (0.36 g, 4mmol) were refluxed for 8 h in DMF (5 mL). After cooling, the mixture was poured to CH_2Cl_2 (50 mL) and 1,2-ethylenediamine (5 mL). The organic layers was washed by water and dried ($MgSO_4$), and concentrated in vacuo. The residue was subjected to chromatography on silica gel with CH_2Cl_2 as the eluent to yield **4f** as white solid (0.20 g, 90%). R_f = 0.33 (petroleum ether/CH_2Cl_2 1:2); m.p. 217-219˚C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.67 (d, *J* = 1.8 Hz, 1H; H_{Ar}), 8.34 (dd, *J* = 8.0, 1.7 Hz, 1H; H_{Ar}), 7.94 (dd, *J* = 8.7, 2.1 Hz, 1H; H_{Ar}), 7.83-7.77 (m, 1H; H_{Ar}), 7.61 (d, *J* = 8.7 Hz, 1H; H_{Ar}), 7.54 (d, *J* = 8.4 Hz, 1H; H_{Ar}), 7.49-7.44 (m, 1H; H_{Ar}); ^{13}C NMR (100 MH_Z, $CDCl_3$): δ = 175.4 (C=O), 158.0, 155.9, 136.9, 135.8, 132.3, 126.9, 125.1, 122.2, 121.6, 119.7, 118.2, 117.7, 108.1; IR (KBr, cm^{-1}): 2231 (s), 1669 (s), 1609 (s), 1489 (s), 1463 (s), 1318 (s), 1238 (m), 755 (s); TOFMS (EI) calcd for (M^+) $C_{14}H_7NO_2$: 221.0469, found = 221.0477.

2-Acetylxanthone (4g): To a solution of 2-(1-hydroxyethyl)-xanthone (0.48 g, 2.0 mmol) in CH_2Cl_2 (20 mL) under a nitrogen atmosphere was added manganese dioxide (1.74 g, 20.0 mmol) in portions. After the suspension was refluxed for 2 days, the black solid was removed by filtration. The filtrate was evaporated under reduced pressure, and the crude product was purified by chromatography on silica gel (CH_2Cl_2) to afford **4g** as a white solid (0.43 g, 90%). R_f = 0.12 (petroleum ether/CH_2Cl_2 1:4); m.p. 204-205˚C; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.89 (d, *J* = 2.4 Hz, 1H; H_{Ar}), 8.38-8.34 (m, 2H; H_{Ar}), 7.79-7.73 (m, 1H, H_{Ar}), 7.57-7.51 (m, 2H; H_{Ar}), 7.45-7.40 (m, 1H;

H_{Ar}), 2.71 (s, 3H; $COCH_3$); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ = 196.3 (*C*OCH_3), 176.6 (C=O), 158.8, 155.9, 135.3, 133.8, 132.9, 128.3, 126.8, 124.6, 121.7, 121.2, 118.8, 118.1, 26.6 (CH_3); IR (KBr, cm^{-1}): 1678 (s), 1670 (s), 1604 (s), 1466 (s), 1427 (m), 1367 (m), 1256 (s), 761 (m); TOFMS (EI) calcd for (M^+) $C_{15}H_{10}O_3$: 238.0630, found = 238.0621.

Xanthone-2-carboxylic acid (4h): 2-(4-Ethylphenoxy)benzoic acid (3.00 g, 12.4 mmol) was stirred with 180 ml of water and $KMnO_4$ (9.00 g) was added in portions, and refluxed for 8h. After treatment with dilute potassium hydroxide solution and extraction with ether, organic phase was acidified by introducing sulfur dioxide. The product was separated as white fluffy crystals **3h** (2.88 g, 90%). **3h** (1.29 g, 5.0 mmol) are heated with 21 g polyphosphoric acid to 180°C. After reacting for 4 h, 50 mL ice-water was added into the mixture when it cooled down to room temp. After stirring overnight the precipitate was collected, washed with water and crystallized from ethanol. **4h** (1.02 g, 85%) was obtained as a white powder. R_f = 0.29 (CH_2Cl_2/THF 5:1); m.p. 298-300˚C; ^1H NMR (300 MHz, [D_6]DMSO): δ 13.32 (s, 1H; COOH), 8.75 (d, *J* = 1.8 Hz, 1H; H_{Ar}), 8.37 (dd, *J* = 8.7, 1.8 Hz, 1H; H_{Ar}), 8.23 (d, *J* = 7.8Hz, 1H; H_{Ar}), 7.96-7.90 (m, 1H; H_{Ar}), 7.79-7.71 (m, 2H; H_{Ar}), 7.53 (m, 1H; H_{Ar}); ^{13}C NMR (75 MHZ, [D_6]DMSO): δ 175.9 (C=O), 166.5 (CO_2H), 158.3, 155.8, 136.2, 135.8, 128.2, 127.1, 126.4, 125.2, 121.4, 121.1, 119.1, 118.6; IR (KBr, cm^{-1}): 3072 (br), 1703 (s), 1669 (s), 1613 (s), 1467(s), 1425 (s), 1301 (s), 1132 (m), 754 (m); TOFMS (EI) calcd for (M^+) $C_{14}H_8O_4$: 240.0423, found = 240.0431.

Xanthone-2-carboxylic acid methyl ester (4i): **4h** (0.24 g, 1.0 mmol) were suspended in 10 mL CH_3OH and cooled to 0˚C. Thionyl chloride was added portionwise through a septum, and stirred for 20 min at room temperature, then refluxed about 2 h. After cooling, the solvent was removed in vacuo. Separation of flash column chromatography (CH_2Cl_2) afforded **4i** (0.24 g, 95%). R_f = 0.16 (petroleum ether/CH_2Cl_2 2:3); m.p. 216-217˚C; ^1H NMR (300 MHz, $CDCl_3$): δ 9.02 (d, *J* = 2.1 Hz, 1H; H_{Ar}), 8.40-8.33 (m, 2H; H_{Ar}), 7.76-7.69 (m, 1H; H_{Ar}), 7.57-7.51 (m, 2H, H_{Ar}), 7.45-7.42 (m, 1H; H_{Ar}), 3.97 (s, 3H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ = 158.6, 155.8, 135.2, 135.1, 129.2, 126.7, 125.9, 124.4, 121.7, 121.4, 118.3, 117.9, 52.2 (CH_3); IR (KBr, cm^{-1}): 1718 (s), 1663 (s), 1612 (s),

1467 (m), 1443 (m), 1283 (m), 1257 (s), 752 (m); TOFMS (EI) calcd for (M^+) $C_{15}H_{10}O_4$: 254.0579, found = 254.0577.

Xanthone-2-carboxylic acid diethylamide (4j): 4h (0.24 g, 1.0 mmol) are refluxed for 30 min with 5 mL thionyl chloride. After cooling, the excess of $SOCl_2$ was removed under reduced pressure and the residue was dissolved in freshly distilled $CHCl_3$ (5 mL). A solution of diethylamine (1mL) was added and the mixture was refluxed for 2 h. After cooling, the solution was concentrated in vacuo and the residue was extracted with ethyl ether, and filtered and concentrated in vacuo and the residue was dissolved and recrystallized in CH_3OH, giving **4j** as white solid (0.28 g, 96%). ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.36-8.33 (m, 2H; H_{Ar}), 7.83-7.73 (m, 2 H; H_{Ar}), 7.57-7.51 (m, 2H; H_{Ar}), 7.44-7.39(m, 1H; H_{Ar}), 3.56-3.36 (br, 4H, CH_2), 1.22 (br, 6H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 176.6 (C=O), 169.7 (CON), 156.3, 156.0, 135.1, 133.5, 132.9, 126.6, 124.6, 124.2, 121.7, 121.2, 118.6, 118.0, 43.6 (CH_2), 39.5 (CH_2), 14.2 (CH_3), 12.9 (CH_3); IR (KBr, cm^{-1}): 2987 (w), 1654 (s), 1640 (s), 1465 (s), 1428 (s), 1267 (m), 1126 (m), 764 (s); TOFMS (EI) calcd for (M^+) $C_{18}H_{17}NO_3$: 295.1208, found = 295.1204.

2,2'-Disubstituted bixanthenylidenes: synthesis procedures are method A for **1a–e**, and method B for **1f–1j**, respectively. Method A: xanthone (8.8 mmol) was refluxed overnight in oxalyl dichloride (10 mL). The excess of oxalyl dichloride was removed, and the residue was dissolved in freshly distilled *p*-xylene (30 mL). Activated Cu powder (3.81 g, 60.0 mmol) was added and refluxed for 7h with occasional shaking. The reaction solution was filtered, and the filter was concentrated and crystallized to give the target product. Method B: Under nitrogen, xanthone (10.0 mmol) in glacial AcOH (20 mL) was heated to 135–140˚C, and zinc powder (1.20 g, 18.3 mmol) was added. The mixture was refluxed for 1h. A few drops of concentrated HCl were introduced from time to time (total amount, 2 mL). After the reaction mixture cooling, methanol (10 mL) was added, and the precipitating product was filtered and dried.

2,2'-Difluorobixanthenylidene (1b): Yield: 68%; R_f = 0.67 (petroleum ether/ethyl acetate 15:1); m.p. >250°C; UV/Vis (THF): λ_{max} (log ε) 370(4.2), 282(3.9), 253(4.1) nm; ^{1}H NMR (300 MHz,

$CDCl_3$): δ 7.29-7.10 (m, 8H; H_{Ar}), 6.98-6.75 (m, 6H; H_{Ar}); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 155.4, 129.1, 128.8, 128.0, 127.8, 122.8, 122.6, 121.4, 118.3, 117.3, 117.2, 115.7, 115.4, 114.2, 114.0, 113.9; IR (KBr, cm^{-1}): 1620 (m), 1589 (m), 1491 (s), 1470 (s), 1446 (s), 1428 (m), 1290 (m), 1239 (m), 1195 (s), 745 (m); TOFMS (EI) calcd for (M^+) $C_{26}H_{14}O_2F_2$: 396.0962, found = 396.0966.

2,2'-Dimethoxybixanthenylidene (1d): Yield: 70%; R_f = 0.57 (petroleum ether/ethyl acetate 5:2); m.p. 266-268˚C; UV/Vis (THF) λ_{max}(log ε): 380(4.3), 283(4.0), 235(4.5) nm; ^1H NMR (300 MHz, $CDCl_3$): δ 7.27-7.11 (m, 8H; H_{Ar}), 6.95-6.61 (m, 6H; H_{Ar}), 3.51 and 3.46 (2s, 6H; CH_3(*E,Z*)); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 155.8, 155.6, 154.6, 154.5, 149.8, 149.6, 128.5, 128.3, 128.1, 125.2, 125.0, 124.6, 124.5, 122.3, 122.2, 121.4, 117.9, 117.1, 117.0, 116.3, 116.2, 111.5, 111.1, 55.4 (CH_3), 55.3 (CH_3); IR (KBr, cm^{-1}): 1619 (m), 1584 (m), 1567 (m), 1494 (s), 1471 (s), 1448 (s), 1206 (s), 1161 (s), 1043 (s), 766 (s); TOFMS (EI) calcd for (M^+) $C_{28}H_{20}O_4$: 420.1362, found = 420.1356.

2,2'-Diethylbixanthenylidene (1e): Yield: 75%; R_f = 0.76 (petroleum ether/ethyl acetate 15:1); m.p. 260-262°C; UV/Vis (THF) λ_{max}(log ε): 369(4.2), 282(4.0), 253(4.1), 235(4.3) nm; ^1H NMR (300 MHz, $CDCl_3$): δ 7.27-7.13 (m, 8H; H_{Ar}), 7.06-6.85 (m, 6H; H_{Ar}), 2.42-2.36 (m, 4H; CH_2), 1.06–0.99 (m, 6H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 149.9, 147.9, 147.8, 132.4, 132.3, 122.4, 122.3, 122.2, 122.1, 121.5, 121.4, 119.3, 119.1, 118.9, 116.5, 115.6, 111.3, 111.0, 22.5 (CH_2), 22.4 (CH_2), 9.7 (CH_3), 9.5 (CH_3); IR (KBr, cm^{-1}): 1585 (m), 1493 (m), 1470 (s), 1445 (s), 1252 (s), 1237 (s), 1209 (s), 1126 (m), 772 (s); TOFMS (EI) calcd for (M^+) $C_{30}H_{24}O_2$: 416.1776, found = 416.1769.

Bixanthenylidene 2,2'-dicarbonitrile (1f): Yield: 89%; R_f = 0.42 (petroleum ether/CH_2Cl_2 1:2); m.p. >250˚C; UV/Vis (THF) λ_{max}(log ε): 368(4.2), 293(4.0) nm; ^1H NMR (300 MHz, $CDCl_3$): δ 7.58-7.54 (m, 2H; H_{Ar}), 7.45-7.31(m, 7H; H_{Ar}), 7.26-6.99 (m, 5H; H_{Ar}); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 158.4, 158.3, 154.7, 132.6, 132.5, 132.3, 131.9, 130.0, 129.5, 127.7, 127.2, 125.1, 124.9, 123.7, 123.5, 123.1, 122.7, 121.0, 120.9, 119.0, 118.7, 118.2, 117.8, 117.5, 106.7, 106.4; IR (KBr, cm^{-1}): 2230 (s), 1597 (m), 1470 s), 1446 (s), 1259 (s), 1240 (m), 837 (sm), 747 (m); TOFMS (EI) calcd for (M^+) $C_{28}H_{14}N_2O_2$: 410.1055, found = 410.1056.

2, 2'-Diacetylbixanthenylidene (1g): Yield: 70%; R_f = 0.16 (petroleum ether/CH_2Cl_2 1:4); m.p. 240-241˚C; UV/Vis (THF): λ_{max} (log ε) 369 (4.2), 239 (4.7) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.95-7.89 (m, 2H; H_{Ar}), 7.77-7.69 (m, 2H; H_{Ar}), 7.38-7.29 (m, 6H; H_{Ar}), 7.20-7.10 (m, 2H; H_{Ar}), 6.97-6.89 (m, 2H; H_{Ar}), 2.24 and 2.19 (2s, 6H; CH_3(*E,Z*)); ^{13}C NMR (100 MH_Z, $CDCl_3$): δ 195.4 (C=O), 195.0 (C=O), 157.9, 157.8, 154.0, 153.8, 130.8, 130.7, 128.6, 128.1, 128.0, 127.9, 127.6, 127.5, 126.8, 126.4, 122.9, 122.8, 122.6, 122.2, 122.1, 120.2, 120.2, 116.9, 116.8, 116.7, 116.3, 25.2 (CH_3), 25.0 (CH_3); IR (KBr, cm^{-1}): 1674 (s), 1596 (s), 1480 (s), 1452 (s), 1301 (m), 1282 (m), 1264 (s), 1204 (m), 1134 (m), 751 (s); TOFMS (EI) calcd for (M^+) $C_{30}H_{20}O_4$: 444.1362, found = 444.1369.

Bixanthenylidene 2,2'-dicarboxylic acid (1h): Method B. Product **1h** (1.82 g, 81 %) was obtained from **4h** (2.38 g, 10.0 mmol). R_f = 0.18 (CH_2Cl_2/THF 5:1); m.p. >250 ˚C; UV/Vis (THF): λ_{max}(log ε) 368(4.1), 237(4.8) nm; ^{1}H NMR (300 MHz, [D_6]DMSO): δ 12.57 (br, 2H, COOH), 7.91-7.87 (m, 2H; H_{Ar}), 7.69-7.66 (m, 2H; H_{Ar}), 7.49-7.38 (m, 6H; H_{Ar}), 7.10-6.95 (m, 4H; H_{Ar}); ^{13}C NMR (100 MH_Z, [D_6]DMSO): δ 172.0 (C=O), 166.2 (C=O), 166.0, 157.8, 157.6, 154.3, 154.2, 130.1, 129.4, 129.2, 128.8, 127.5, 127.1, 125.4, 125.3, 123.7, 123.4, 123.3, 123.2, 123.1, 120.7, 120.6, 117.5, 117.3, 117.2; IR (KBr, cm^{-1}): 3075 (br), 1686 (s), 1599 (m), 1567 (m), 1300 (m), 1259 (s), 1152 (s), 1126 (s), 776 (m); TOFMS (EI) calcd for (M^+) $C_{28}H_{16}O_6$: 448.0947, found = 448.0941.

Bixanthenylidene 2,2'-dicarboxylic acid methyl ester (1i): Yield: 85%; R_f = 0.24 (petroleum ether/CH_2Cl_2 2:3); m.p. 272-274˚C; UV/Vis (THF) λ_{max}(log ε): 369(4.2), 239(4.7) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.97-7.92 (m, 2H; H_{Ar}), 7.86-7.80 (m, 2H; H_{Ar}), 7.34-7.25 (m, 6H; H_{Ar}), 7.15-7.06 (m, 2H; H_{Ar}), 6.94-6.85 (m, 2H; H_{Ar}), 3.78, 3.72 (2s, 6H; CH_3(*E,Z*)); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 166.2 (C=O), 158.7, 155.1, 130.3, 130.1, 130.0, 129.8, 129.0, 128.2, 127.5, 124.7, 124.2, 123.7, 123.3, 123.2, 117.6, 117.5, 117.4, 52.1 (CH_3), 51.9 (CH_3); IR (KBr, cm^{-1}): 1722 (s), 1713 (s), 1600 (m), 1472 (m), 1447 (m), 1433 (m), 1296 (m), 1261 (s), 1222 (m), 773 (s); TOFMS (EI) calcd for (M^+) $C_{30}H_{20}O_6$: 476.1260, found = 476.1262.

Bixanthenylidene 2, 2'-dicarboxylic acid diethylamide (1j): Yield: 62%; R_f = 0.49 (CH_2Cl_2/ethyl acetate 5:1); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 367 (4.2), 236 (4.6) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.34-7.16 (m, 12H; H_{Ar}), 6.96-6.88 (m, 2H; H_{Ar}), 3.29 (m, 8 H; CH_2), 1.06 (m, 12 H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 170.2 (C=O), 156.0, 155.3, 131.7, 128.9, 128.0, 127.8, 127.2, 126.5, 124.6, 124.2, 123.1, 122.8, 121.4, 117.3, 43.1 (br, CH_2), 39.8 (br, CH_2), 13.5 (br, CH_3); IR (KBr, cm^{-1}): 2986 (w), 1624 (s), 1446 (s), 1379 (m), 1314 (m), 1292 (m), 1255 (s), 1207 (s), 1105 (m), 773 (m); TOFMS (EI) calcd for (M^+) $C_{36}H_{34}N_2O_4$: 558.2519, found = 558.2516.

3,10-Difluoro-7,16-dioxa-dibenzo[a,o]perylene (2b(*E*)): R_f = 0.68 (petroleum ether/ethyl acetate 15:1); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 447 (4.2), 425 (4.2), 453 (3.9), 337 (3.9), 298 (4.2), 251 (4.5) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.48 (d, J = 8.4 Hz, 1H; H_{Ar}), 7.84 (d, J = 8.1 Hz, 1H; H_{Ar}), 7.55-7.50 (m, 2H; H_{Ar}), 7.31-7.14 (m, 6H; H_{Ar}), 7.00-6.96 (m, 2H; H_{Ar}); IR (KBr, cm^{-1}): 1743 (m), 1621 (m), 1496 (m), 1461 (s), 1378 (m), 1309 (m), 1261 (s), 1097 (s) , 751 (m); TOFMS (EI) calcd for (M^+) $C_{26}H_{12}O_2F_2$: 394.0805, found = 394.0804.

10,13-Difluoro-7,16-dioxa-dibenzo[a,o]perylene (2b(*Z*)): R_f = 0.49 (petroleum ether/ethyl acetate 15:1); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 447 (4.2), 425 (4.2), 453 (4.0), 337 (3.9), 296 (4.2), 273 (4.3), 244 (4.5) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.06 (d, J = 8.1 Hz, 2H; H_{Ar}), 7.61-7.57 (m, 2H; H_{Ar}), 7.53 (t, J = 8.0 Hz, 2H; H_{Ar}), 7.26-7.16(m, 4H; H_{Ar}), 7.05-6.98 (m, 2H; H_{Ar}); IR (KBr, cm^{-1}): 1739 (m), 1622 (s), 1593 (m), 1497 (m), 1478 (s), 1454 (s), 1260 (s), 1193 (m), 770 (m); TOFMS (EI) calcd for (M^+) $C_{26}H_{12}O_2F_2$: 394.0805, found = 394.0810.

3,10-Dimethyl-7,16-dioxa-dibenzo[a,o]perylene (2c(*E*)): R_f = 0.70 (petroleum ether/ethyl acetate 15:1); m.p.>250°C; UV/Vis (THF): λ_{max} (log ε) 447 (4.2), 422 (4.2), 352 (4.0), 336 (3.9), 298 (4.2), 254 (4.5) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.07 (d, J = 8.4 Hz, 1H; H_{Ar}), 7.84 (d, J = 7.8 Hz, 1H; H_{Ar}), 7.60 (s, 1H; H_{Ar}), 7.42 (t, J = 8.1 Hz, 1H; H_{Ar}), 7.32 (d, J = 8.1 Hz, 1H; H_{Ar}), 7.25-7.22 (m, 1H), 7.18-7.12 (m, 3H), 7.04 (m, 2H; H_{Ar}), 6.85 (td, J = 7.5, 0.8 Hz, 1H; H_{Ar}), 2.89(s, 3H; CH_3), 2.14 (s, 3H; CH_3); ^{13}C NMR (100 MH_Z, $CDCl_3$): δ 152.7, 150.6, 150.1, 148.5, 131.7, 131.1, 130.6, 130.4, 129.7, 129.1, 128.5, 127.6, 126.4, 125.7, 122.9, 122.7, 122.1, 121.6, 121.3,

118.2, 118.0, 117.0, 116.9, 112.1, 111.9, 25.2 (CH_3), 20.7 (CH_3); IR (KBr, cm^{-1}): 2957 (w), 1589 (s), 1564 (m), 1482 (s), 1453 (s), 1356 (m), 1267 (s), 752 (m); TOFMS (EI) calcd for (M^+) $C_{28}H_{18}O_2$: 386.1307, found = 386.1277.

10,13-Dimethoxy-7,16-dioxa-dibenzo[a,o]perylene (2c(*Z*)): UV/Vis (THF): λ_{max} (log ε) 442 (4.2), 420 (4.2), 352 (4.0), 336 (3.9), 296 (4.2), 274 (4.7), 245 (4.5) nm; TOFMS (EI) calcd for (M^+) $C_{28}H_{18}O_2$: 386.1307, found = 386.1313.

3,10-Dimethoxy-7,16-dioxa-dibenzo[a,o]perylene (2d(*E*)): R_f = 0.45 (petroleum ether/ethyl acetate 15:1); m.p. 227-229˚C; UV/Vis (THF): λ_{max} (log ε) 455 (4.2), 433 (4.1), 366 (3.9), 350 (3.8), 310 (4.0), 232 (4.6) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.94 (d, *J*= 8.1 Hz, 1H; H_{Ar}), 7.83 (d, *J* = 7.8 Hz, 1H; H_{Ar}), 7.45 (m, 1H; H_{Ar}), 7.30 (d, *J* = 2.7 Hz, 1H; H_{Ar}), 7.20-7.03 (m, 6H; H_{Ar}), 6.94-6.85 (m, 2H; H_{Ar}), 4.03 (s, 3H; CH_3), 3.53 (s, 3H; CH_3); ^{13}C NMR (75 MH_Z, $CDCl_3$): δ 154.7, 153.5, 153.2, 150.1, 147.4, 144.6, 129.8, 129.3, 128.4, 126.8, 122.1, 122.0, 119.4, 118.3, 118.1,117.2, 112.2, 112.0, 110.4, 109.7, 56.4 (CH_3), 55.6 (CH_3); IR (KBr, cm^{-1}): 2924 (w), 1615 (m), 1590 (m), 1483 (s), 1450 (s), 1421 (s), 1316 (s), 1252 (s), 1102 (m), 749 (m); TOFMS (EI) calcd for (M^+) $C_{28}H_{18}O_4$: 418.1205, found = 418.1198.

10,13-Dimethoxy-7,16-dioxa-dibenzo[a,o]perylene (2d(*Z*)): UV/Vis (THF): λ (log ε) 454 (4.2), 432 (4.2), 366 (3.9), 350 (3.8), 300 (4.1), 276 (4.2), 249 (4.62) nm; TOFMS (EI) calcd for (M^+) $C_{28}H_{18}O_4$: 418.1205, found = 418.1202.

3,10-Diethyl-7,16-dioxa-dibenzo[a,o]perylene (2e(*E*)): R_f = 0.72 (petroleum ether/ethyl acetate 15:1); m.p.>250°C; UV/Vis (THF): λ_{max} (log ε) 446 (4.2), 427 (4.1), 352 (4.0), 336 (3.8), 297 (4.0), 252 (4.6) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.97 (d, *J* = 8.1 Hz, 1H; H_{Ar}), 7.88 (d, *J* = 7.8 Hz, 1H; H_{Ar}), 7.64 (s, 1H; H_{Ar}), 7.45-7.40 (m, 2H, H_{Ar}), 7.25-7.07 (m, 6H, H_{Ar}), 6.85 (t, *J* = 7.5 Hz, 1H; H_{Ar}), 3.36-3.26 (q, *J* = 7.2 Hz, 1H; CH_2), 3.26-3.17 (q, *J* = 7.2 Hz, 1H; CH_2), 2.44(q, *J* = 7.4 Hz, 2H; CH_2), 1.45(t, *J* = 7.4 Hz, 3H; CH_3), 1.07 (t, *J* = 7.7 Hz, 3H; CH_3); ^{13}C NMR (100 MH_Z, $CDCl_3$): δ 152.6, 150.7, 150.1, 148.2, 138.3, 134.7, 129.7, 129.6, 129.5, 129.2, 128.7, 127.6, 126.4, 125.9, 122.7, 122.5, 122.1, 121.6, 121.4, 121.2, 118.0, 117.9, 117.0, 116.9, 112.4, 111.9, 28.8 (CH_2), 28.3

(CH_2), 15.9 (CH_3), 15.7 (CH_3); IR (KBr, cm^{-1}): 2958 (w), 1588 (s), 1564 (m), 1480 (s), 1451 (s), 1421 (s), 1357 (m), 1313 (s), 1266 (s), 752 (m); TOFMS (EI) calcd for (M^+) $C_{30}H_{22}O_2$: 414.162, found = 414.1585.

10,13-Diethyl-7,16-dioxa-dibenzo[a,o]perylene (2e(*Z*)): UV/Vis (THF): λ_{max} (log ε) 441 (4.2), 419 (4.2), 350 (4.0), 334 (3.8), 295 (4.1), 274 (4.3), 246 (4.6) nm; TOFMS (EI) calcd for (M^+) $C_{30}H_{22}O_2$: 414.1620, found = 414.1523.

7,16-Dioxa-dibenzo[a,o]perylene-3,10-dicarbonitrile (2f(*E*)): R_f = 0.51 (petroleum ether/CH_2Cl_2 1:2); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 442 (4.2), 422 (4.2), 352 (4.0), 336 (4.0), 302 (4.2), 294 (4.2), 245 (4.7) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 9.06 (d, *J* = 8.4 Hz, 1H; H_{Ar}), 8.19 (s, 1H; H_{Ar}), 7.96 (d, *J* = 8.1 Hz, 1H; H_{Ar}), 7.82 (d, *J* = 7.6 Hz, 1H; H_{Ar}), 7.65 (t, *J* = 8.0 Hz, 1H; H_{Ar}), 7.56 (d, *J* = 8.3 Hz, 1H; H_{Ar}), 7.43-7.30 (m, 5H), 7.03 (t, *J* = 7.5 Hz, 1H; H_{Ar}); IR (KBr, cm^{-1}): 2225(s), 1581 (s), 1482 (s), 1460 (s), 1318 (s), 1271 (s), 750 (m); TOFMS (EI) calcd for (M^+) $C_{28}H_{12}N_2O_2$: 408.0899, found = 408.0898.

