Supplementary information

Preparation and properties of lateral monofluoro substituted benzoxazole based mesogenic compounds

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sTable 1 Melting and clearing points for nPF(3)PBx and compounds I.

Terminal substituent	n	Melting point (°C)		Clearing point (°C)	
		nPF(3)PBx	Compounds I ^[13]	nPF(3)PBx	Compounds I ^[13]
H	4	124.1	113.9	163.1	126.3
	5	120.7	104.9	161.1	119.9
	6	110.6	101.6	162.4	118.9
	7	115.0	88.8	159.6	116.4
	8	113.4	87.4	159.1	115.9
	10	113.7	85.5	156.2	110.7
CH ₃	4	139.8	94.7	219.4	190.7
	5	133.7	77.0	209.9	181.4
	6	121.0	68.3	208.9	176.6
	7	108.2	54.8	201.0	173.7
	8	104.8	62.1	198.1	176.0
	10	95.9	64.9	189.9	165.8
Cl	4	116.9	144.3	249.7	203.1
	5	88.6	124.5	251.3	196.2
	6	90.1	97.6	244.7	193.2
	7	93.5	93.3	246.5	190.1
	8	92.5	91.3	246.2	188.6
	10	98.8	89.4	239.8	187.4
NO ₂	4	141.1	153	244.5	223.9
	5	137.9	148.9	234.1	210.6
	6	132.8	144.7	228.3	203.8
	7	130.1	141.3	223.7	197.0
	8	127.