1-(10-Acetyl-7,16-dioxa-dibenzo[a,o]perylen-3-yl)-ethanone (2g(*E*)): R_f = 0.28 (petroleum ether/CH_2Cl_2 1:4); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 443 (4.2), 424 (4.2), 349 (4.1), 337 (4.1), 297 (4.3), 259 (4.7) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.54 (s, 1H; H_{Ar}), 7.94 (d, *J* = 8.4 Hz, 2H; H_{Ar}), 7.62-7.44 (m, 3H; H_{Ar}), 7.36-7.24 (m, 5H; H_{Ar}), 6.93 (t, 1H; *J* = 7.4 Hz, H_{Ar}), 2.39 (s, 3H; CH_3), 3.32 (s, 3H; CH_3); ^{13}C NMR (100 MHz, $CDCl_3$): δ 205.5 (C=O), 196.5 (C=O), 156.5, 152.6, 151.8, 150.1, 134.5, 131.7, 130.1 128.0, 126.6, 123.0, 121.9, 121.3, 120.3, 118.1 118.0, 117.9, 113.1, 112.5, 31.1 (CH_3), 26.5 (CH_3); IR (KBr, cm^{-1}): 2923 (w), 1672 (s), 1594 (s), 1585 (s), 1484 (m), 1461 (s), 1451 (s), 1319 (s), 1266 (s), 752 (s); TOFMS (EI) calcd for (M^+) $C_{30}H_{18}O_4$: 442.1205, found = 442.1197.

7,16-Dioxa-dibenzo[a,o]perylene-3,10-dicarboxylic acid (2h(*E*)): R_f = 0.26 (CH_2Cl_2/THF 5:1); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 441 (4.1), 420 (4.1), 347 (3.9), 334 (3.8), 297 (4.1), 245 (4.7) nm; ^{1}H NMR (400 MHz, [D_6]DMSO): δ 13.33 (s, 1H; COOH), 12.83 (s, 1H; COOH), 8.47 (s, 1H; H_{Ar}), 7.93 (d, *J* = 8.4 Hz, 1H; H_{Ar}), 7.88 (d, *J* = 8.0 Hz, 1H; H_{Ar}), 7.82 (d, *J* = 8.0 Hz, 1H; H_{Ar}),

7.77 (d, J = 8.4 Hz, 1H; H_{Ar}), 7.58 (t, J =8.0 Hz, 1H; H_{Ar}), 7.44-7.34 (m, 5H; H_{Ar}), 7.02 (t, J = 7.4 Hz, 1H; H_{Ar}); IR (KBr, cm^{-1}): 3440 (br), 1618 (s), 1594 (m), 1493 (s), 1462 (m), 1292 (s), 766 (s); TOFMS (EI) calcd for (M^+) $C_{28}H_{14}O_6$: 446.0790, found = 446.0781.

7,16-Dioxa-dibenzo[a,o]perylene-3,10-dicarboxylic acid dimethyl ester (2i(*E*)): R_f = 0.37 (petroleum ether/CH_2Cl_2 2:3); m.p. 292-294˚C; UV/Vis (THF): λ_{max} (log ε) 440 (4.2), 420 (4.2), 348 (4.0), 334 (3.9), 297 (4.2), 239 (4.7) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.59 (s, 1H; H_{Ar}), 7.96-7.88 (m, 2 H; H_{Ar}), 7.76 (d, J = 8.1 Hz, 1H; H_{Ar}), 7.55 (d, J = 8.1, 1H; H_{Ar}), 7.45-7.40 (m, 1H; H_{Ar}), 7.31 (m, 1H; H_{Ar}), 7.26-7.20 (m, 4 H; H_{Ar}), 6.90 (t, J = 7.5 Hz, 1H; H_{Ar}), 3.90 (s, 3 H; CH_3), 3.80 (s, 3 H; CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ 171.5 (C=O), 156.2, 152.2, 149.8, 131.3, 131.0, 130.6, 130.1, 129.4, 128.9, 127.9, 126.6, 126.5, 124.7, 124.0, 123.1, 121.4, 120.3, 118.0, 117.7, 117.6, 112.6, 112.0, 52.5 (CH_3), 52.1 (CH_3); IR (KBr, cm^{-1}): 2926 (m), 1722 (s), 1651 (w), 1595 (m), 1461 (m), 1285 (s), 1266 (s), 1211 (s), 1126 (s), 757 (m); TOFMS (EI) calcd for (M^+) $C_{28}H_{18}O_4$: 474.1103, found = 474.1097.

7,16-Dioxa-dibenzo[a,o]perylene-3,10-dicarboxylic acid bis-diethylamide(2j(*E*)): R_f = 0.67 (CH_2Cl_2/ethyl acetate 5:1); m.p. >250˚C; UV/Vis (THF): λ_{max} (log ε) 443 (4.2), 421 (4.2), 350 (3.9), 335 (3.9), 297 (4.2), 246 (4.7) nm; ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.10 (d, J = 8.4 Hz, 1H; H_{Ar}), 7.93-7.90 (m, 2H; H_{Ar}), 7.46-7.40 (m, 2H; H_{Ar}), 7.31-7.19 (m, 6H; H_{Ar}), 7.28(m, 1H; H_{Ar}), 7.24-7.19(m, 4H; H_{Ar}), 6.90 (t, J = 7.6 Hz, 1H; H_{Ar}), 3.93-3.86 (m, 2H; CH_2), 3.44-3.32 (m, 4H; CH_2), 2.72-2.60 (m, 2H; CH_2), 1.10 (m, 12H; CH_3); ^{13}C NMR (100 MHz, $CDCl_3$): 171.1 (C=O), 169.1 (C=O), 152.5, 151.5, 149.4, 148.9, 130.7, 129.4, 127.5, 127.4, 126.2, 124.9, 124.8, 124.5, 121.9, 121.0, 120.8, 120.7, 119.9, 119.7, 117.3, 116.6, 116.5, 118.8, 111.6, 41.6 (CH_2), 38.2 (CH_2), 28.7 (CH_2), 12.3 (CH_3), 11.2 (CH_3); IR (KBr, cm^{-1}): 2964 (m), 1722 (m), 1629 (s), 1564 (m), 1454 (s), 1412 (s), 1348 (m), 1311 (s), 1264 (s), 757 (m); TOFMS (EI) calcd for (M^+) $C_{36}H_{32}N_2O_4$: 556.2362, found = 556.2357.

II. Sequential HPLC analysis of the photolysis of **1f**

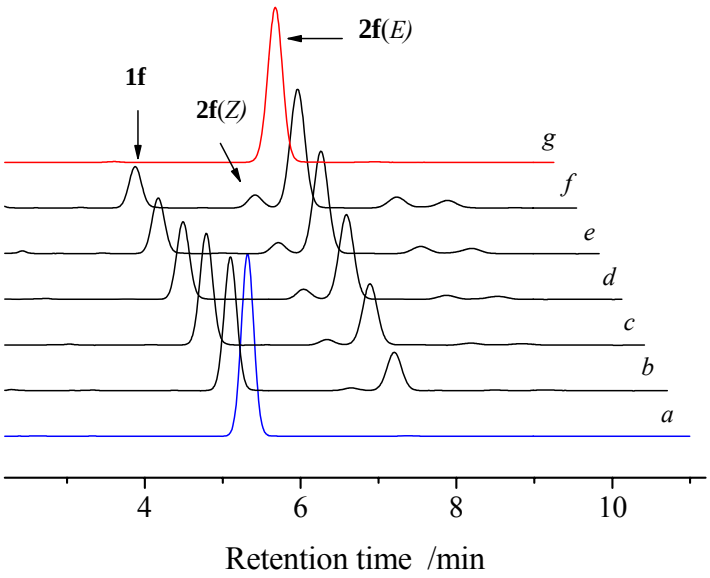


Fig. S1 HPLC chromatograms of the crude products in the photolysis of **1f** in aerated THF/methanol (v/v 1:9) solution irradiated for (a) 0 min, (b) 1.5 min, (c) 3.0 min, (d) 4.5 min, (e) 6.0 min, (f) 7.5 min upon 365 nm light; (g) pure **2f**(*E*).

III. Photoconversion of **1** to **2** Monitored by UV/Vis Spectrometer

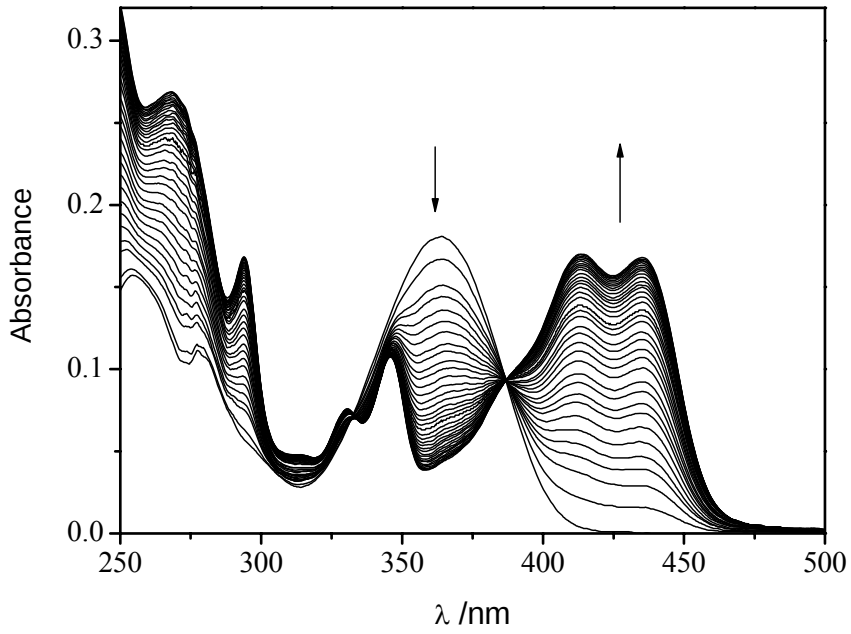


Figure S2a. UV/vis absorption spectra of **1a** in THF recorded after irradiation for different times (0→12 min) irradiated under 365nm light from a handheld UV lamp.

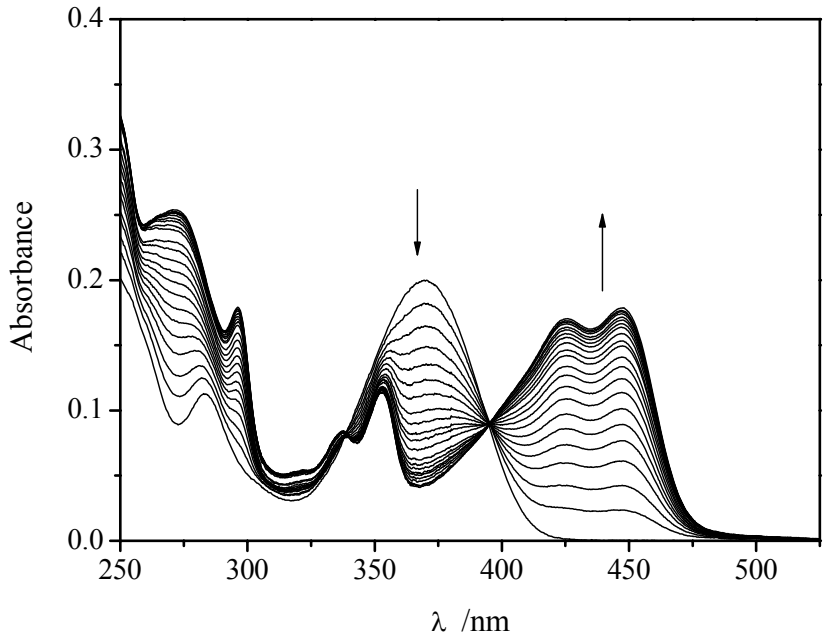


Figure S2b. UV/vis absorption spectra of **1b** in THF recorded after irradiation for different times (0→60 min) irradiated under 365nm light from a handheld UV lamp.

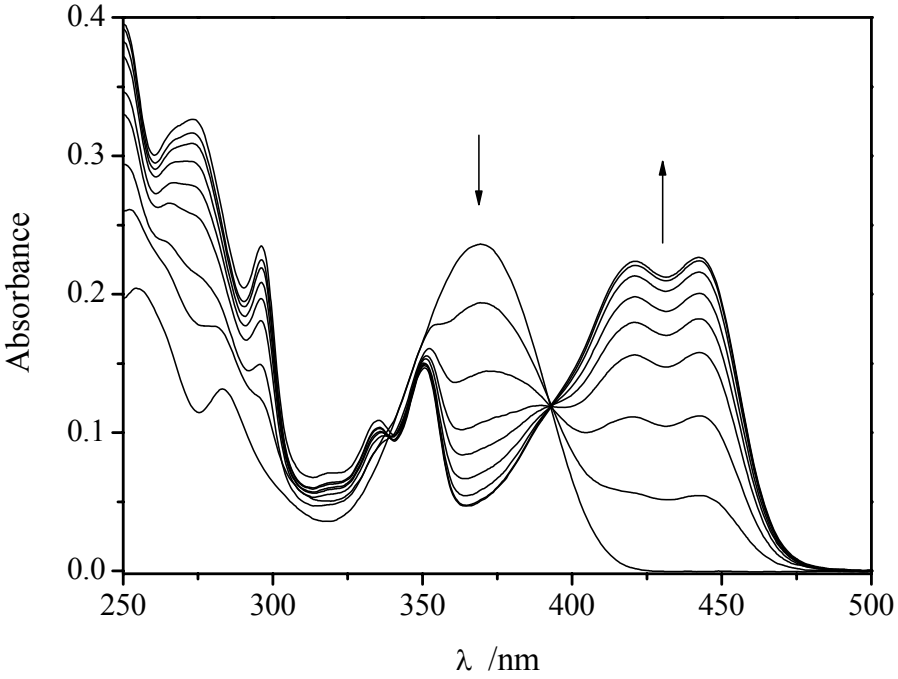


Figure S2c. UV/vis absorption spectra of **1c** in THF recorded after irradiation for different times (0→78 min) irradiated under 365nm light from a handheld UV lamp.

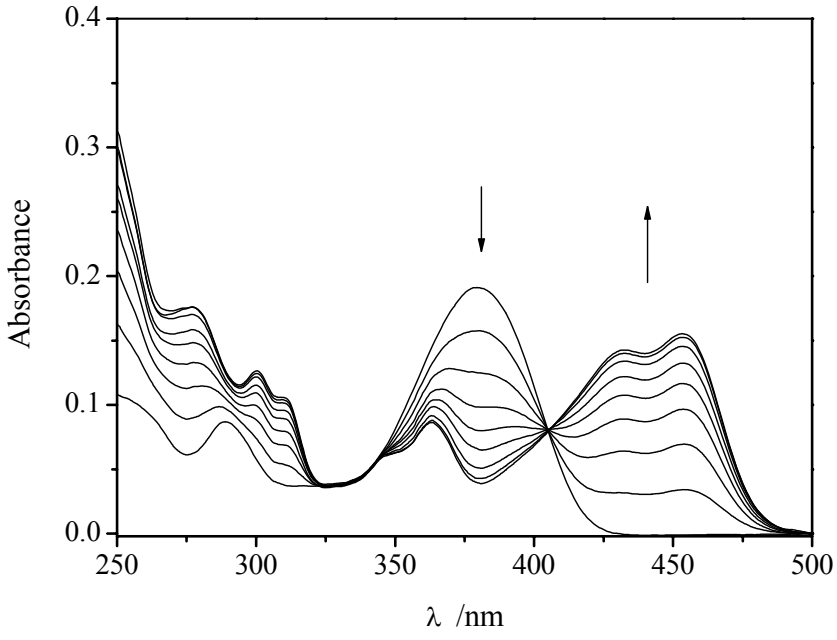


Figure S2d. UV/vis absorption spectra of **1d** in THF recorded after irradiation for different times (0→150 min) irradiated under 365nm light from a handheld UV lamp.

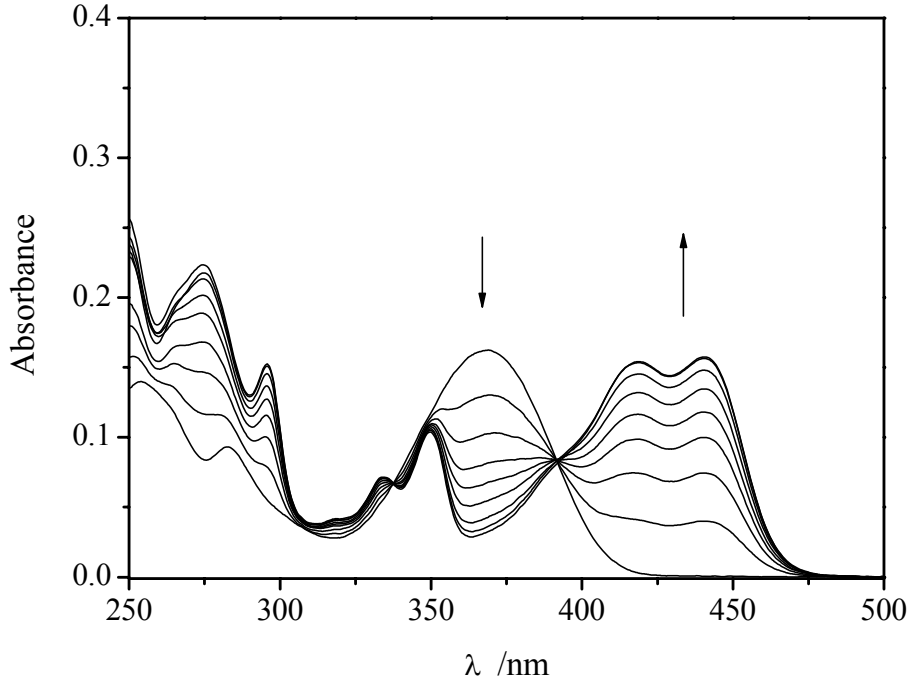


Figure S2e. UV/vis absorption spectra of **1e** in THF recorded after irradiation for different times (0→85 min) irradiated under 365nm light from a handheld UV lamp.

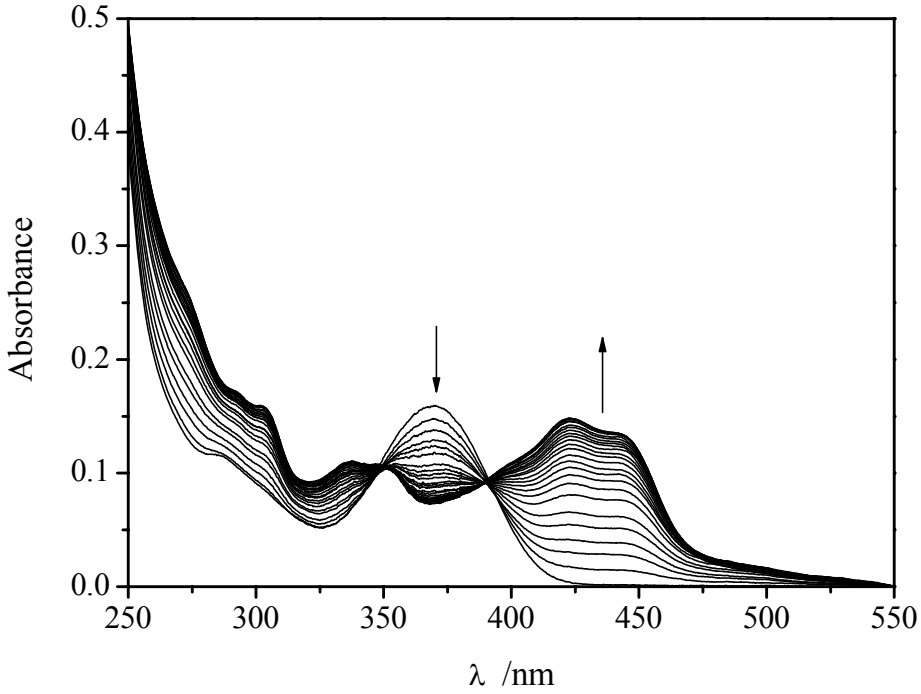


Figure S2f. UV/vis absorption spectra of **1f** in THF recorded after irradiation for different times (0→18 min) irradiated under 365nm light from a handheld UV lamp.

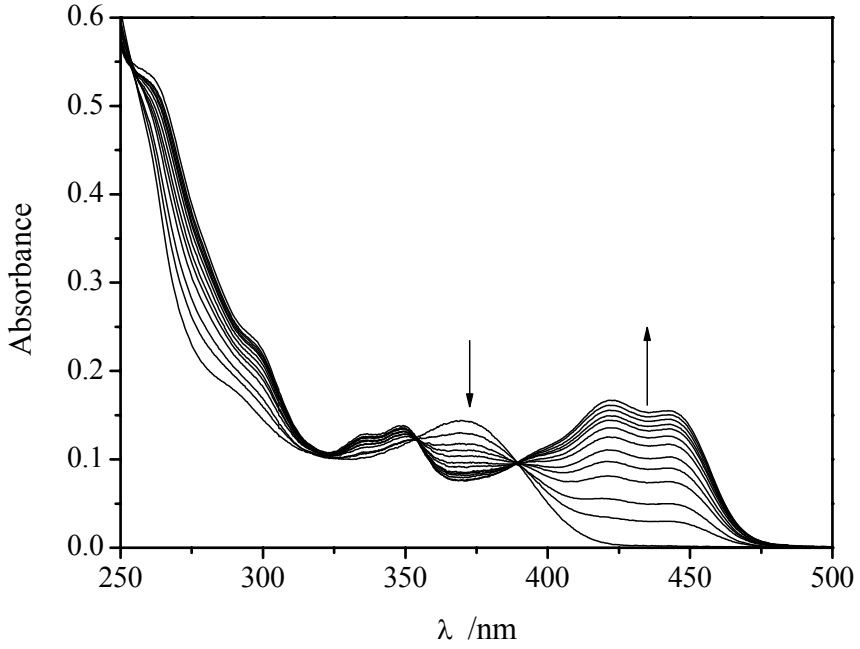


Figure S2g. UV/vis absorption spectra of **1g** in THF recorded after irradiation for different times (0→1 min) irradiated under 365nm light from a handheld UV lamp.

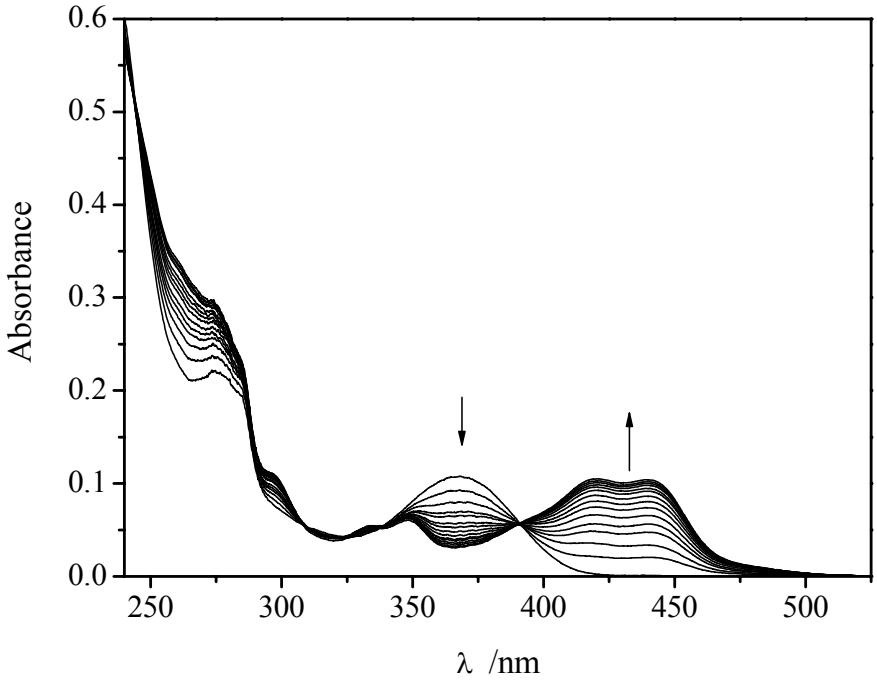


Figure S2h. UV/vis absorption spectra of **1h** in THF recorded after irradiation for different times (0→1.3 min) irradiated under 365nm light from a handheld UV lamp.

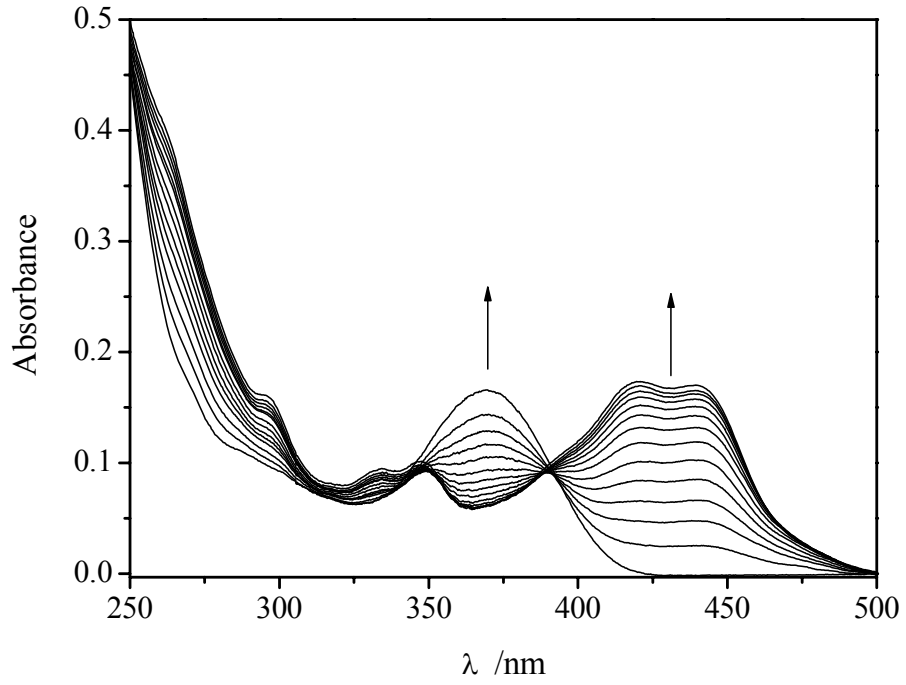


Figure S2i. UV/vis absorption spectra of **1i** in THF recorded after irradiation for different times (0→4 min) irradiated under 365nm light from a handheld UV lamp.

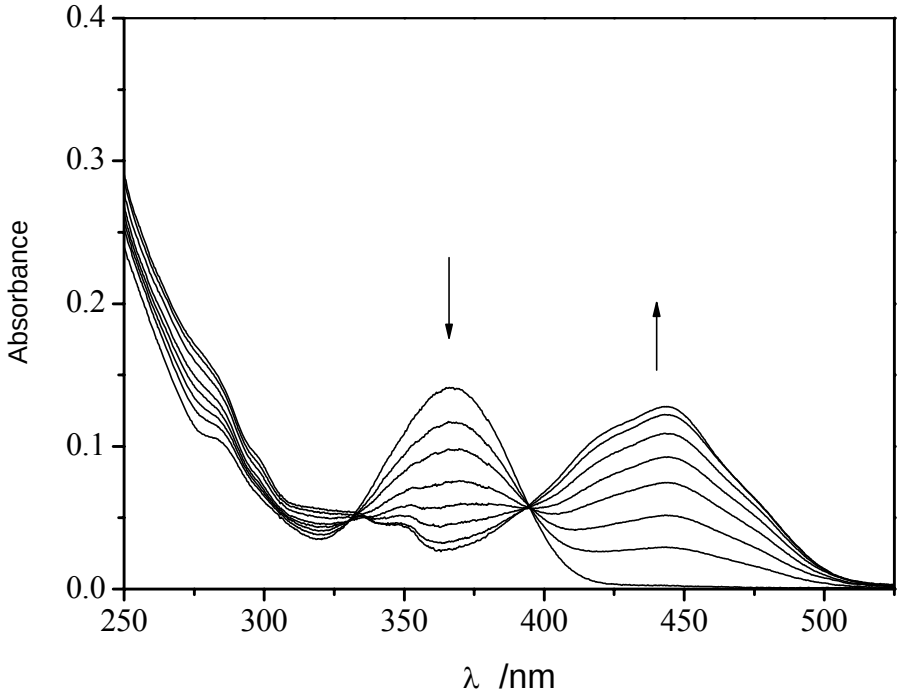
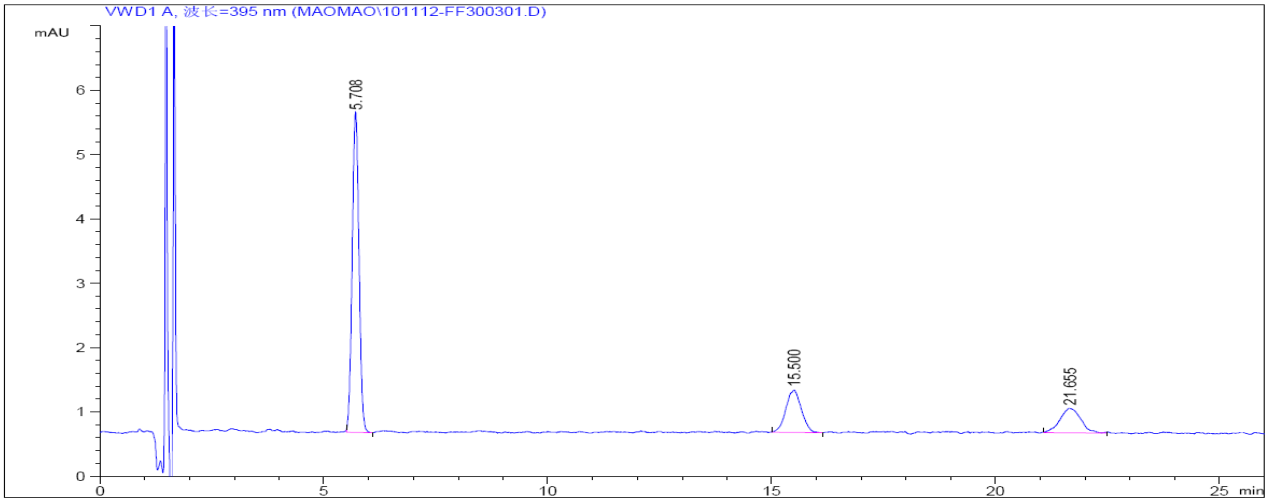


Figure S2j. UV/vis absorption spectra of **1j** in THF recorded after irradiation for different times (0→1.4 min) irradiated under 365nm light from a handheld UV lamp.

IV. HPLC Chromatograms for Photolysis crude products of **1** in aerated CH_3CN/THF (v/v, 9:1) solutions

1. HPLC chromatograms of compounds **1b** (R = F), **2b**(*E*) and **2b**(*Z*)

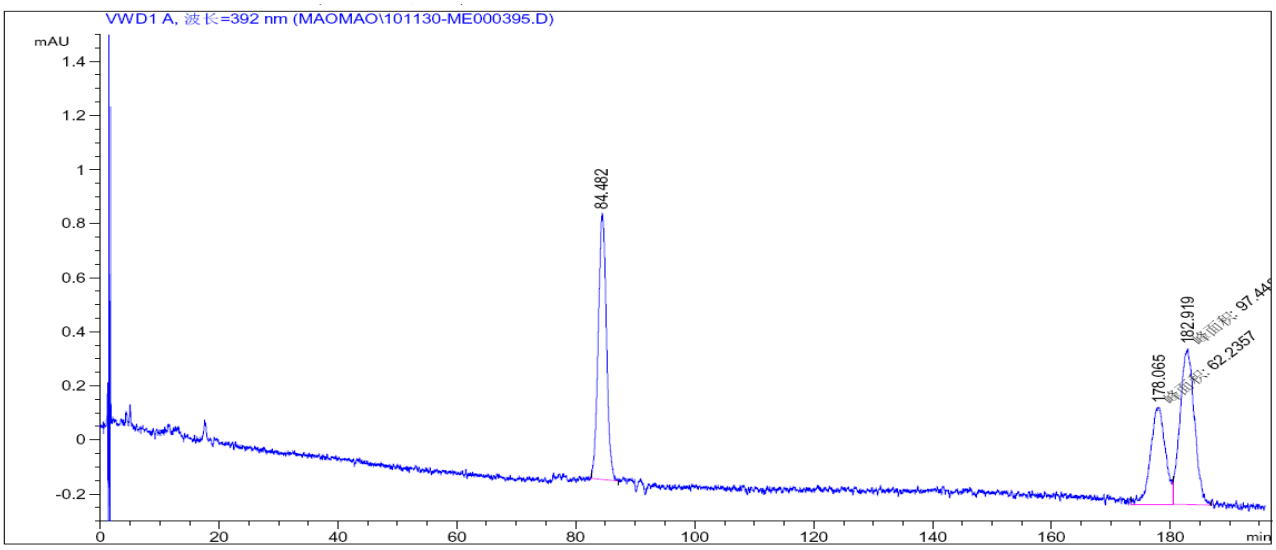


Condition:

Flow phase: methanol/water = 95:5. Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 5.7 min, 15.5 min and 21.7 min for **1b**, **2b**(*Z*) and **2b**(*E*), respectively.

2. HPLC chromatograms of compounds **1c** (R = CH_3), **2c**(*E*) and **2c**(*Z*)

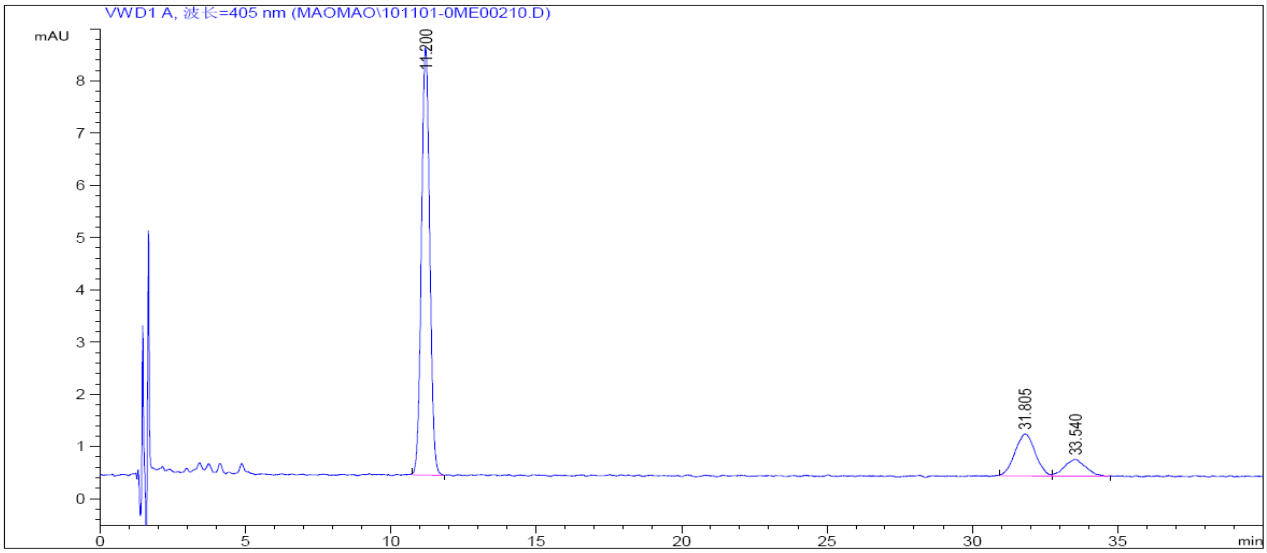


Condition:

Flow phase: methanol/water = 87:13, Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 84.5 min, 178.1 min and 182.9 for **1**, **2c**(*Z*) and **2c**(*E*), respectively.

3. HPLC chromatograms of compounds **1d** (R = OCH_3), **2d**(*E*) and **2d**(*Z*)

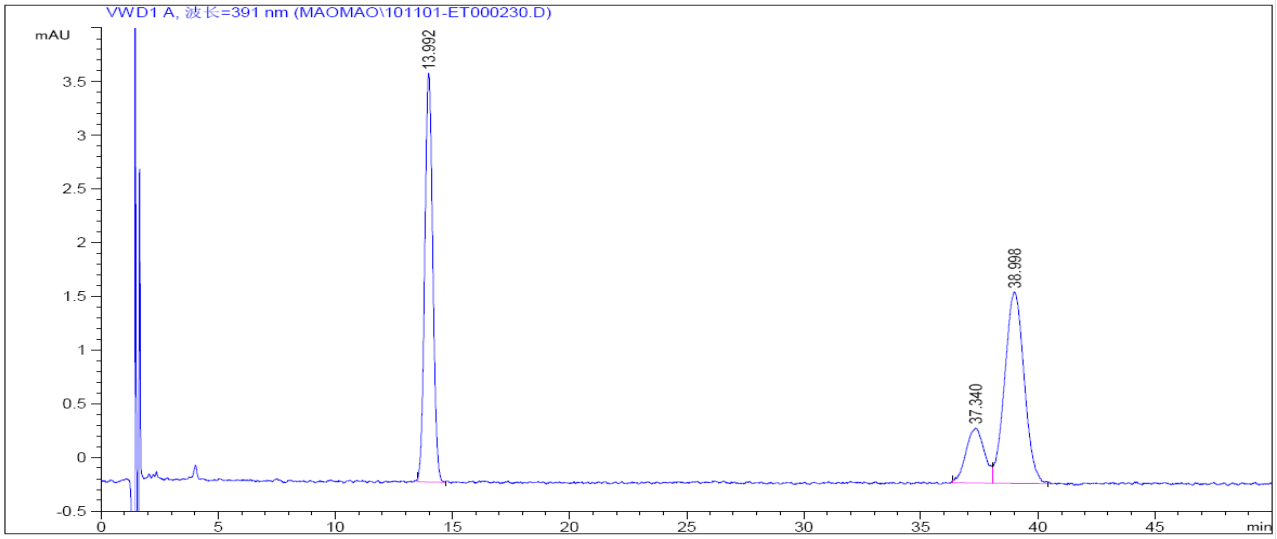


Condition:

Flow phase: methanol/water = 90:10, Flow rate: 1 mL/min, Column temperature: 20˚C,

Retention times: 11.2 min, 31.8 min and 33.5 min for **1d**, **2d**(*E*) and **2d**(*Z*), respectively.

4. HPLC chromatograms of compounds **1e** (R=Et), **2e**(*Z*) and **2e**(*E*)

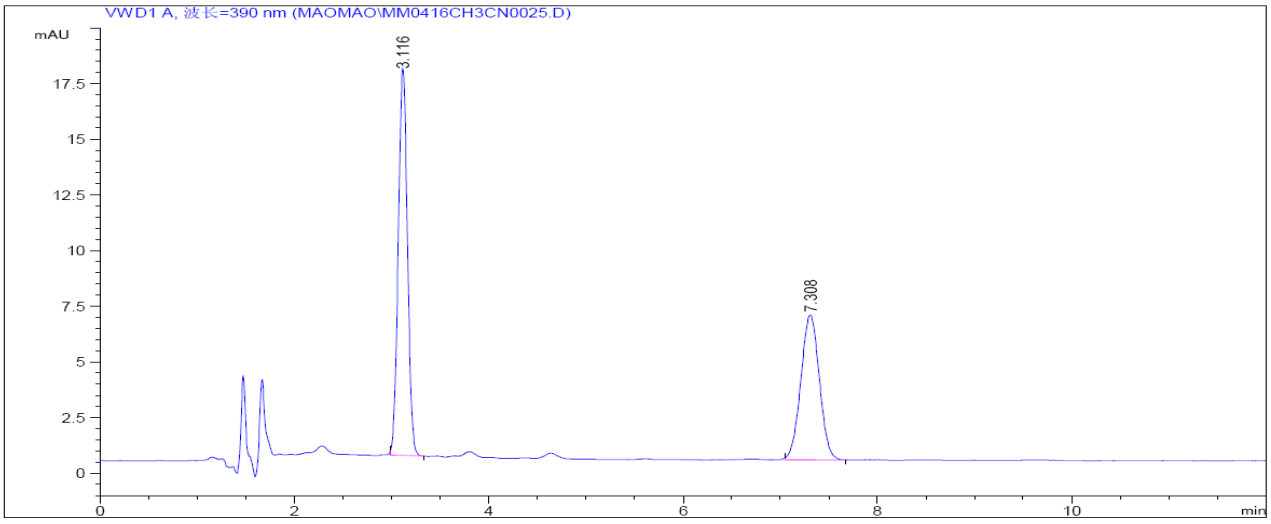


Condition:

Flow phase: methanol/water = 96:4, Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 14.0 min, 37.3 min and 39.0 min for **1e**, **2e**(*Z*) and **2e**(*E*), respectively.

5. HPLC chromatograms of compounds **1f** (R = CN) and **2f**(*E*)

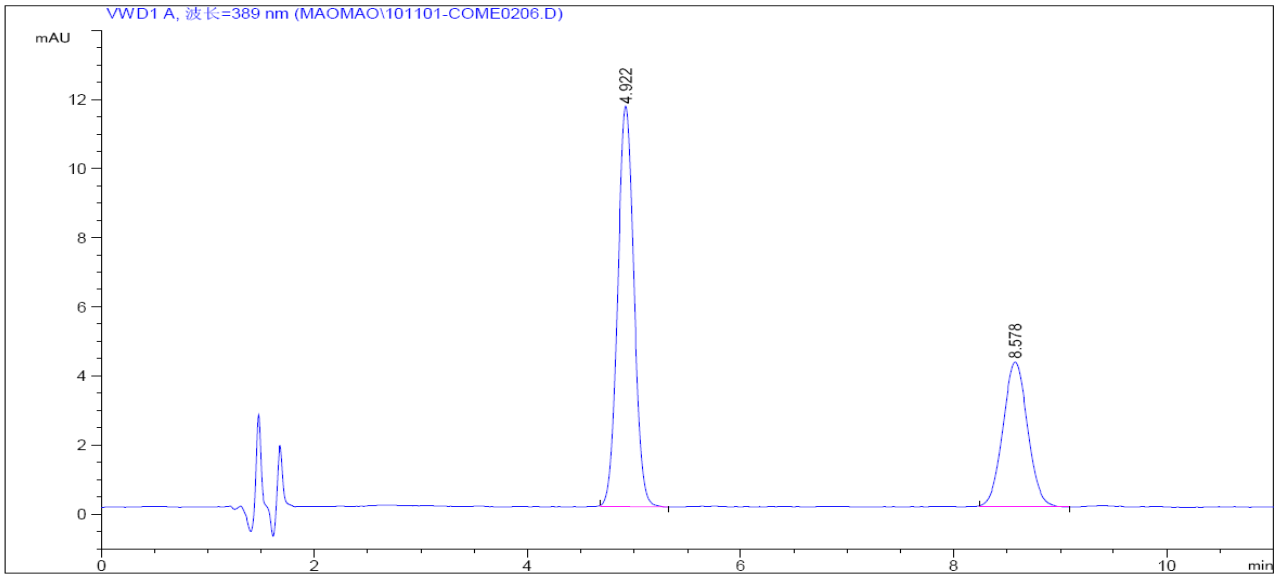


Condition:

Flow phase: methanol/water = 92:8, Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 3.1 min and 7.3 min for **1f** and **2f**(*E*), respectively.

6. HPLC chromatograms of compounds **1g** (R = $COCH_3$) and **2g**(*E*)

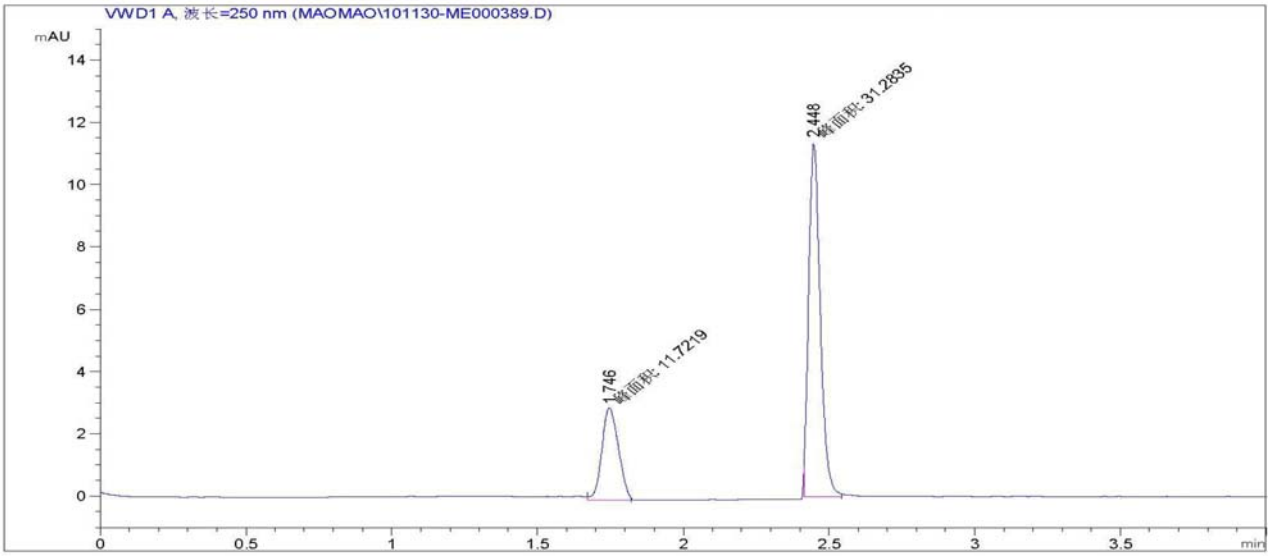


Condition:

Flow phase: methanol/water = 90:10, Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 4.9 min, 8.6 min for **1g** and **2g** (*E*), respectively.

8. HPLC chromatograms of compounds **1h** (R = COOH) and **2h**(*E*)

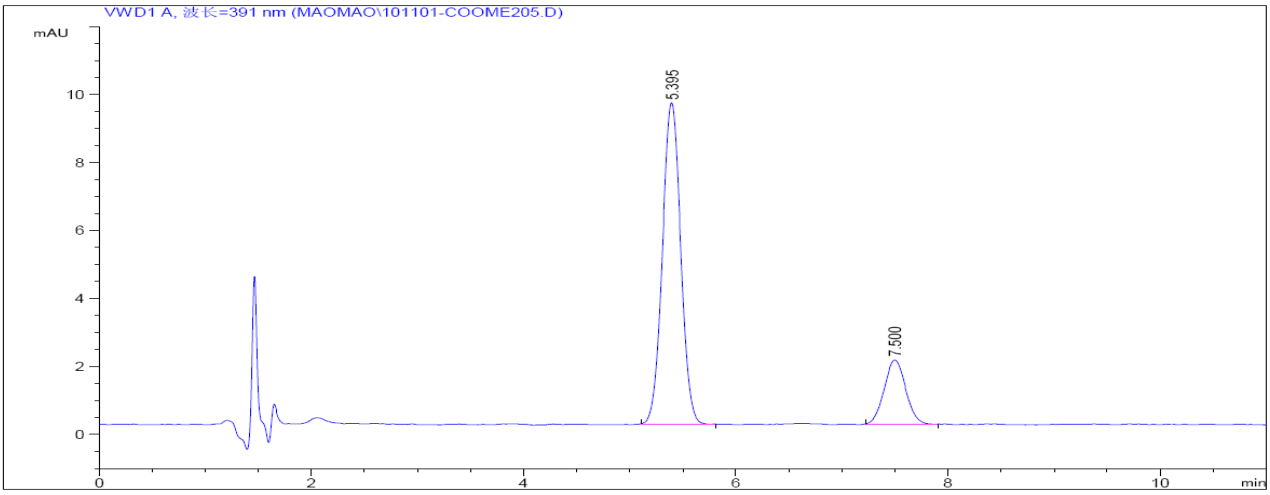


Condition:

Flow phase: *n*-hexane/ethanol = 85:15, Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 1.7 min, 2.4 min for **1h** and **2h**(*E*), respectively.

7. HPLC chromatograms of compounds **1i** (R = $COOCH_3$) and **2i**(*E*)

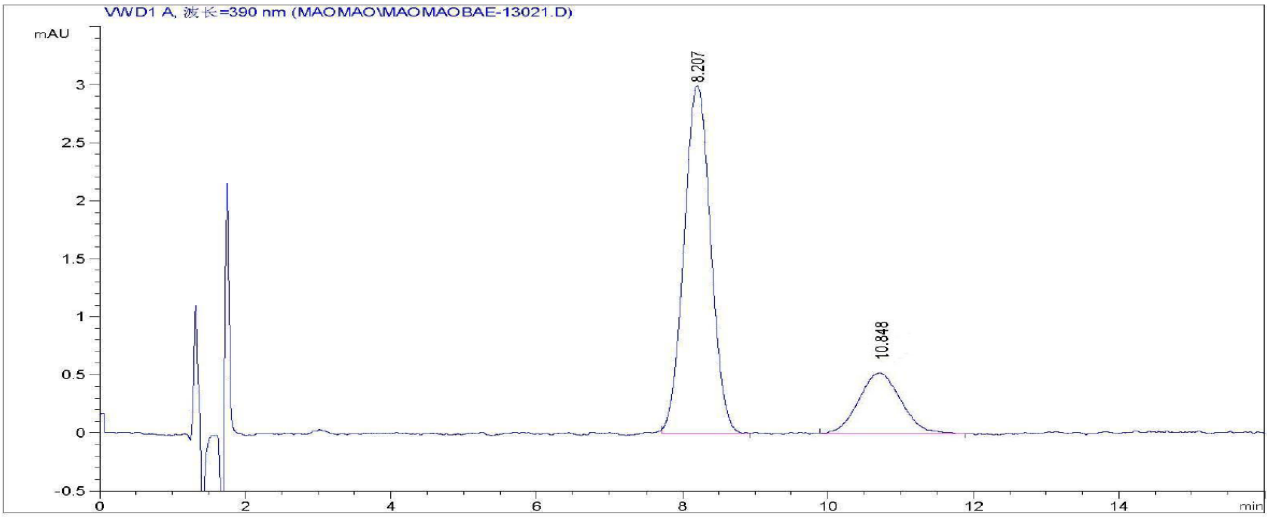


Condition:

Flow phase: methanol/water = 94:6, Flow rate: 1 mL/min, Column temperature: 20˚C

Retention times: 5.4 min, 7.5 min for **1i** and **2i**(*E*), respectively.

9. HPLC chromatograms of compounds **1j** (R=$CONEt_2$) and **2j**(*E*)



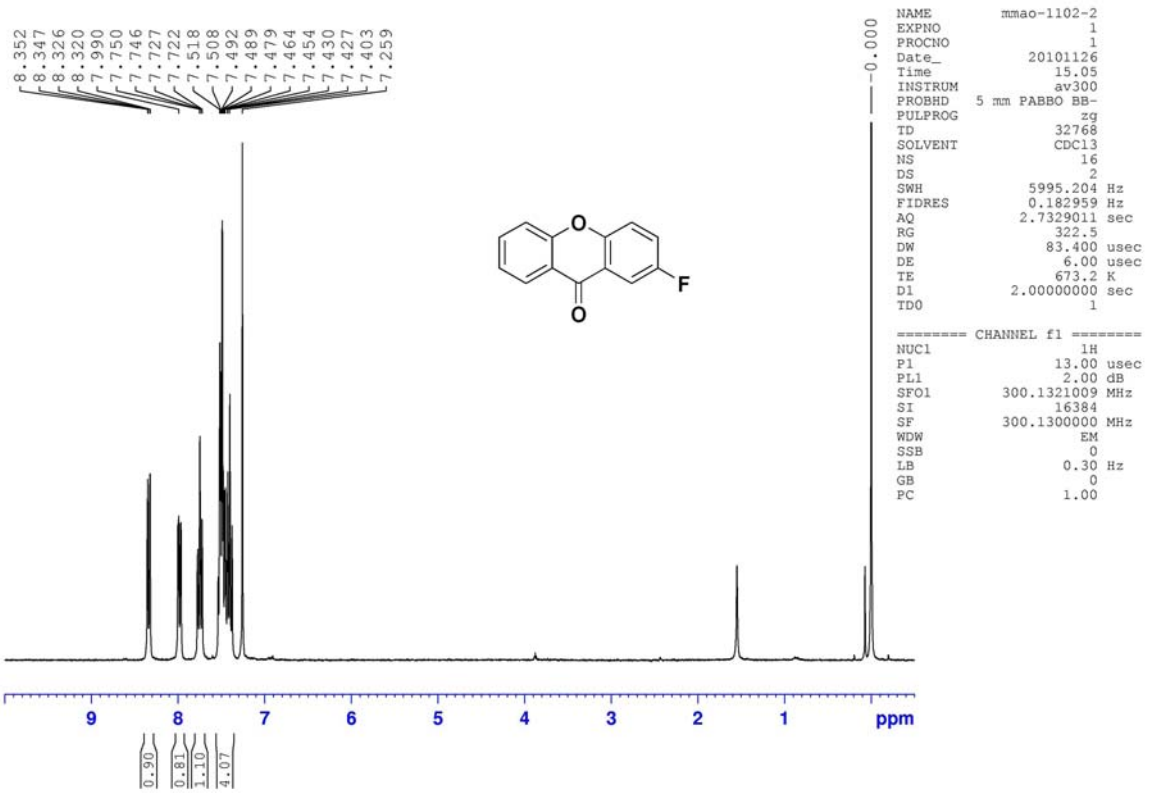
Condition:

Flow phase: methanol/water = 80:20, Flow rate: 1 mL/min, Column temperature: 20˚C

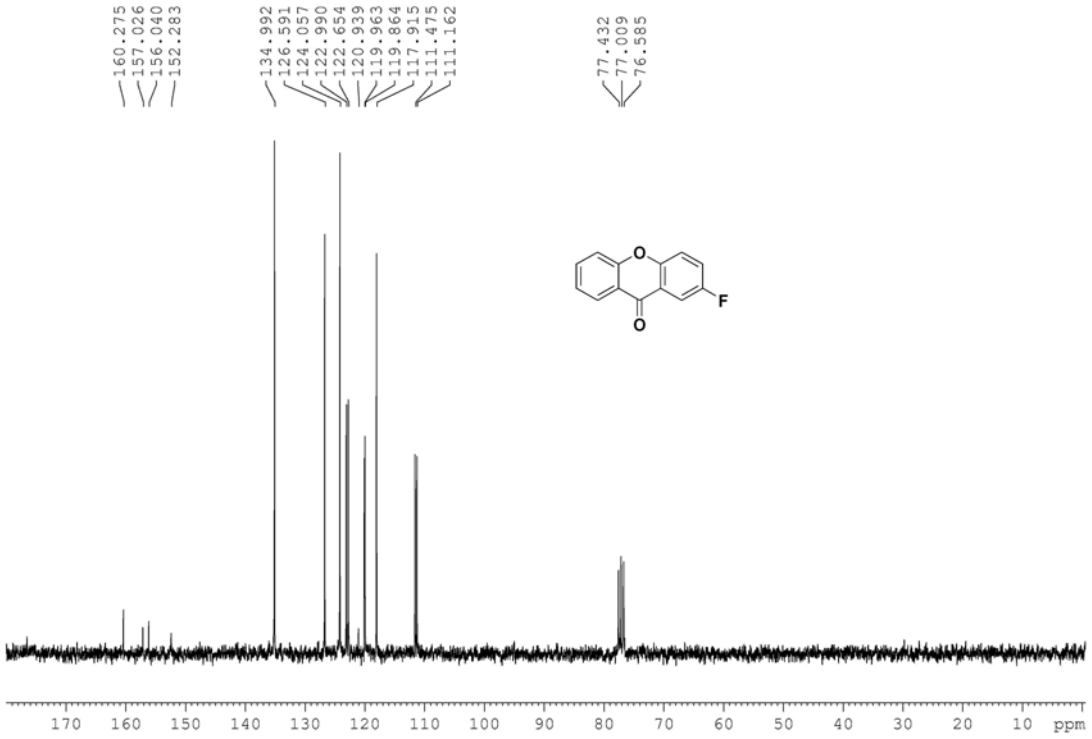
Retention times: 8.2 min, 10.8 min for **1j** and **2j**(*E*), respectively.

V. Copies of ^{1}H NMR and ^{13}C NMR Spectra

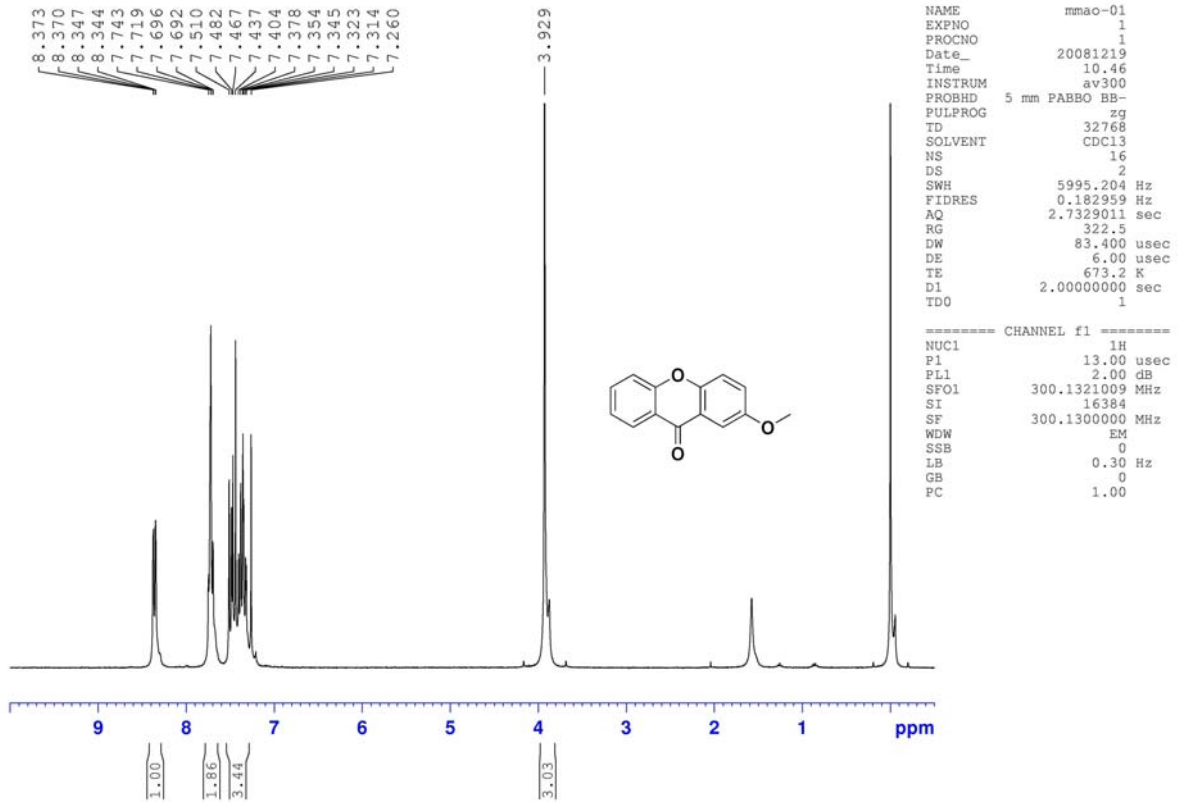
^{1}H NMR spectrum of compound **4b**



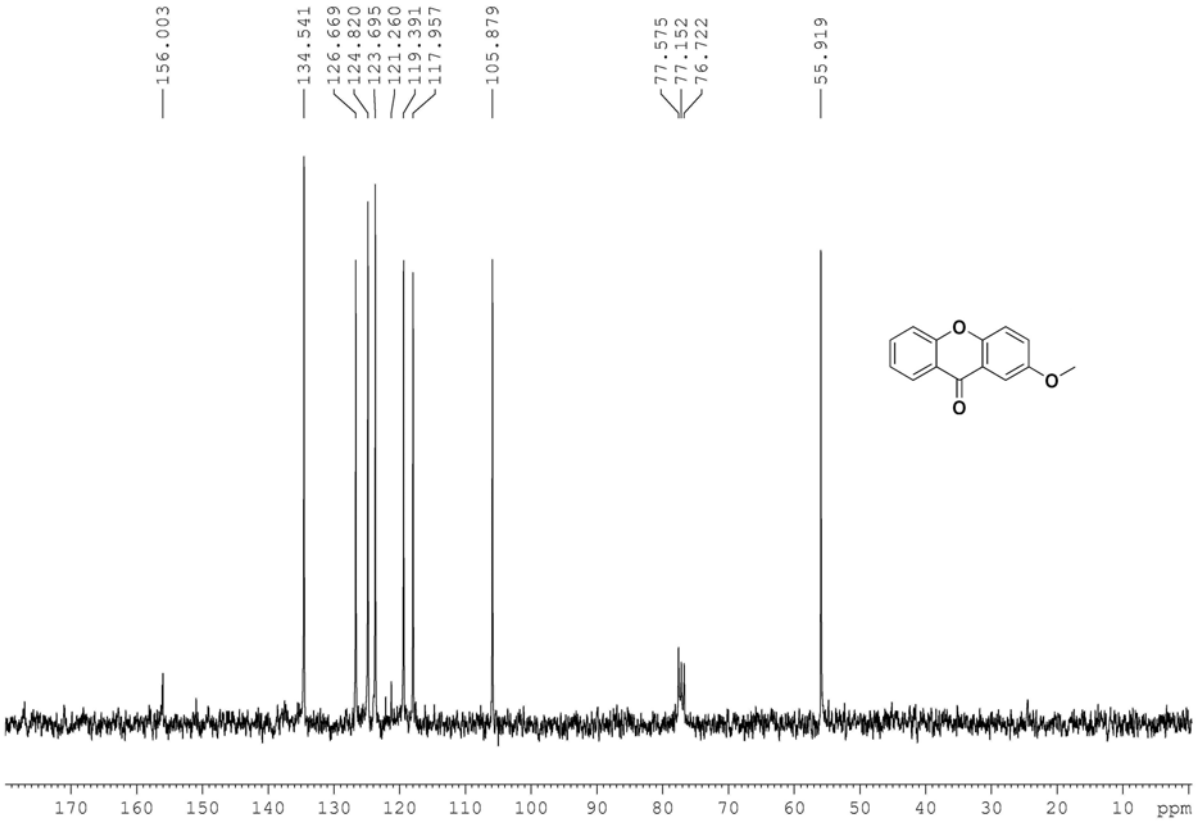
^{13}C NMR spectrum of compound **4b**



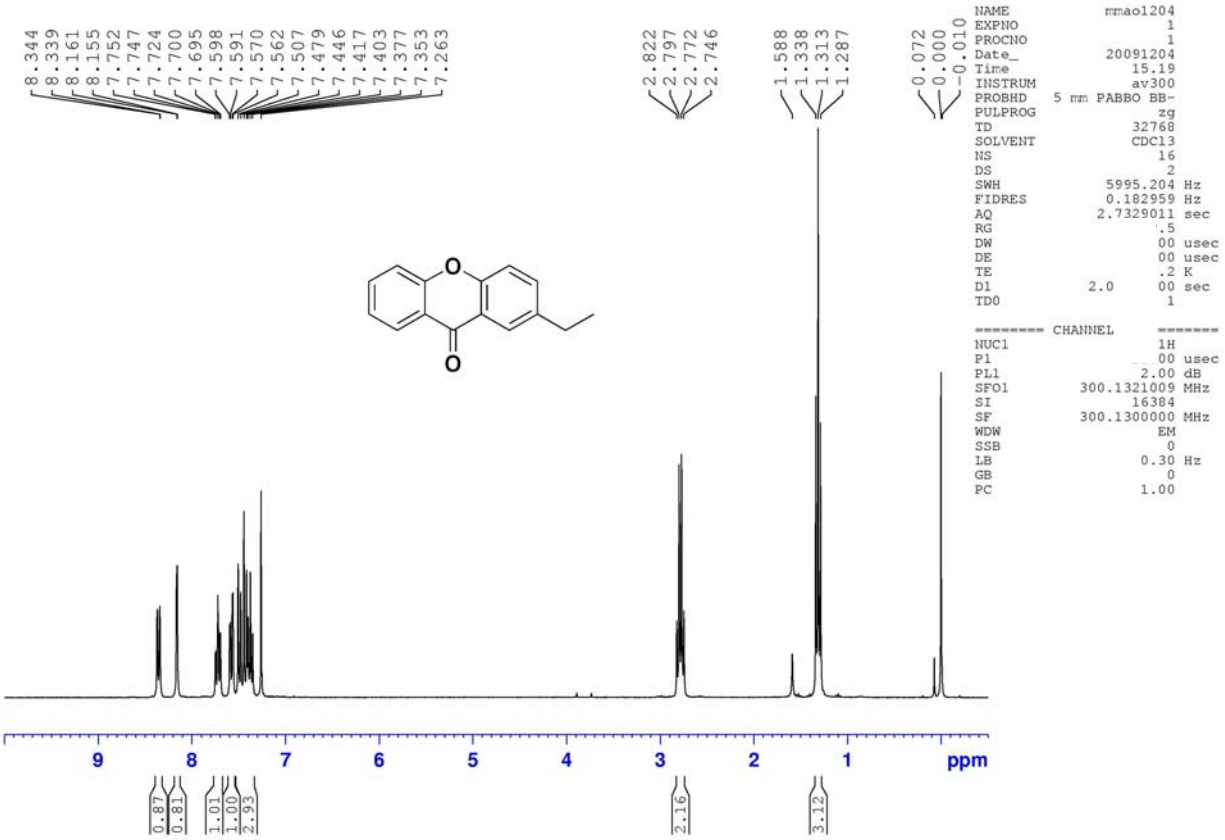
^{1}H NMR spectrum of compound **4d**



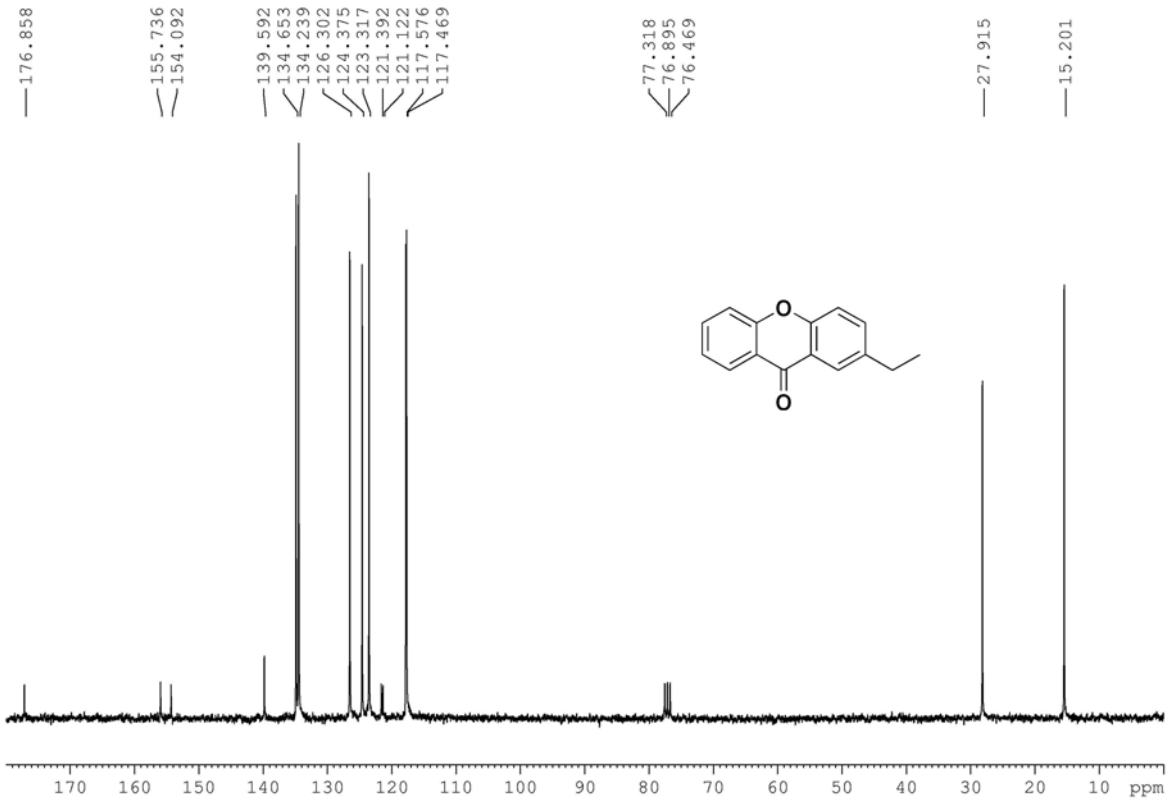
^{13}C NMR spectrum of compound **4d**



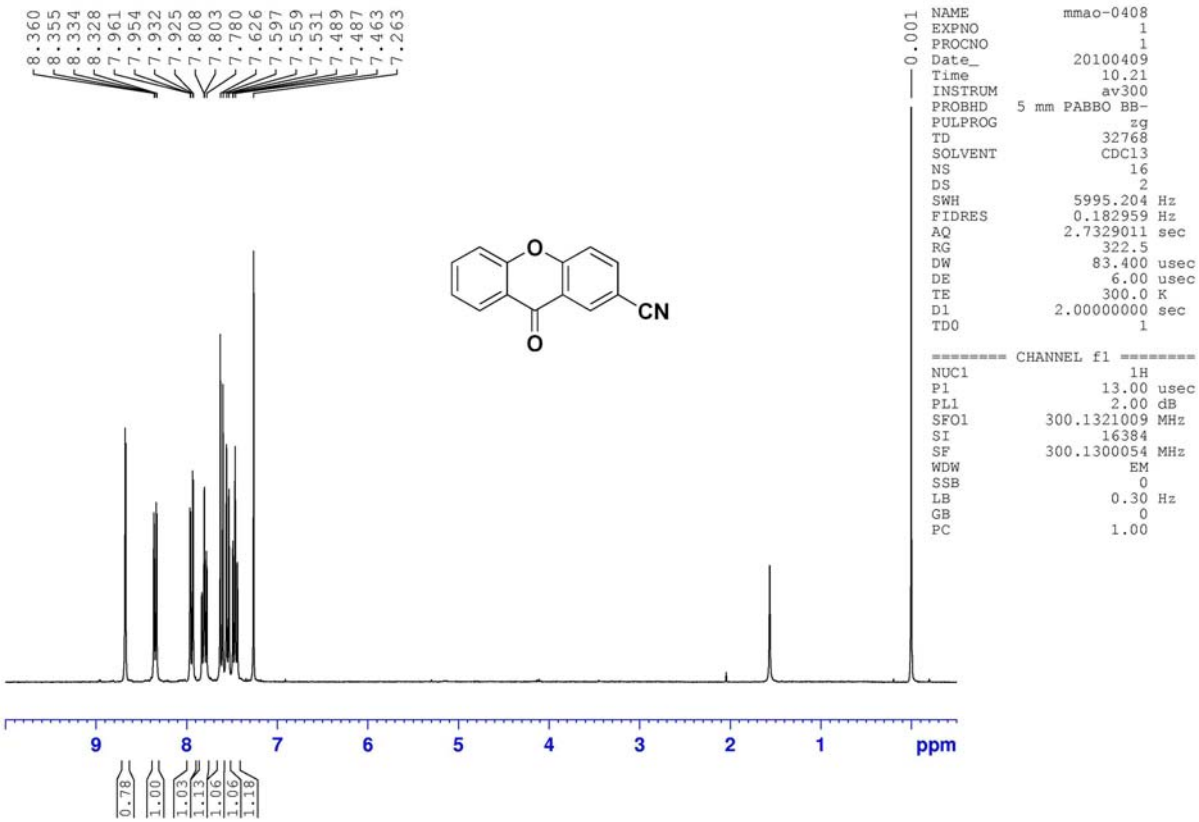
^{1}H NMR spectrum of compound **4e**



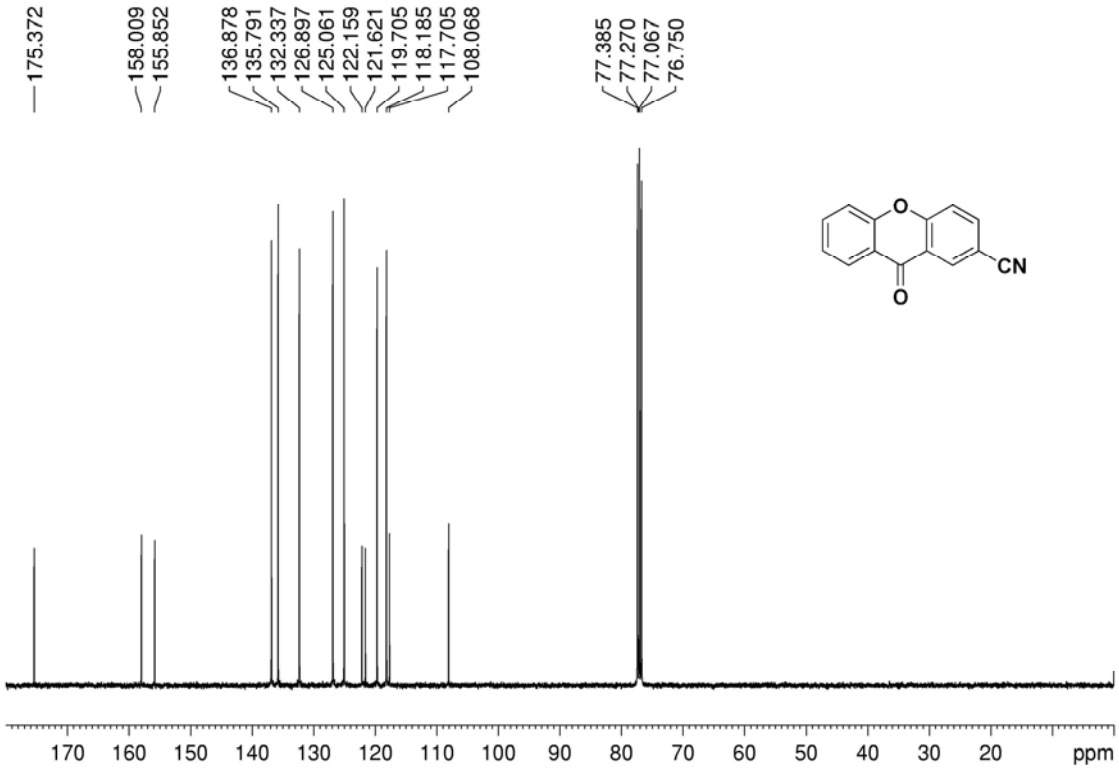
^{13}C NMR spectrum of compound **4e**



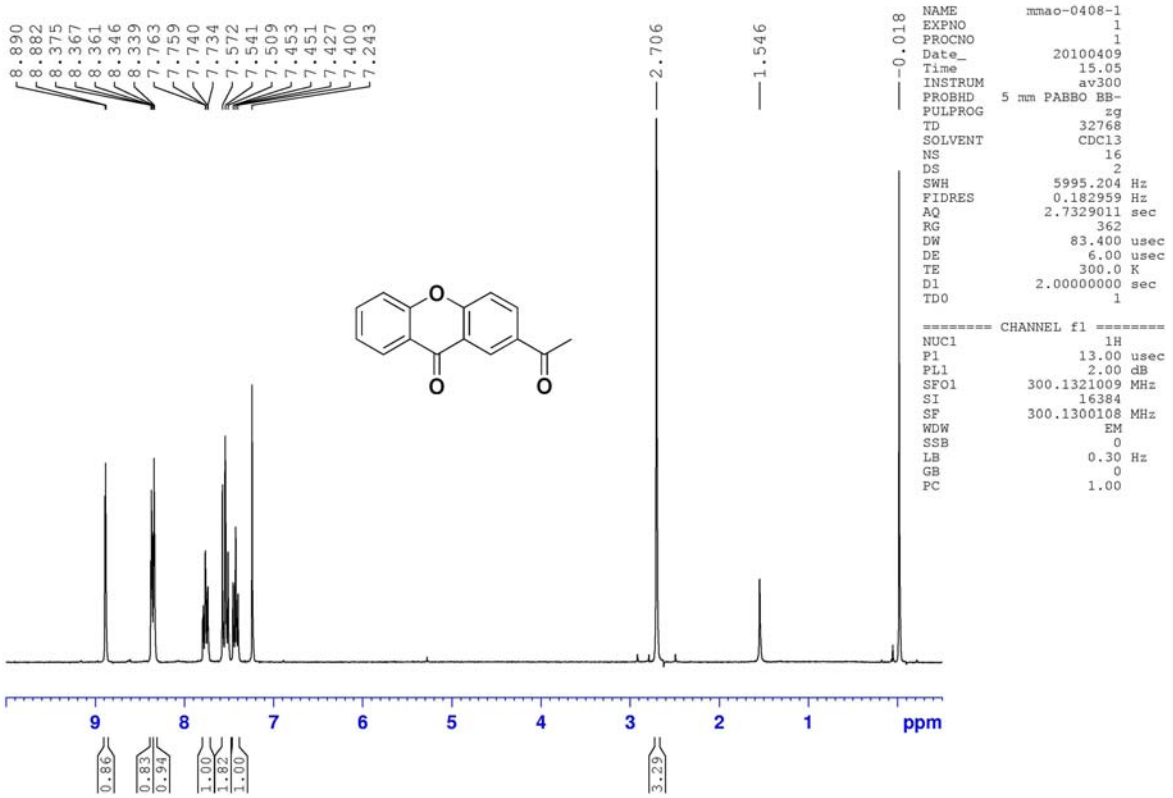
^{1}H NMR spectrum of compound **4f**



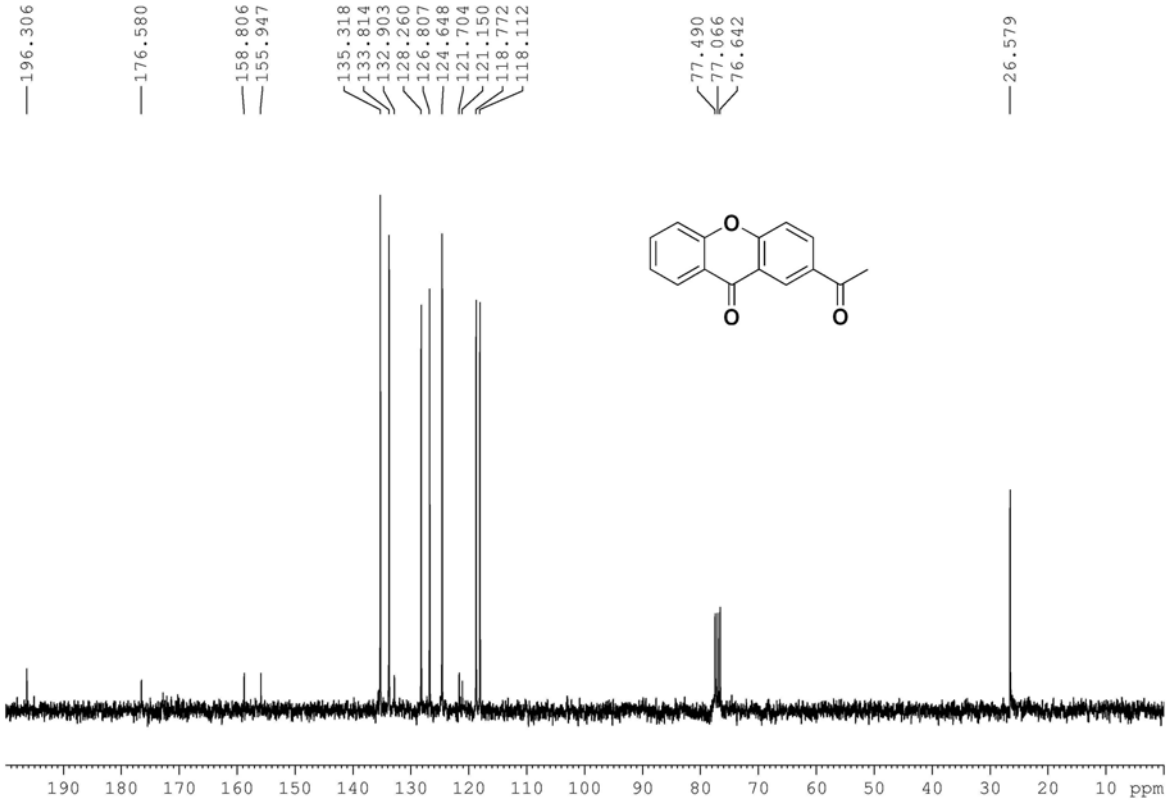
^{13}C NMR spectrum of compound **4f**



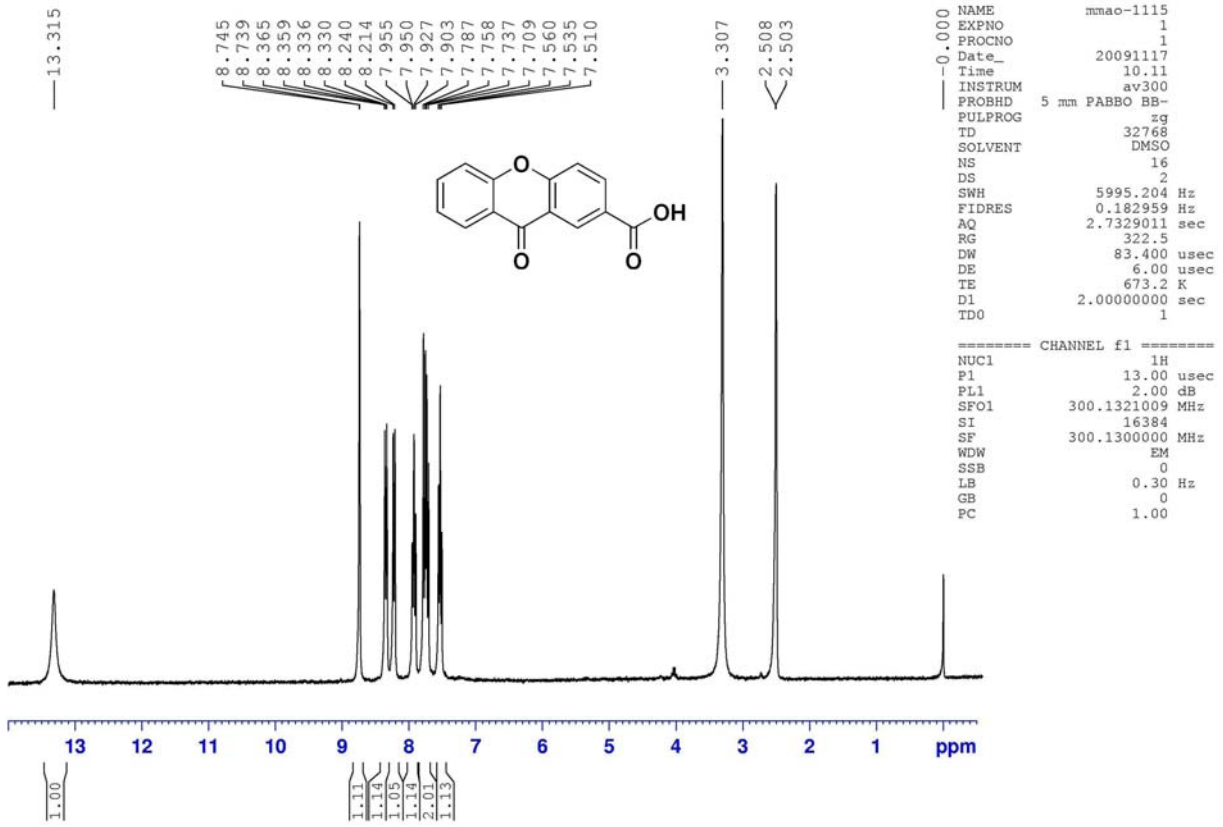
^{1}H NMR spectrum of compound **4g**



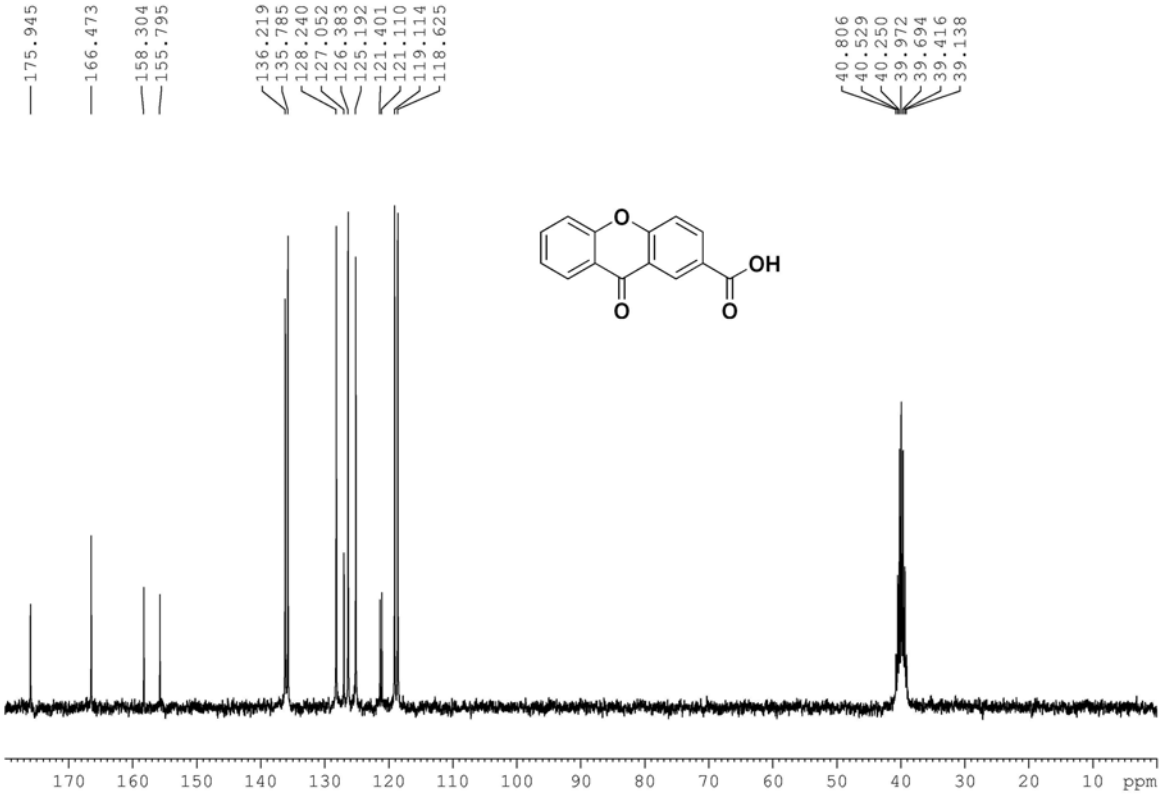
^{13}C NMR spectrum of compound **4g**



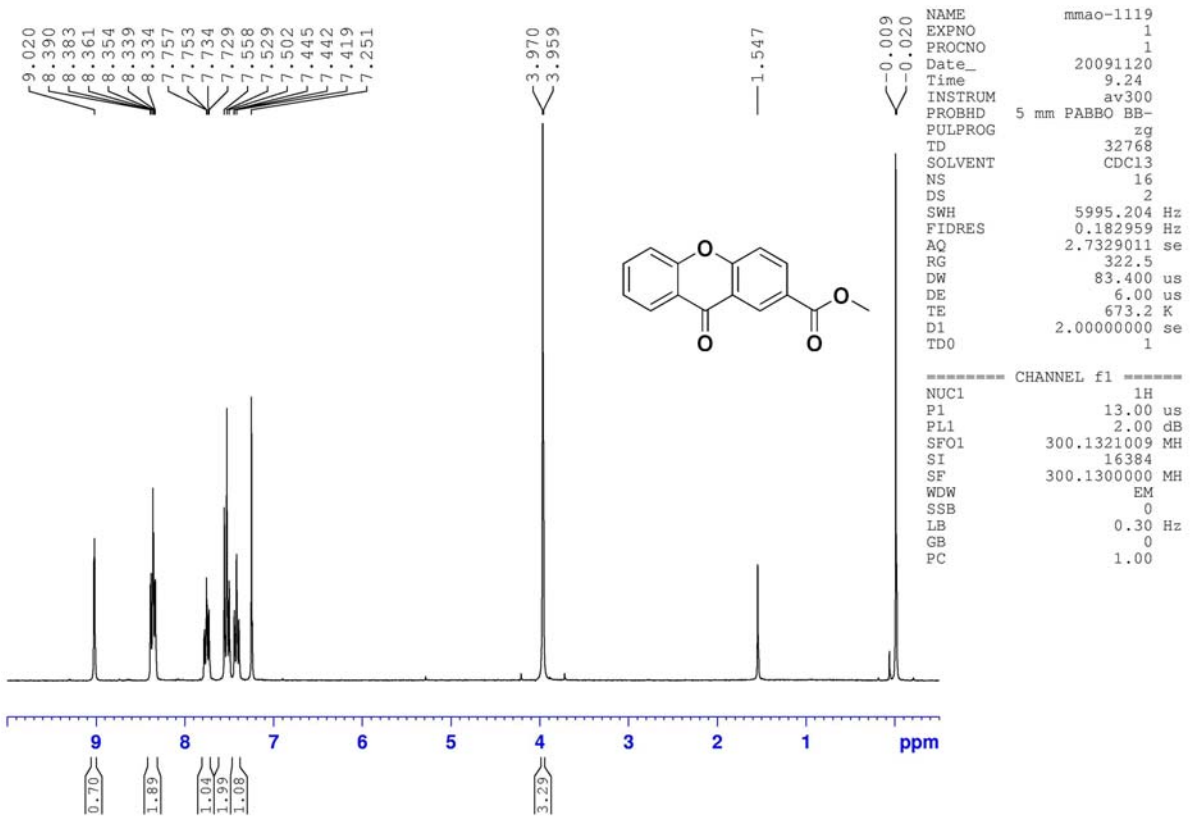
^{1}H NMR spectrum of compound **4h**



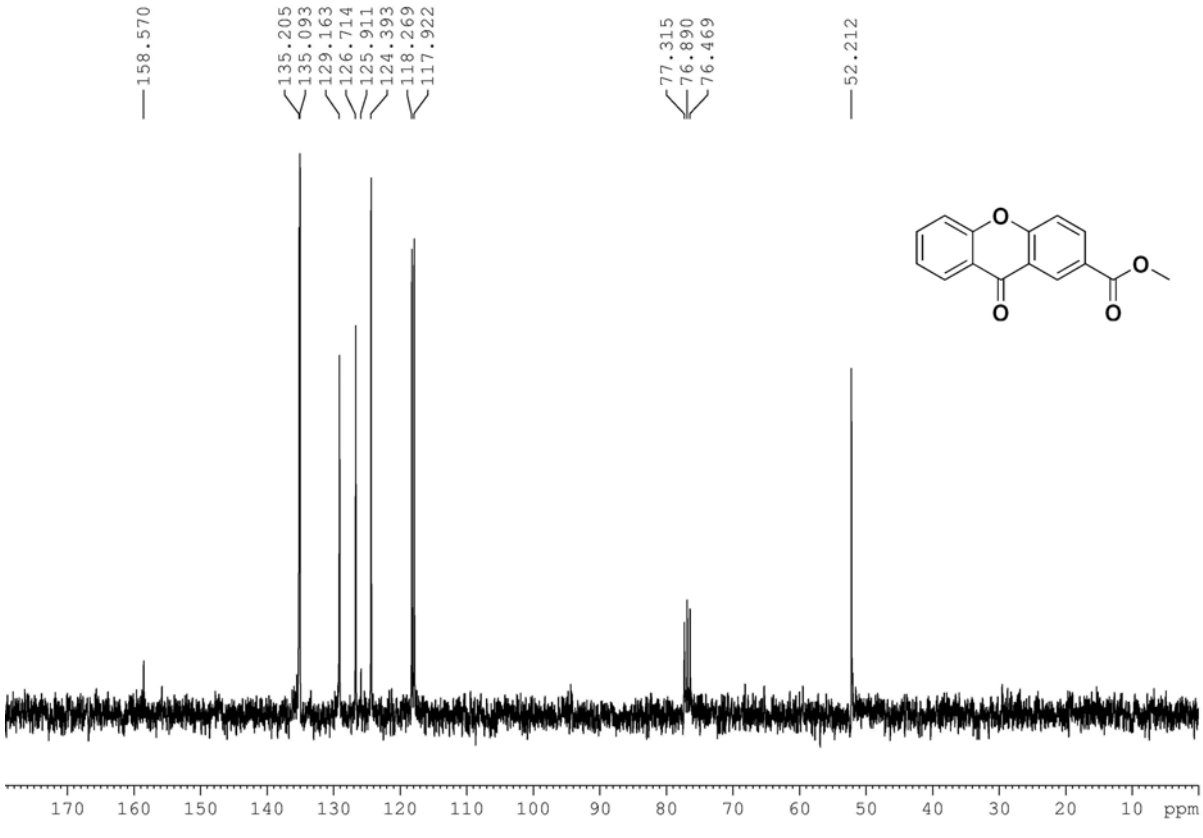
^{13}C NMR spectrum of compound **4h**



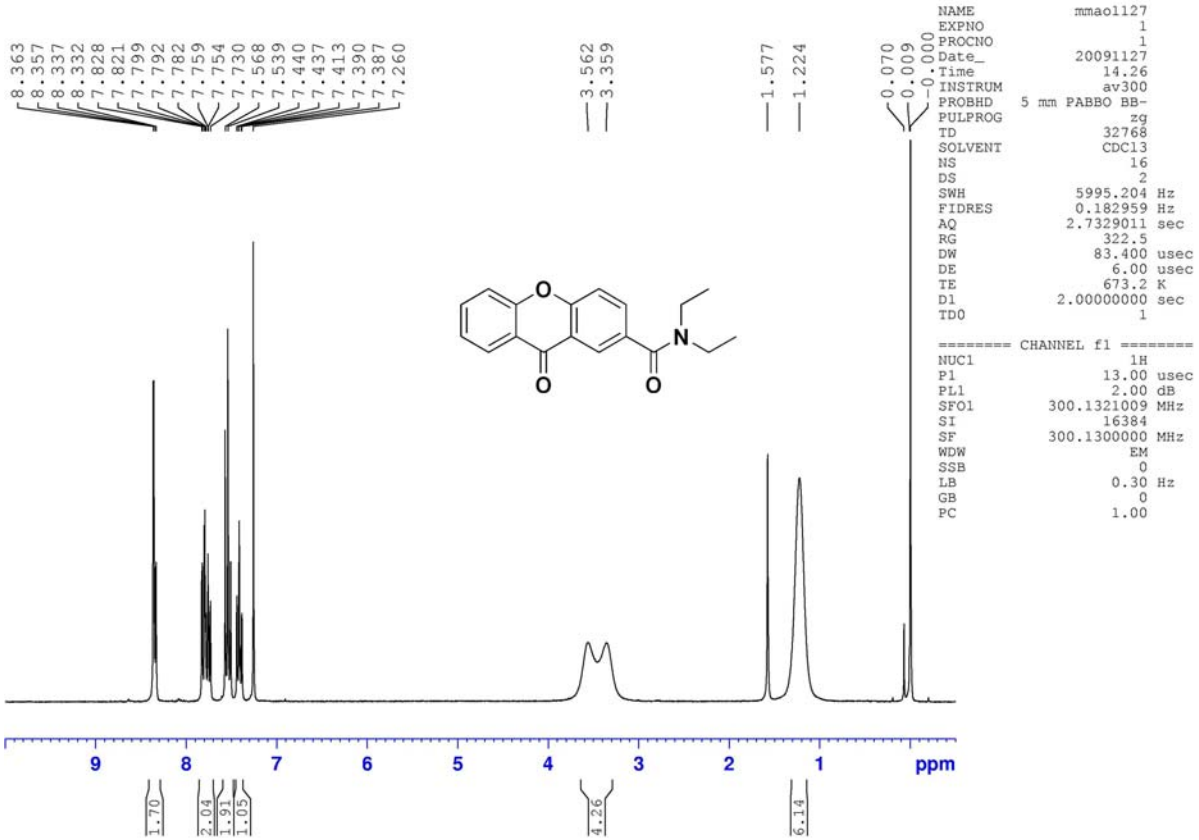
^{1}H NMR spectrum of compound **4i**



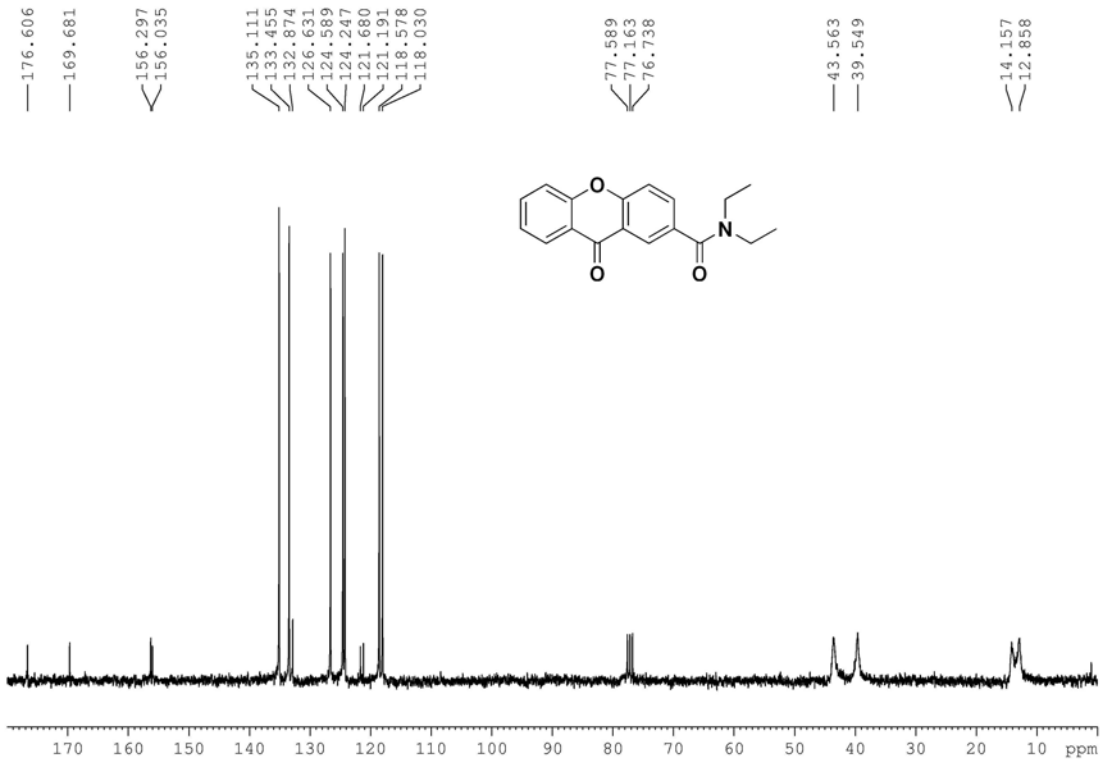
^{13}C NMR spectrum of compound **4i**



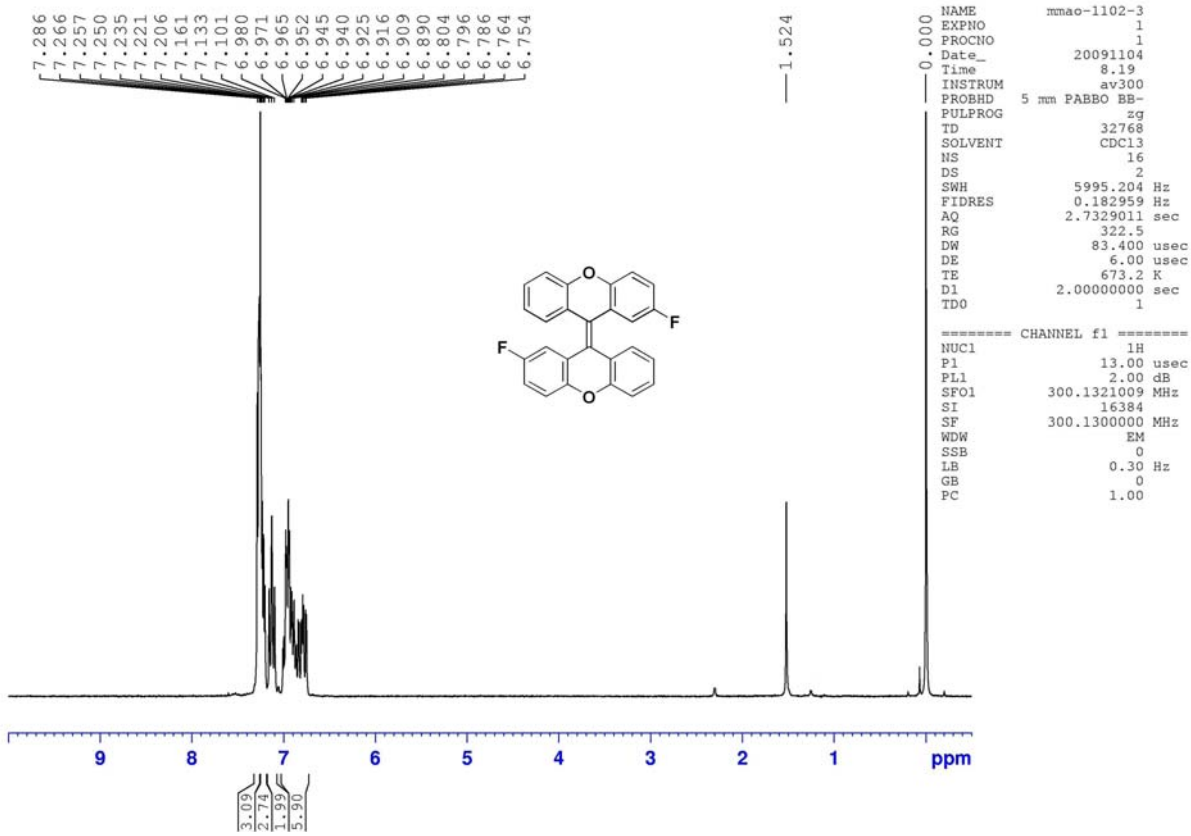
^{1}H NMR spectrum of compound **4j**



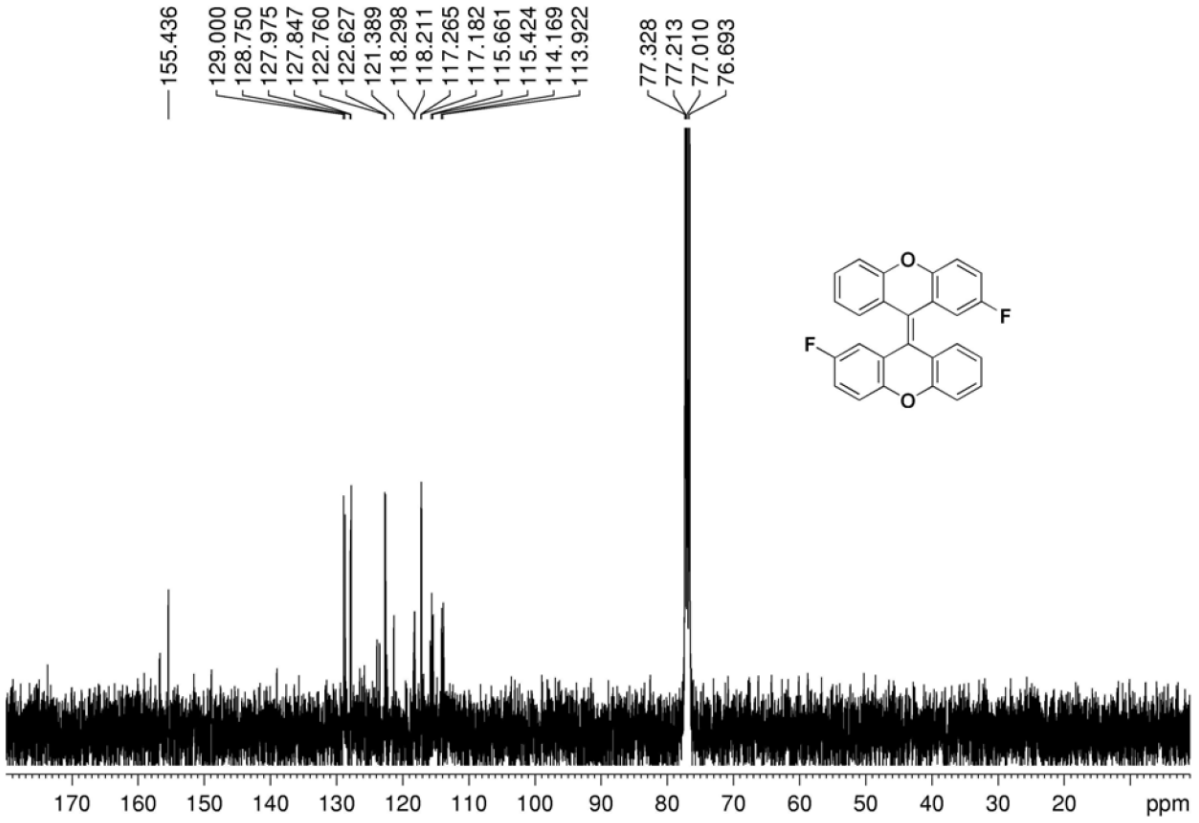
^{13}C NMR spectrum of compound **4j**



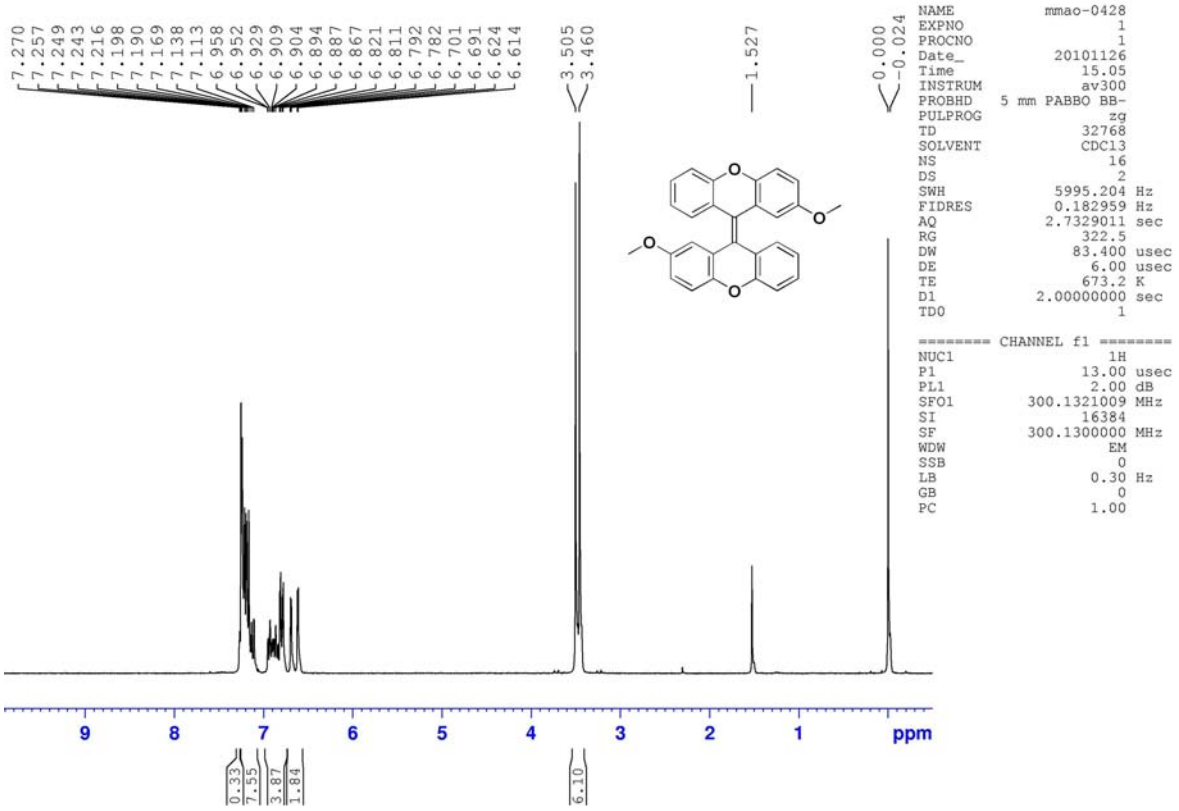
^{1}H NMR spectrum of compound **1b**



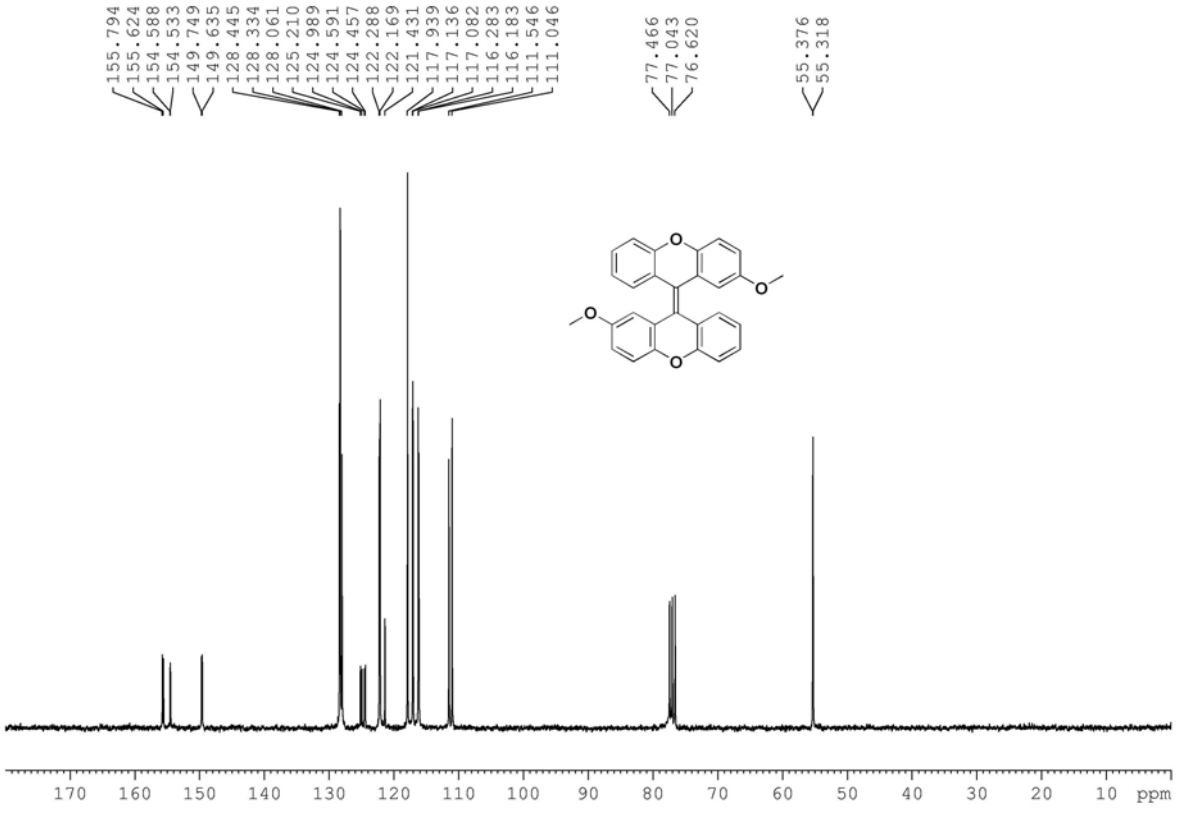
^{13}C NMR spectrum of compound **1b**



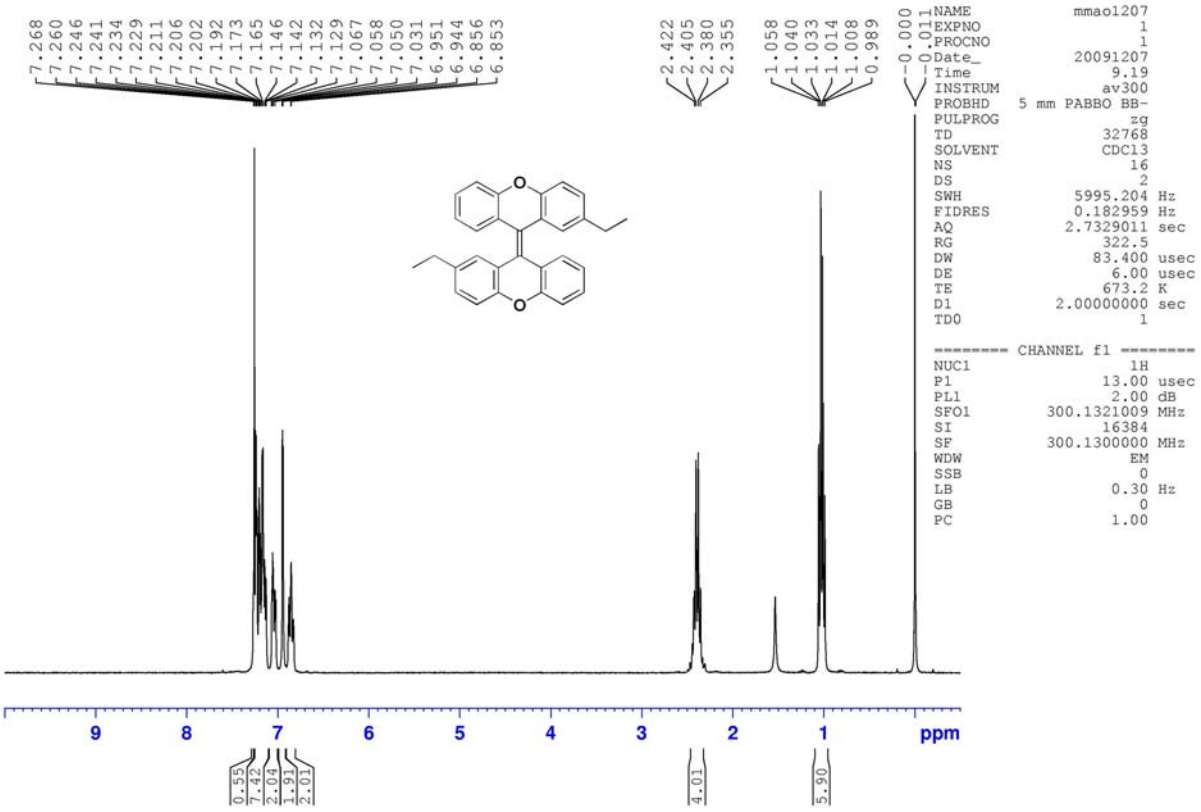
^{1}H NMR spectrum of compound **1d**



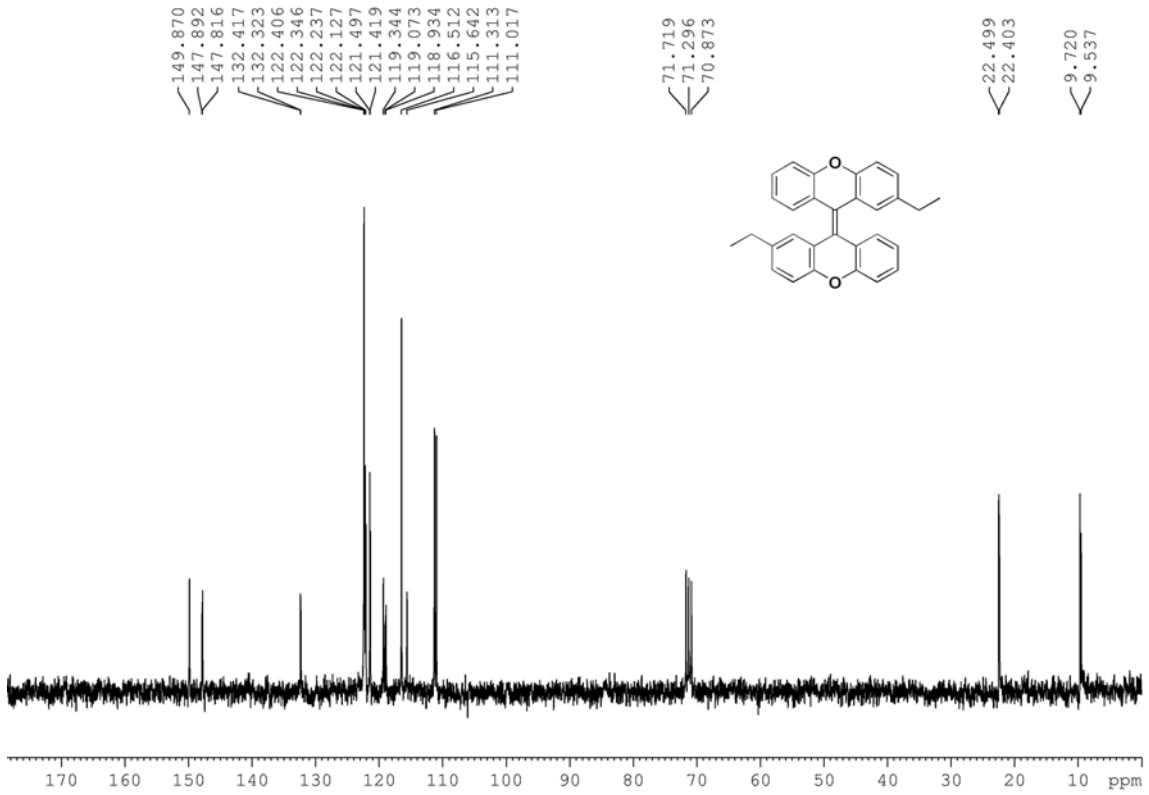
^{13}C NMR spectrum of compound **1d**



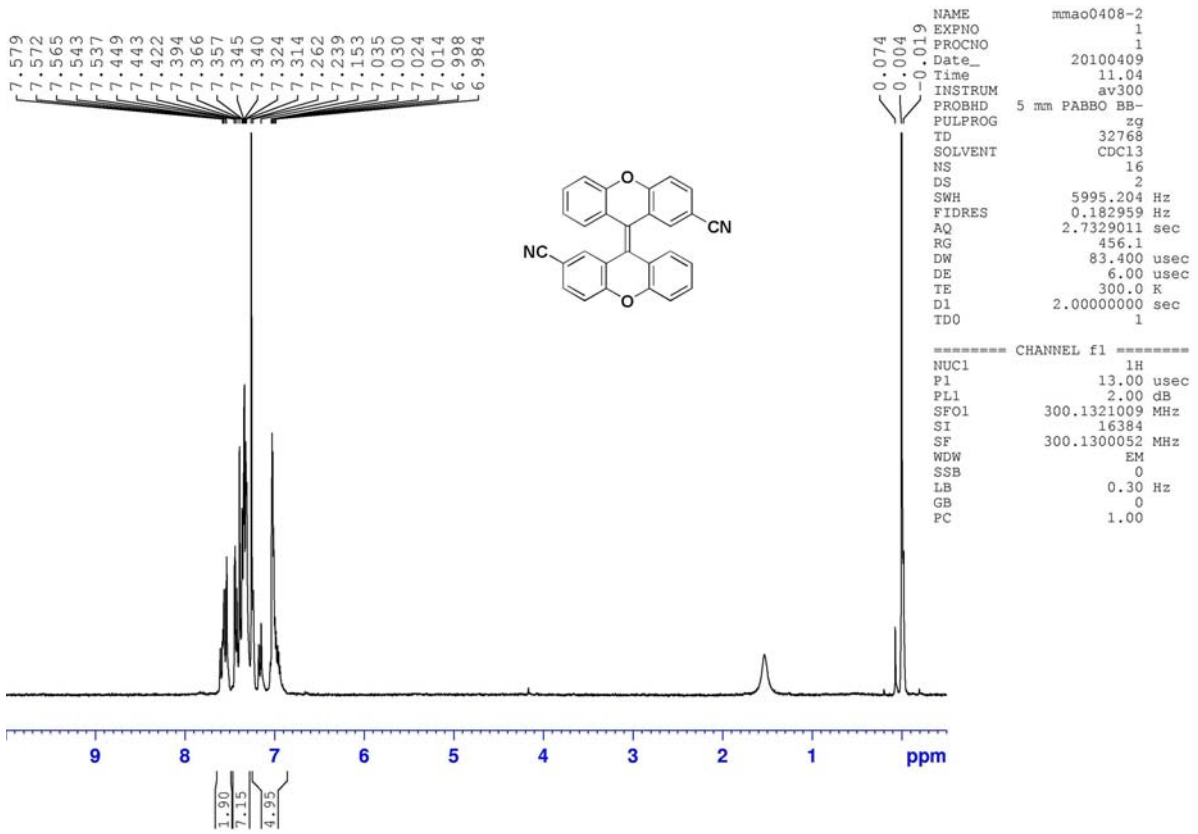
^{1}H NMR spectrum of compound **1e**



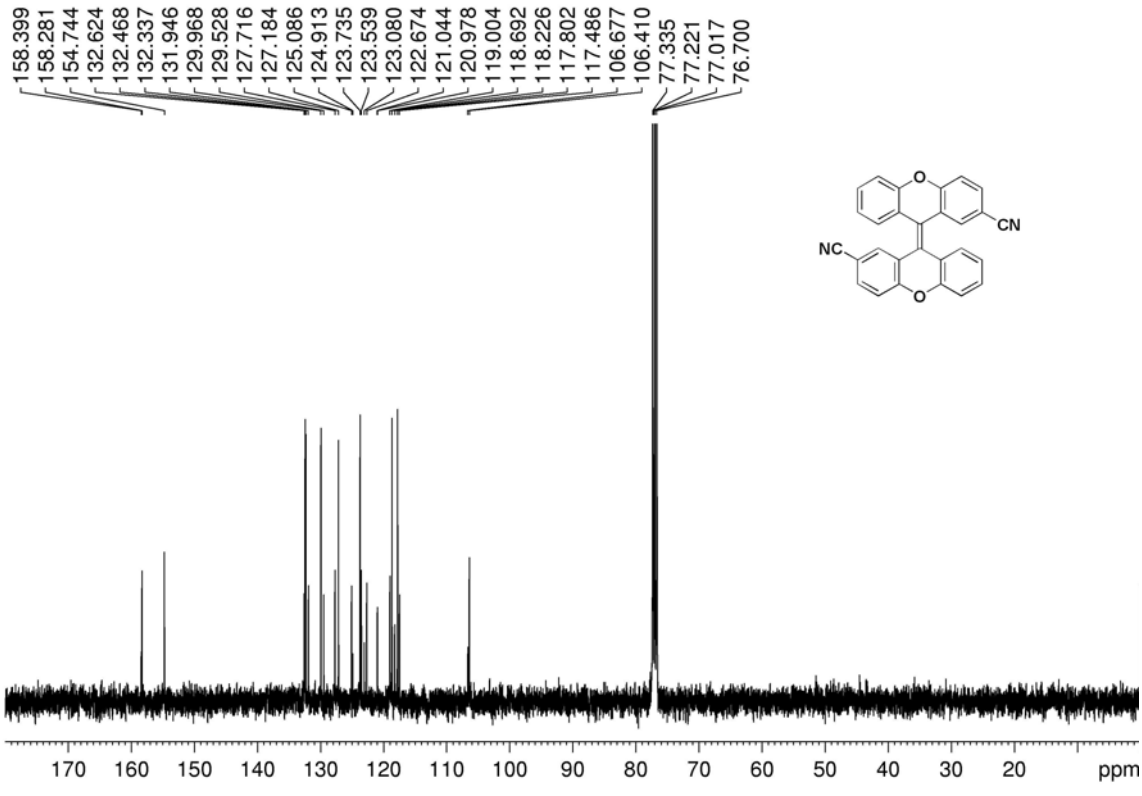
^{13}C NMR spectrum of compound **1e**



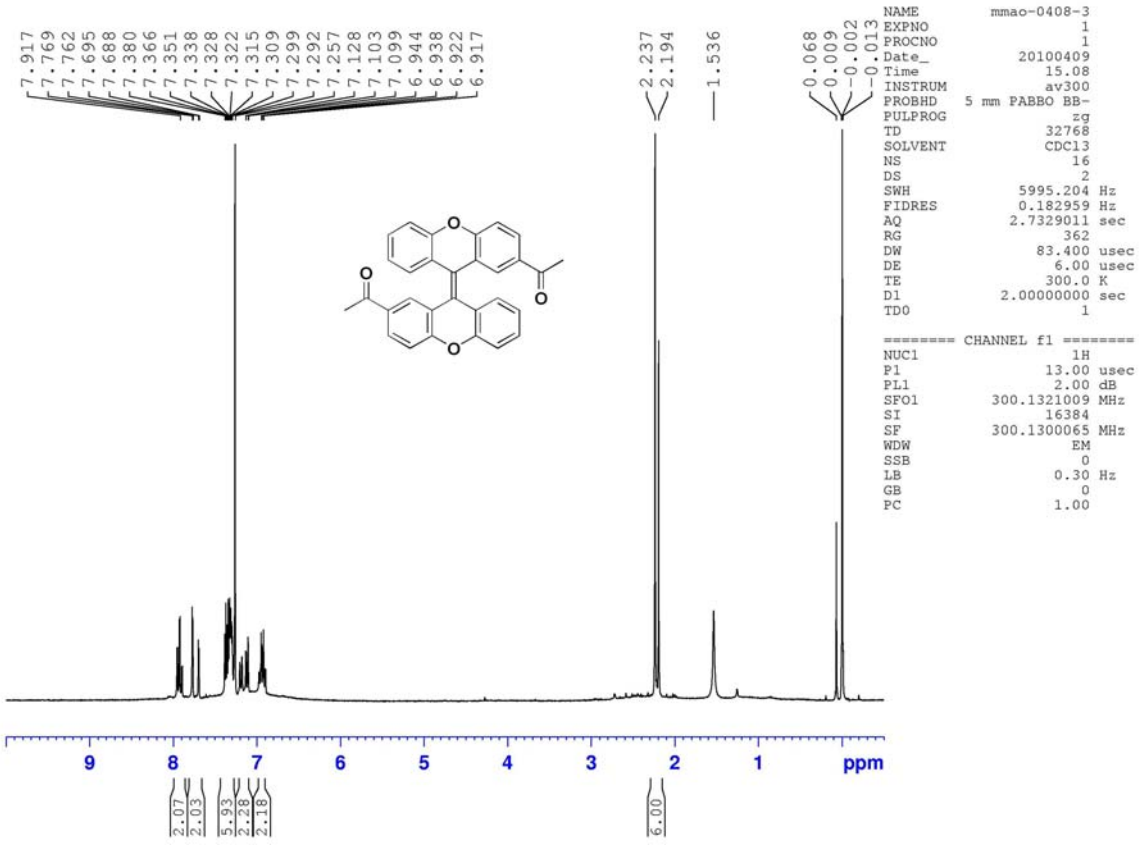
^{1}H NMR spectrum of compound **1f**



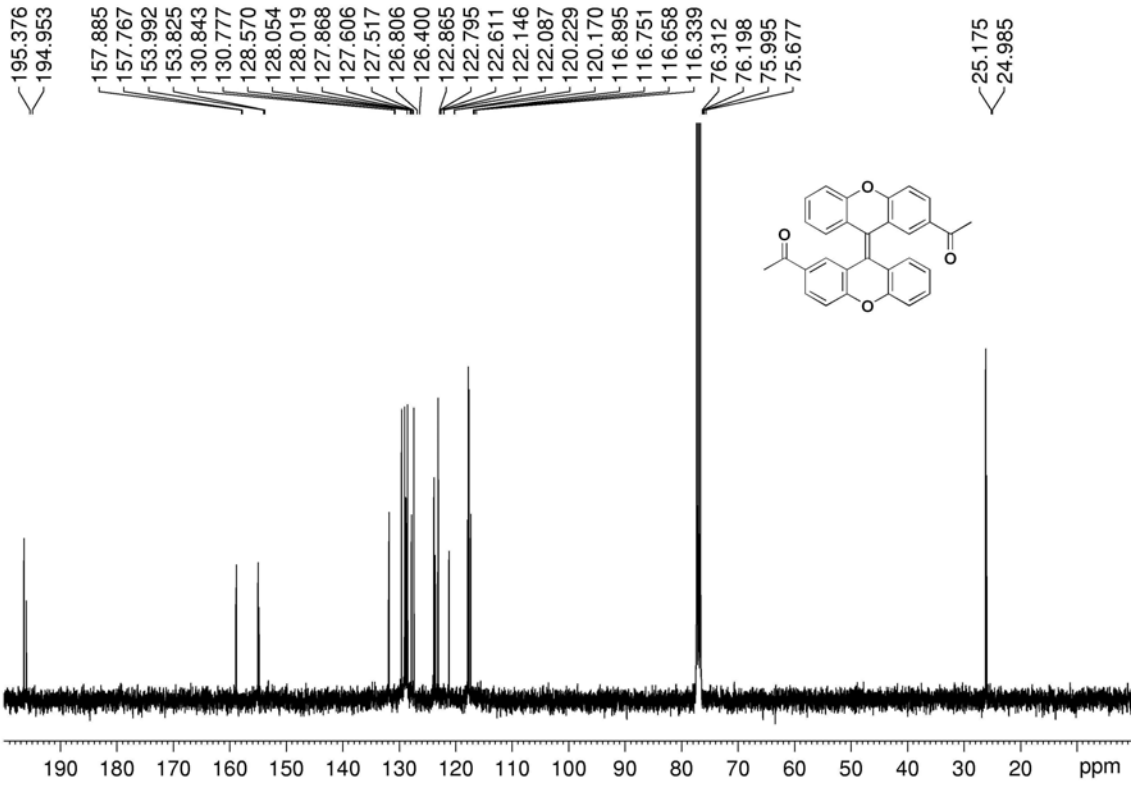
^{13}C NMR spectrum of compound **1f**



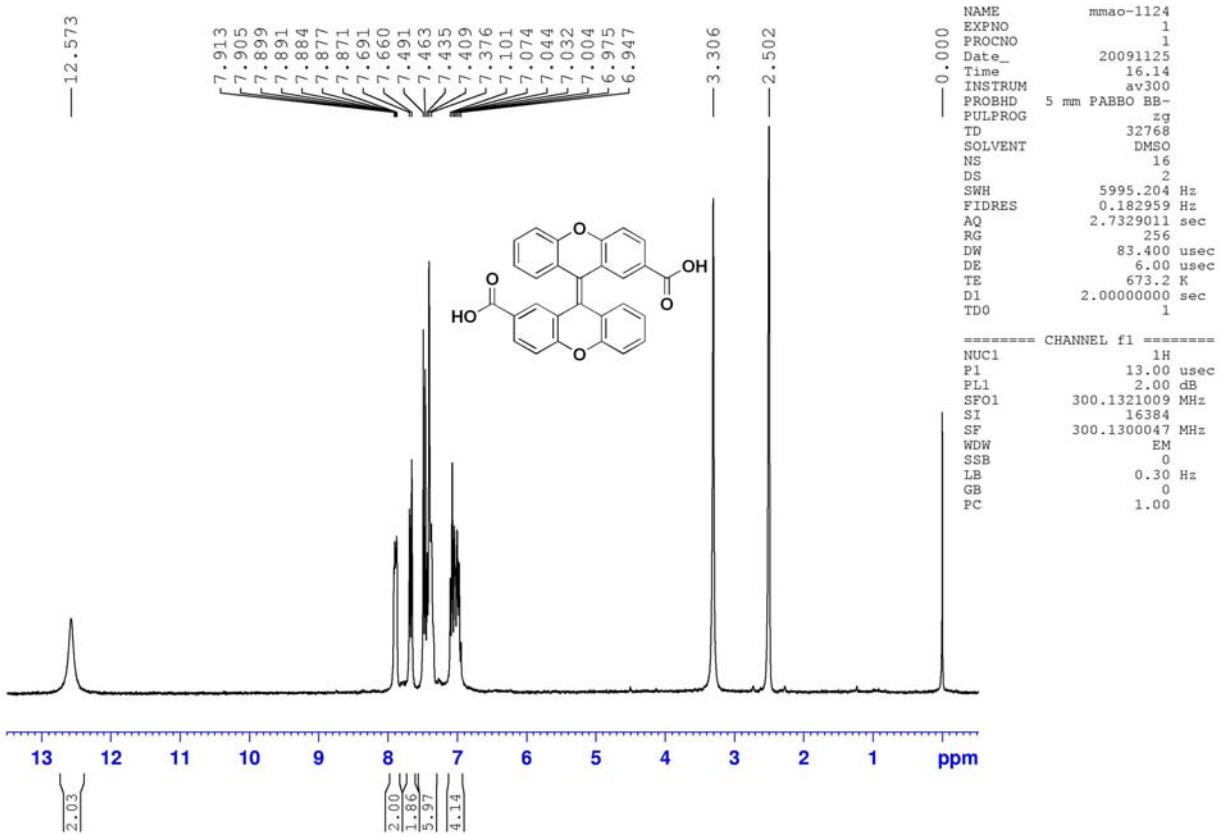
^{1}H NMR spectrum of compound **1g**



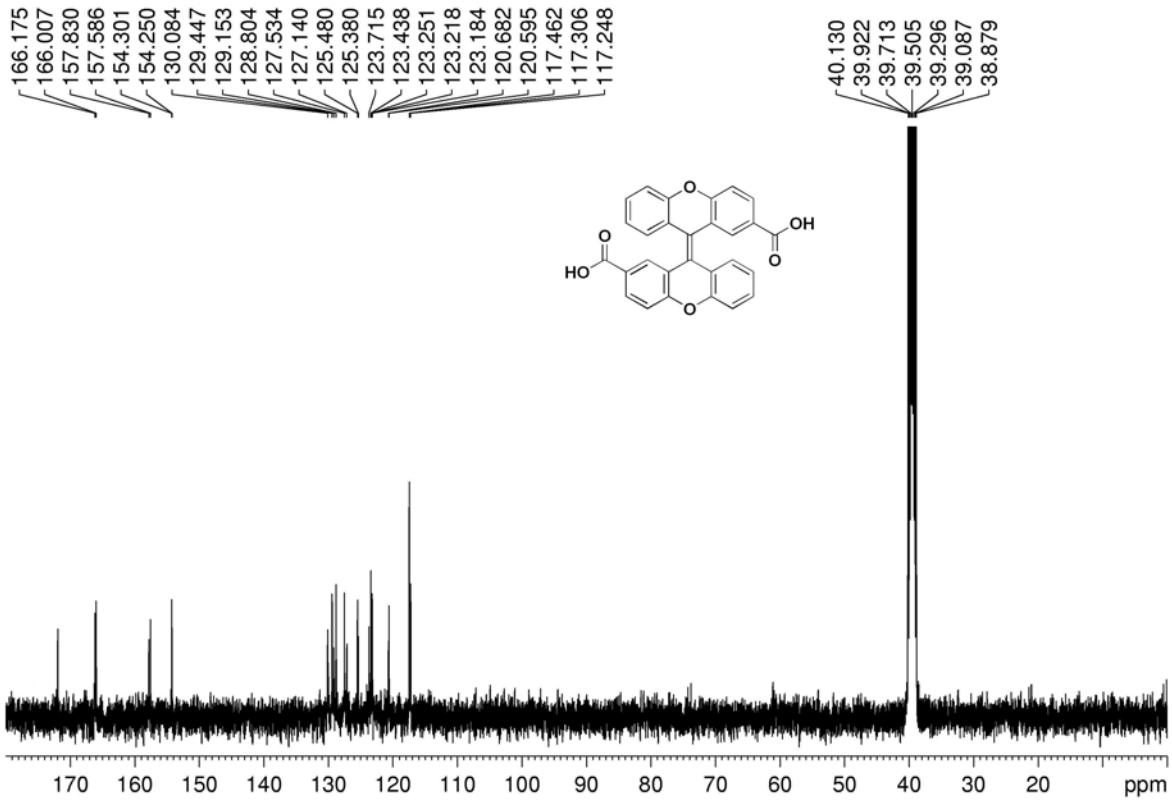
^{13}C NMR spectrum of compound **1g**



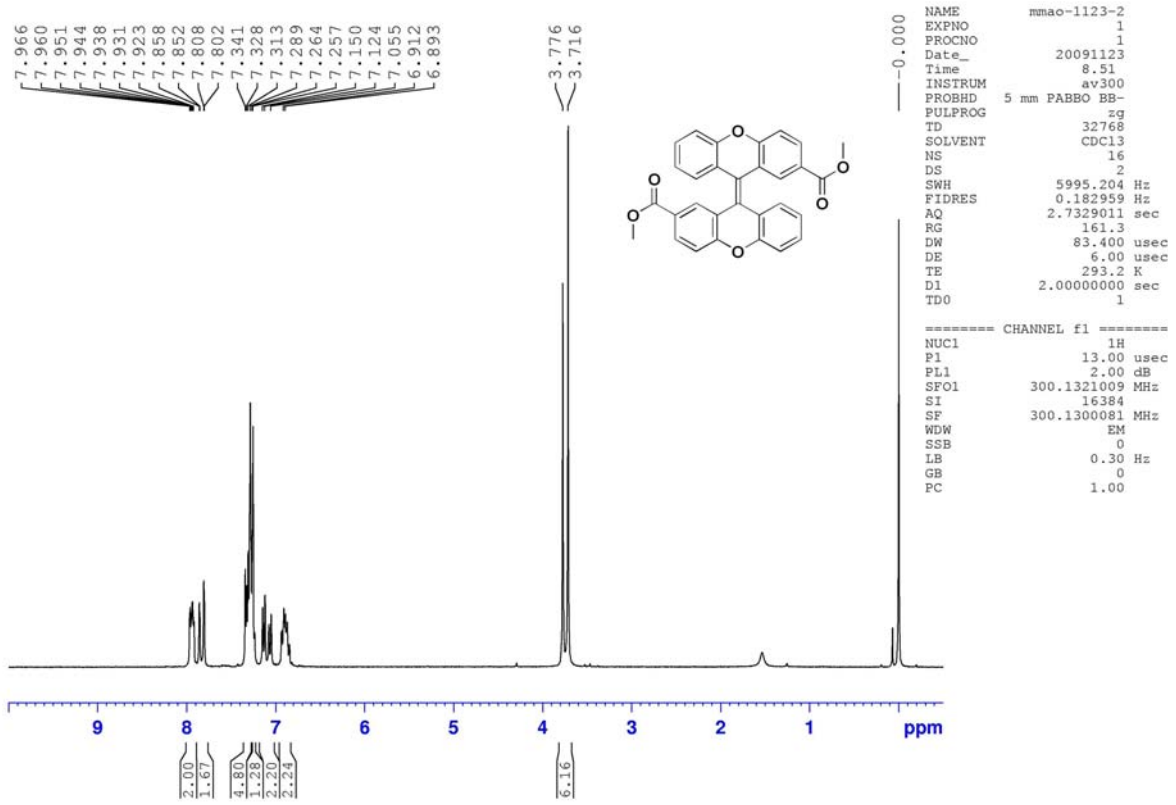
^{1}H NMR spectrum of compound **1h**



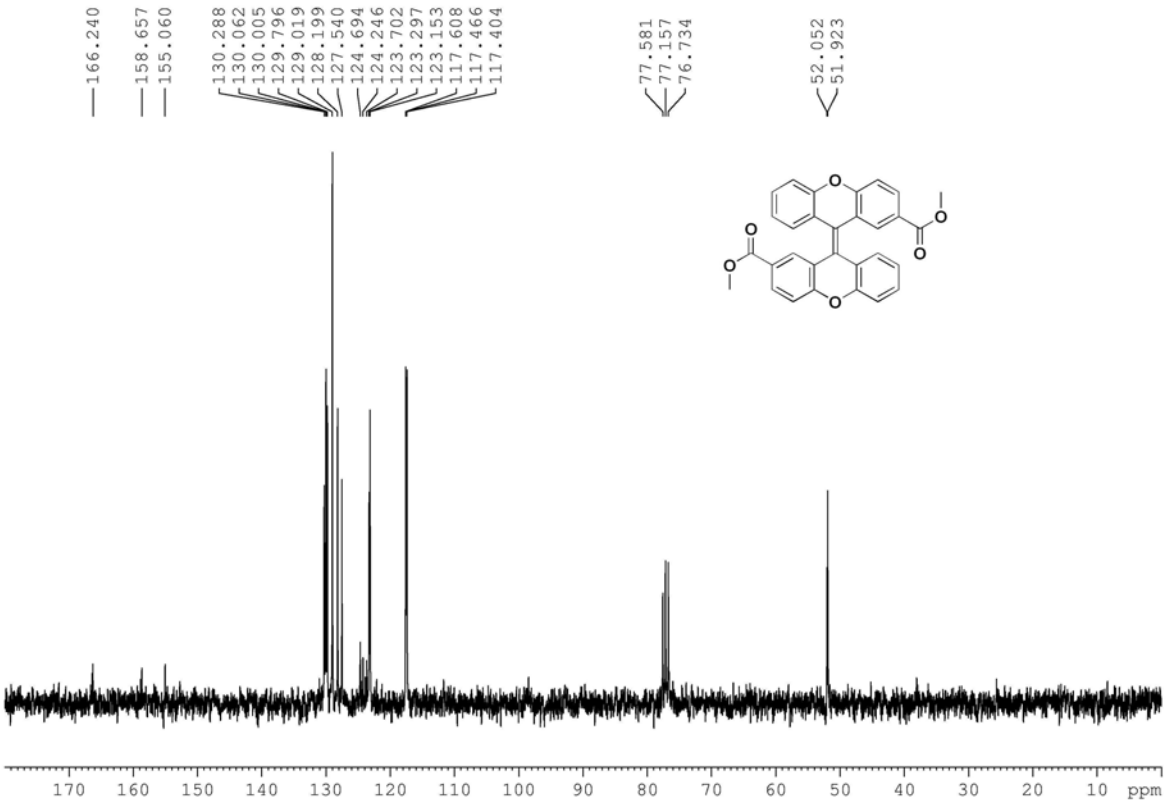
^{13}H NMR spectrum of compound **1h**



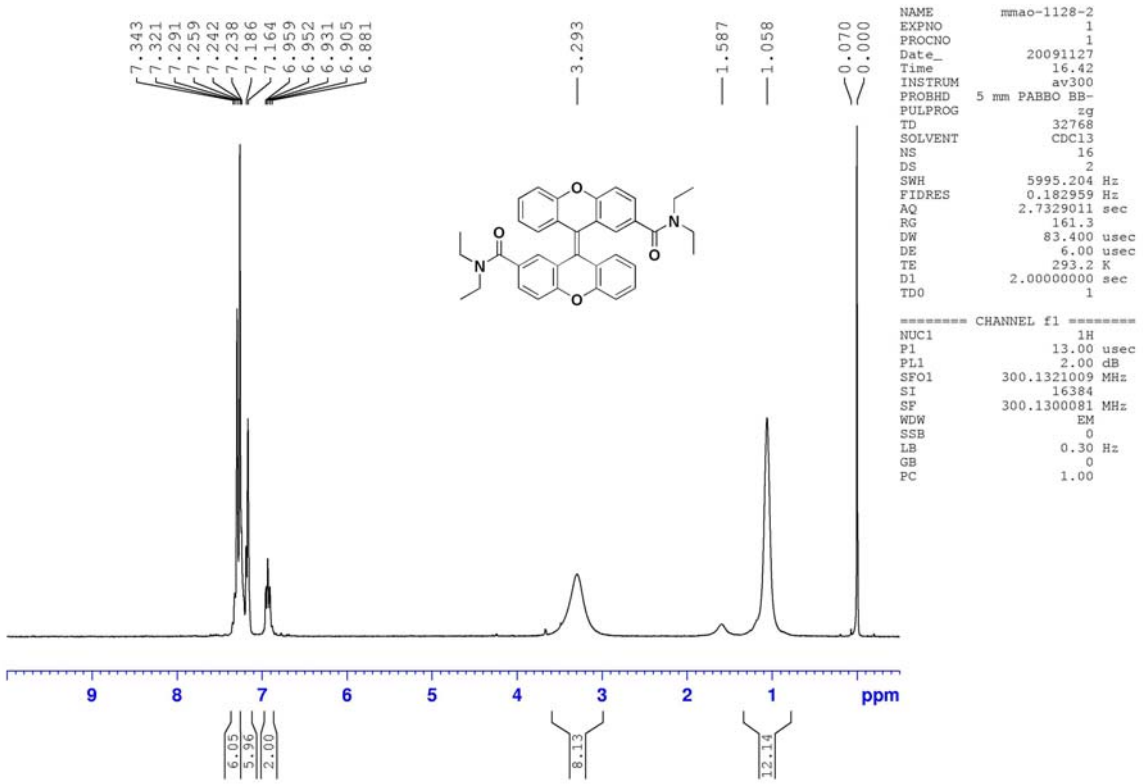
^{1}H NMR spectrum of compound **1i**



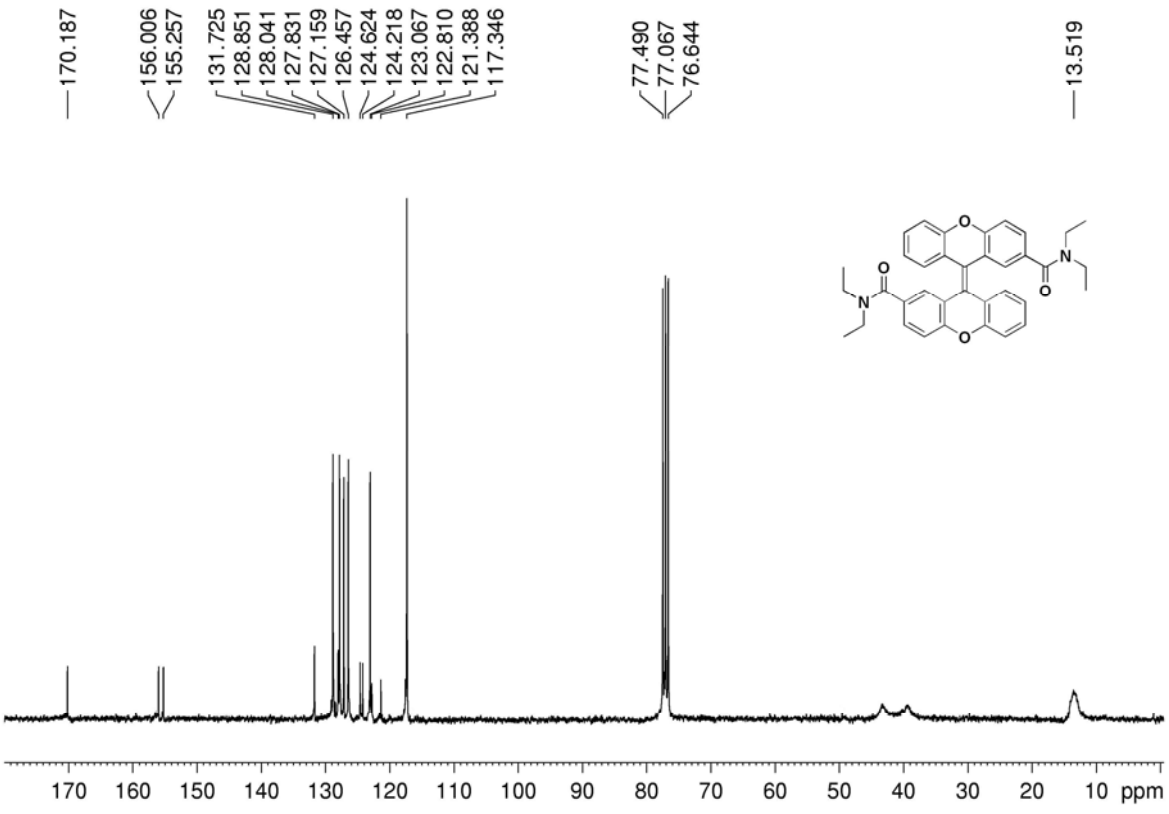
^{13}C NMR spectrum of compound **1i**



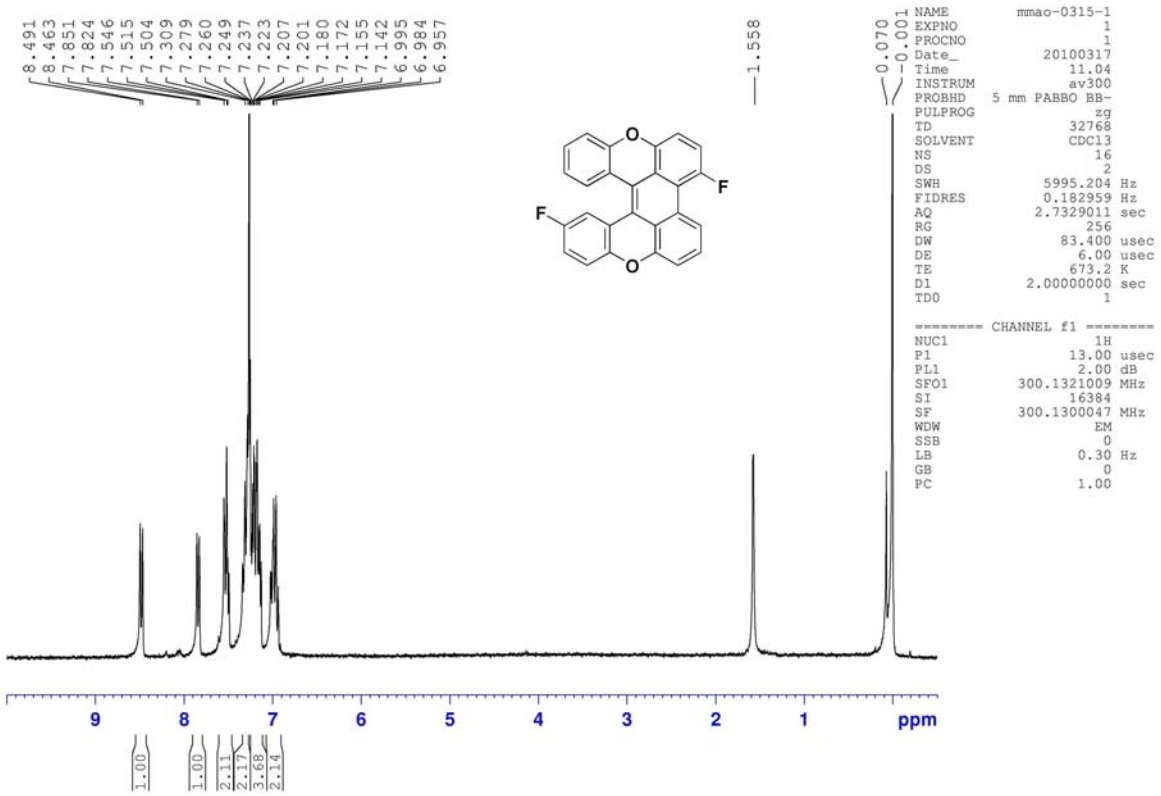
^{1}H NMR spectrum of compound **1j**



^{13}C NMR spectrum of compound **1j**



^{1}H NMR spectrum of compound **2b**(*E*)



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PROCNO 1
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FIDRES 0.182959 Hz
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RG 256
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DE 6.00 usec
TE 673.2 K
D1 2.00000000 sec
TD0 1

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PL1 2.00 dB
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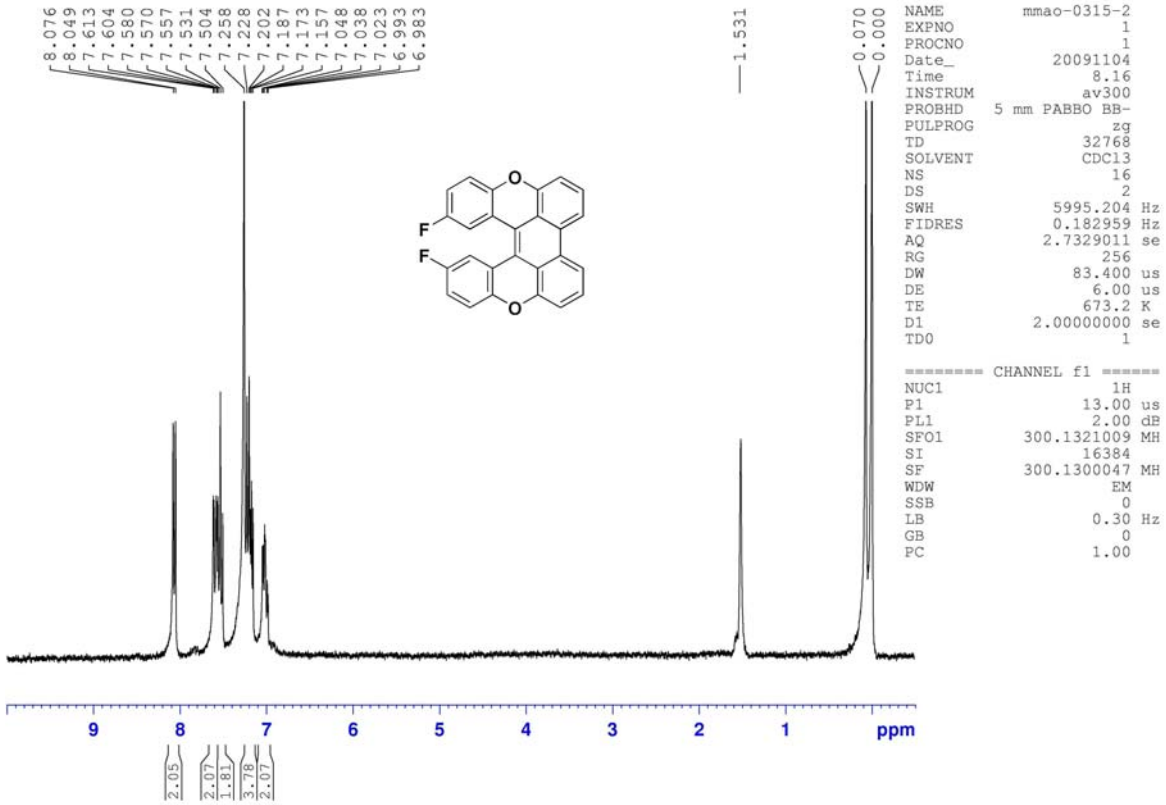
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

^{1}H NMR spectrum of compound **2b**(*Z*)



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RG 256
DW 83.400 us
DE 6.00 us
TE 673.2 K
D1 2.00000000 se
TD0 1

======== CHANNEL f1 ======
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SI 16384
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SSB 0
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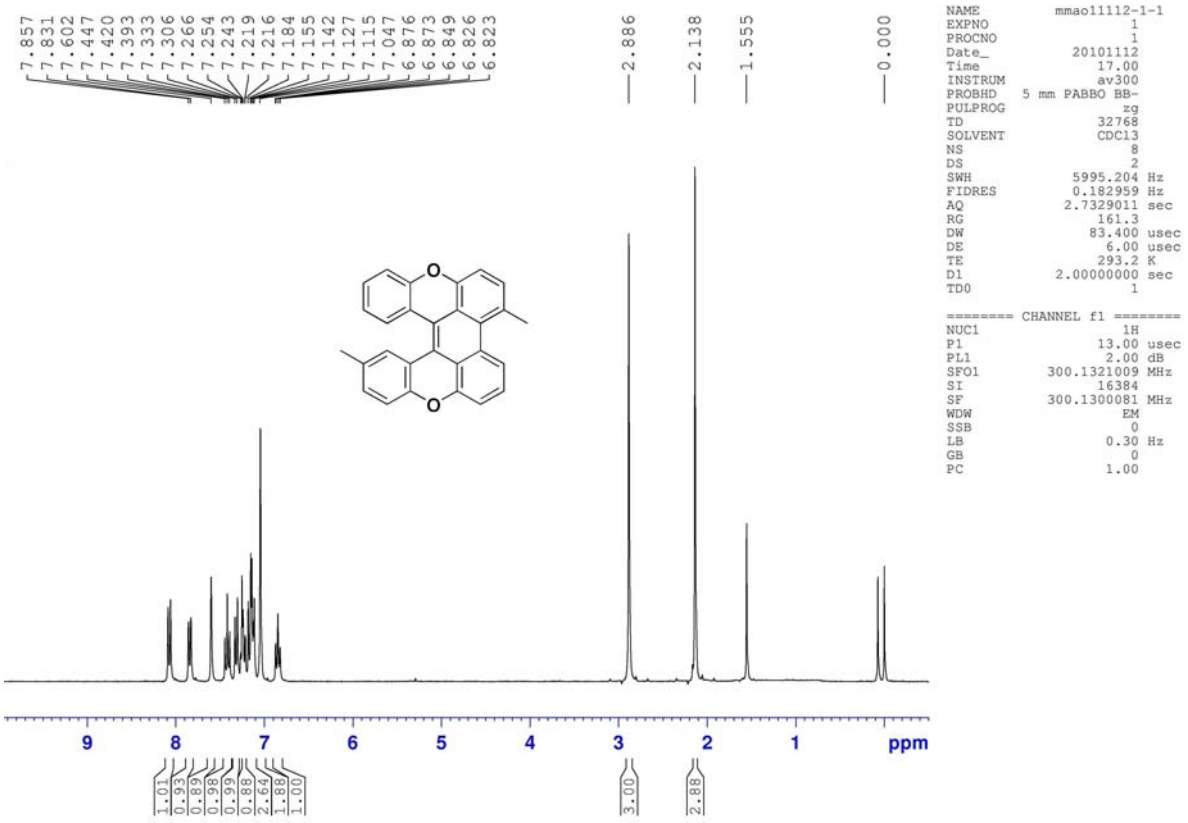
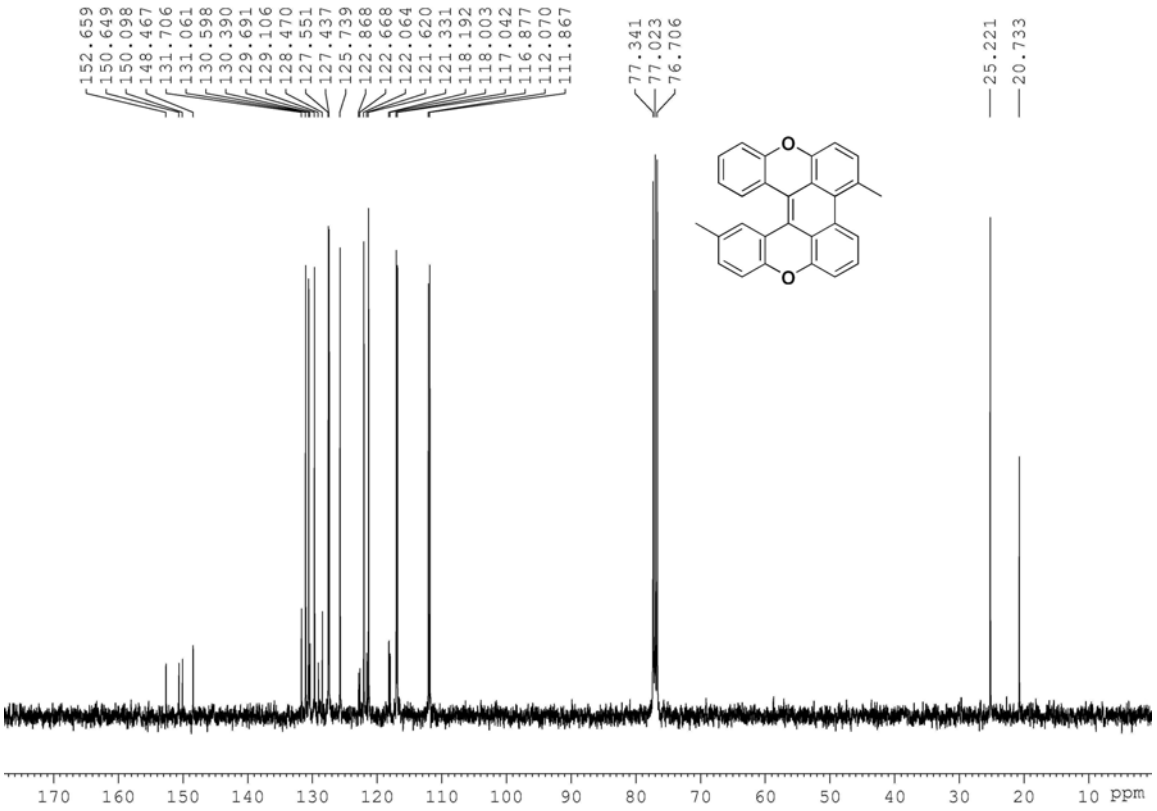
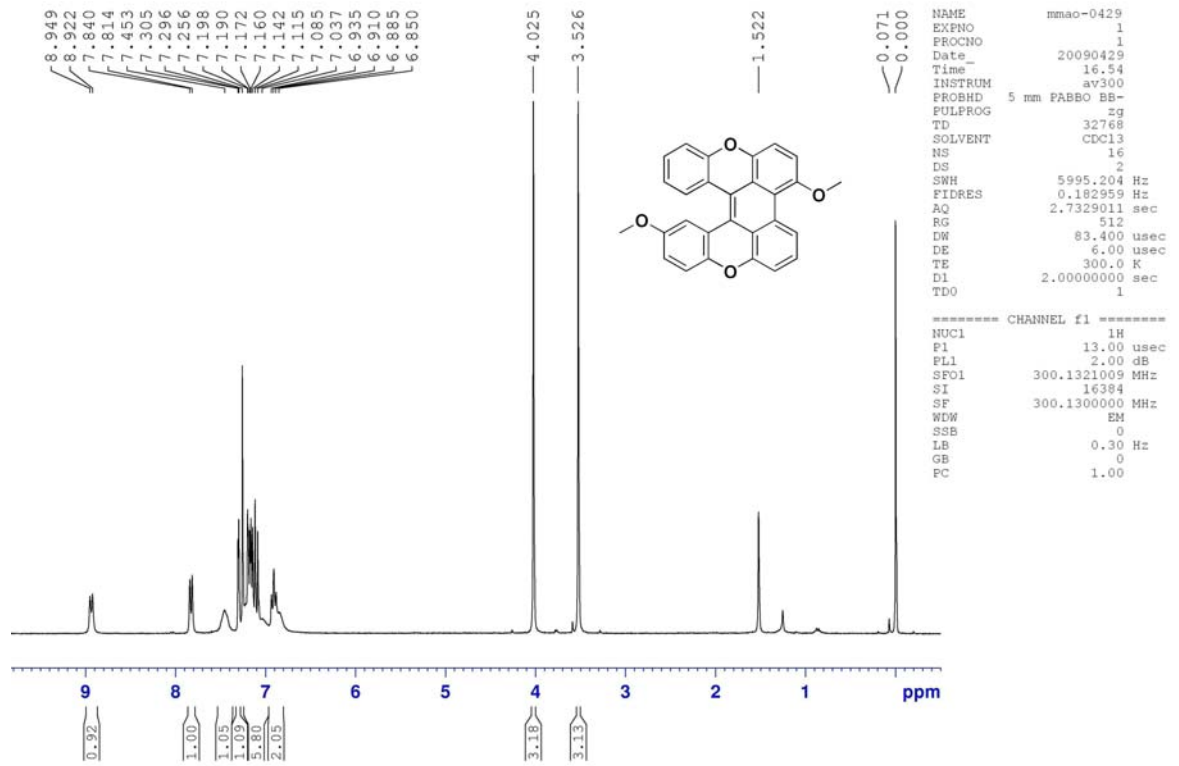
^{1}H NMR spectrum of compound **2c**(*E*)



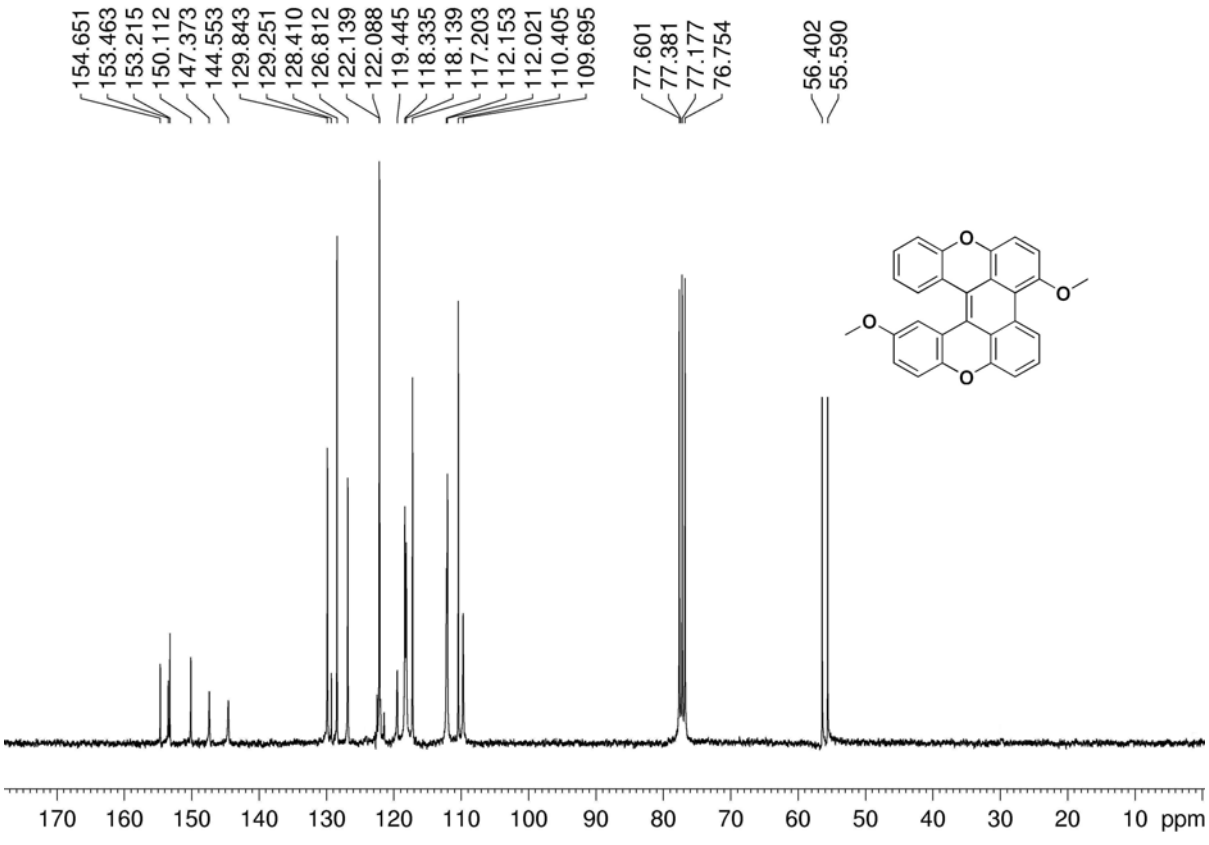
^{13}C NMR spectrum of compound **2c**(*E*)



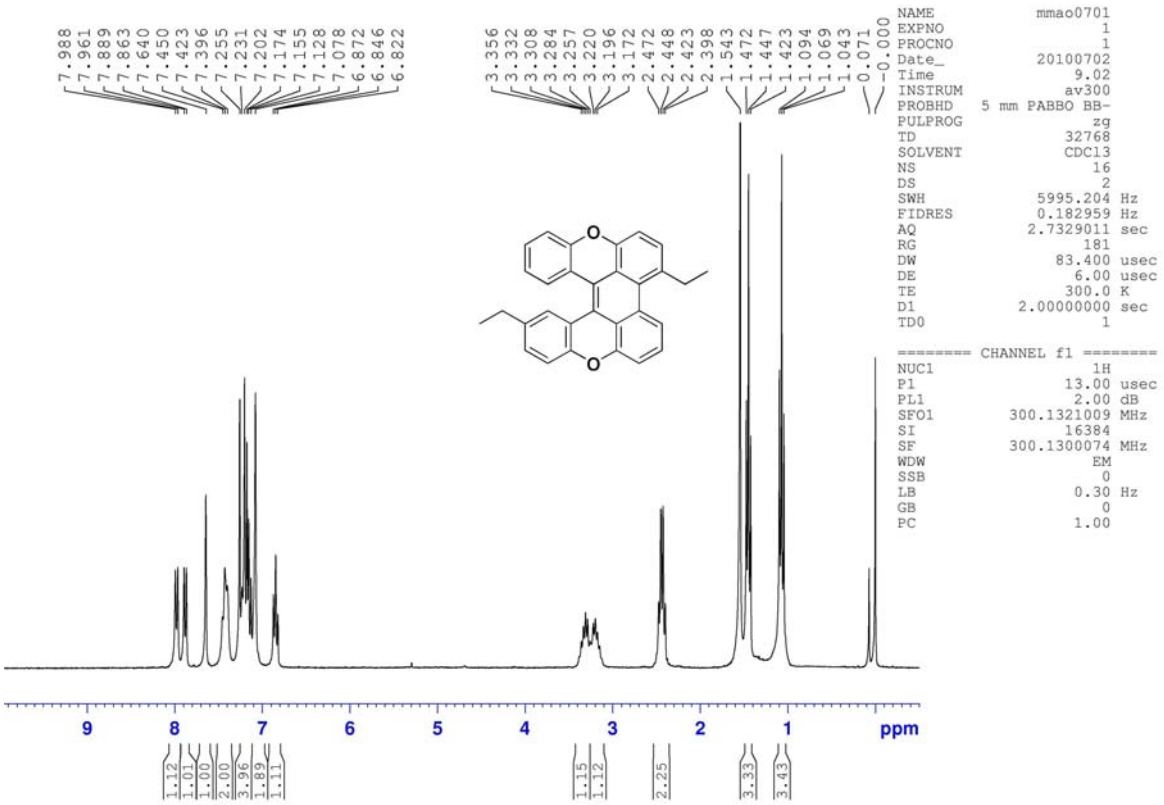
^{1}H NMR spectrum of compound **2d**(*E*)



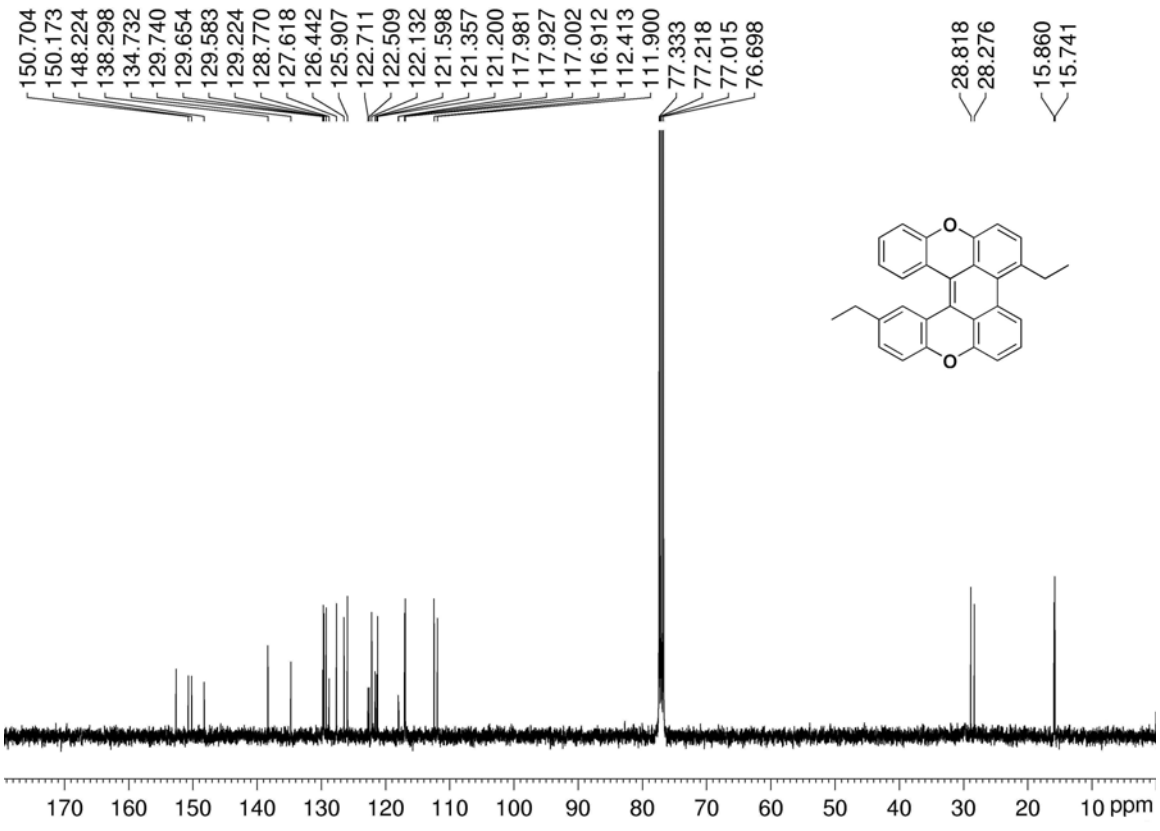
^{13}C NMR spectrum of compound **2d**(*E*)



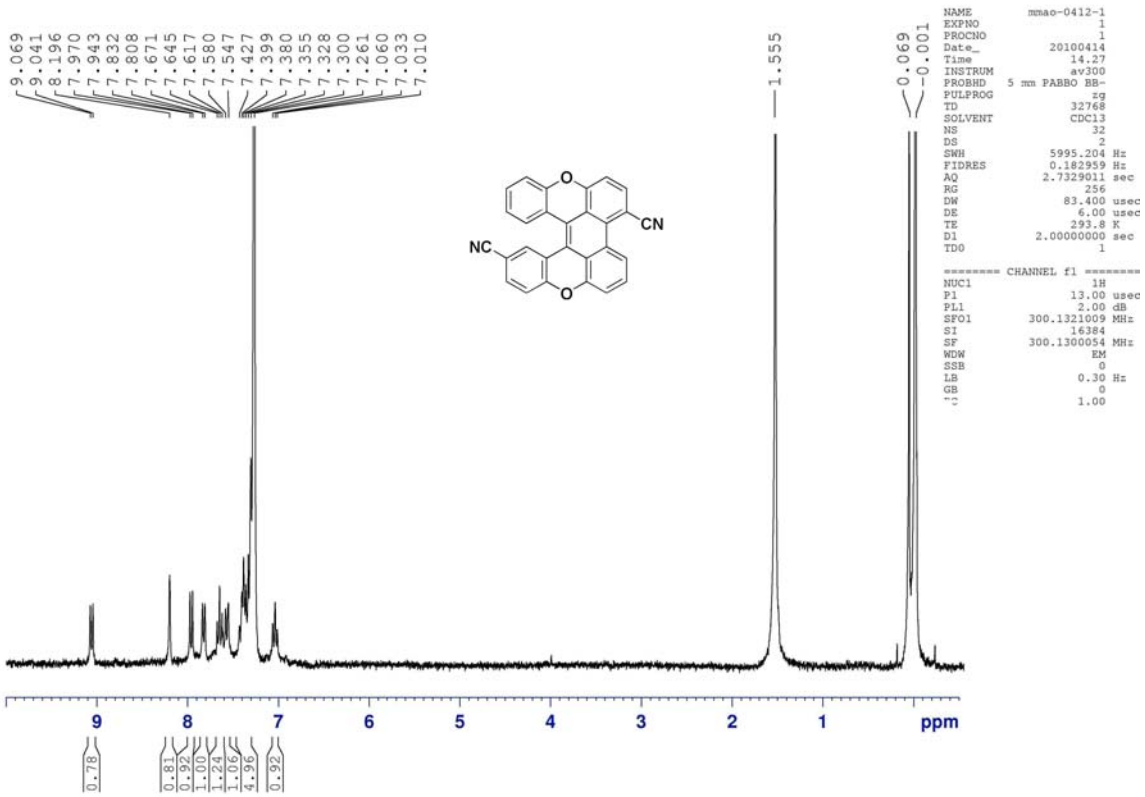
^{1}H NMR spectrum of compound **2e**(*E*)



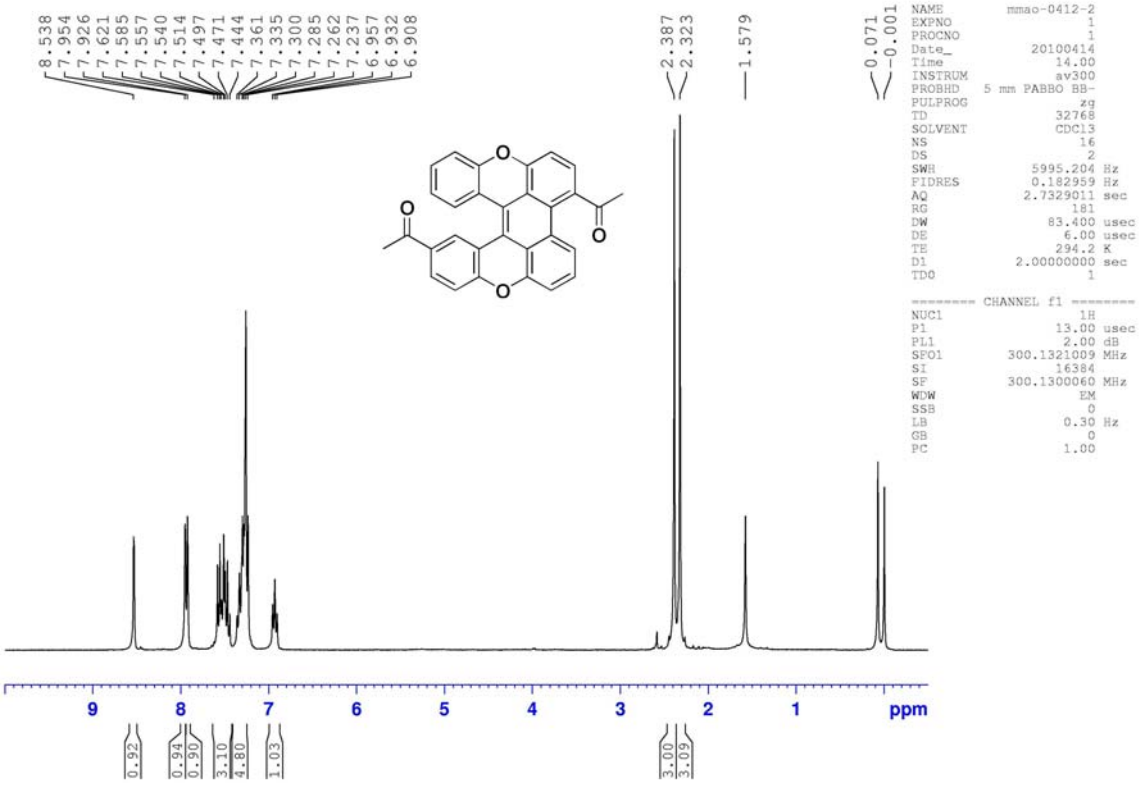
^{13}C NMR spectrum of compound **2e**(*E*)



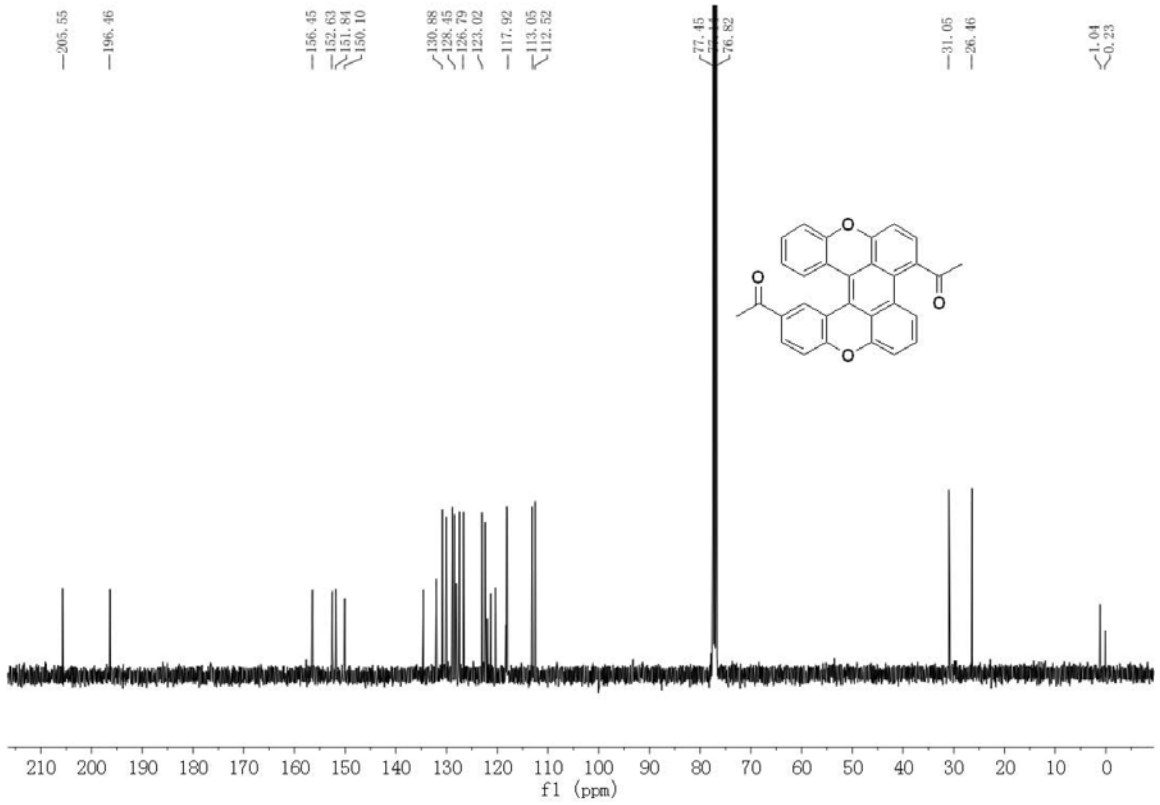
^{1}H NMR spectrum of compound **2f**(*E*)



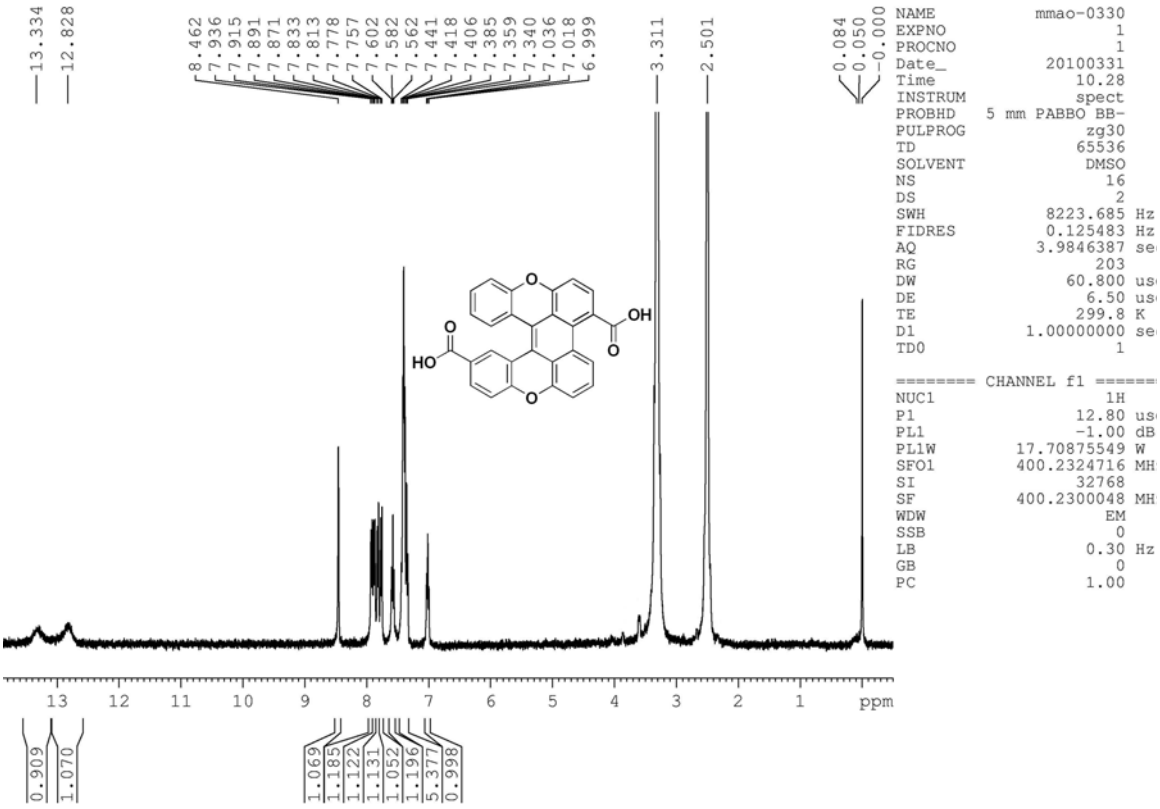
^{1}H NMR spectrum of compound **2g**(*E*)



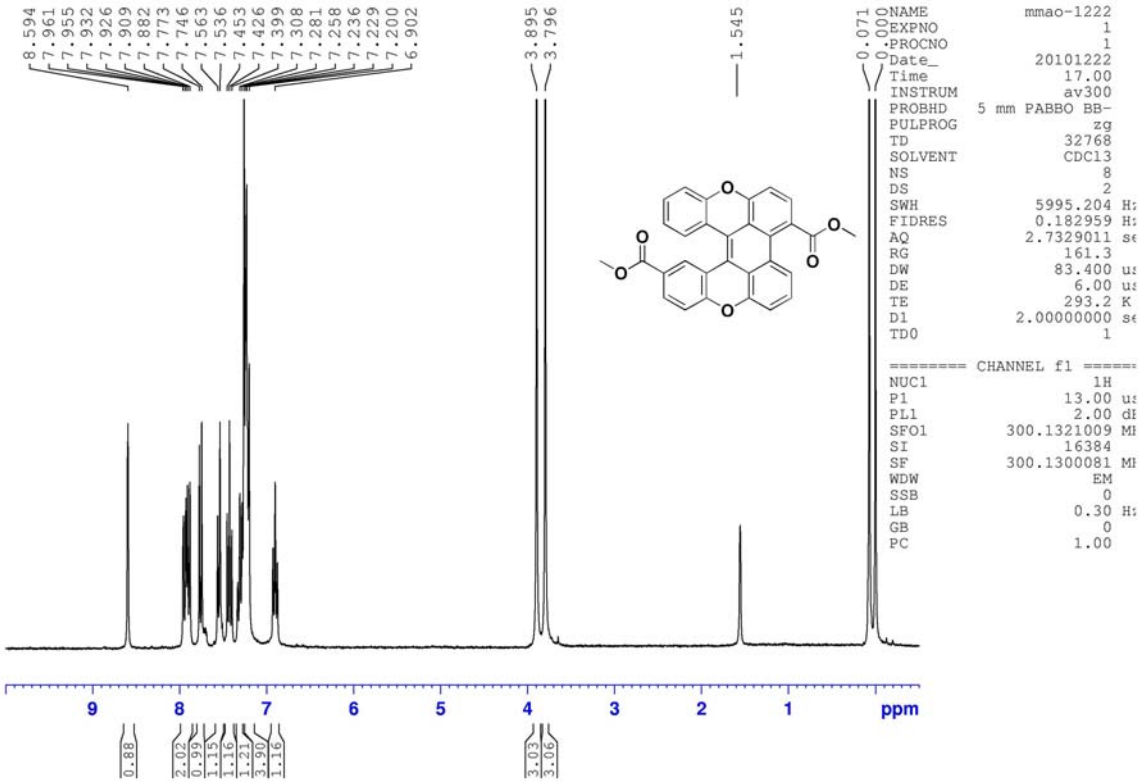
^{13}C NMR spectrum of compound **2g**(*E*)



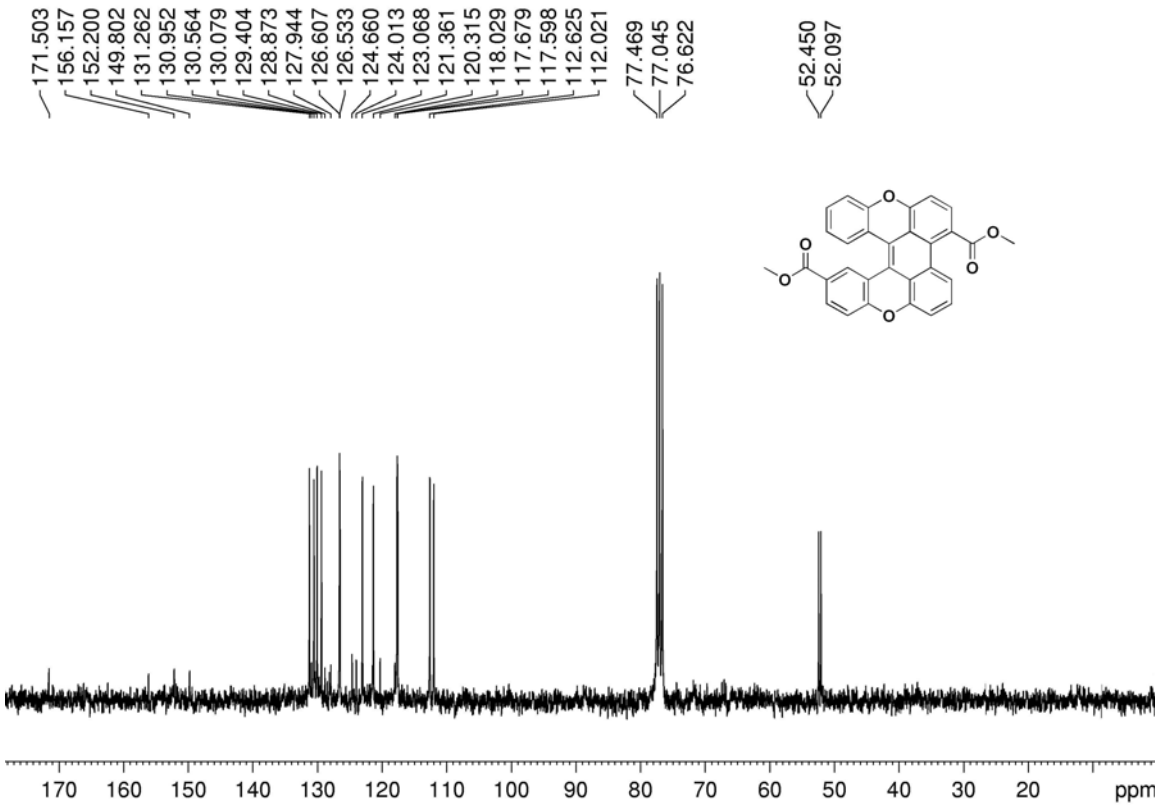
^{1}H NMR spectrum of compound **2h**(*E*)



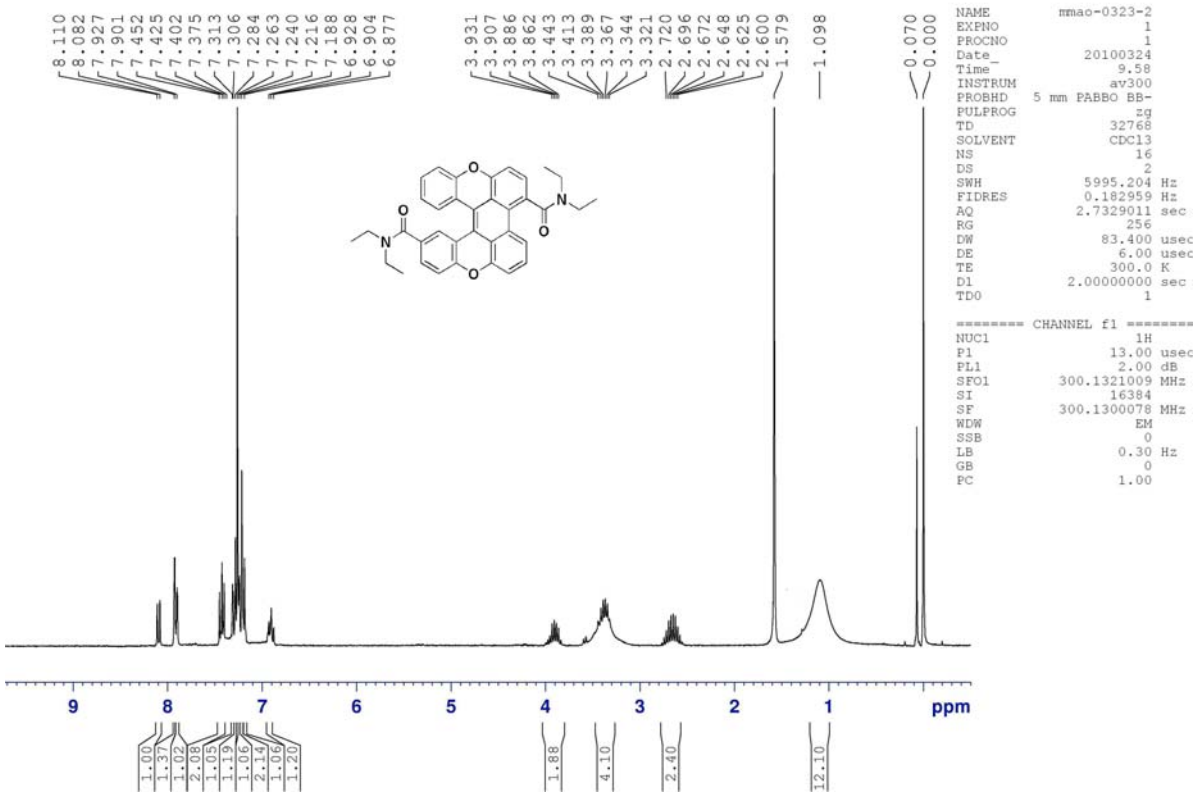
^{1}H NMR spectrum of compound **2i**(*E*)



^{13}C NMR spectrum of compound **2i**(*E*)



^{1}H NMR spectrum of compound **2j**(*E*)



^{13}H NMR spectrum of compound **2j**(*E*)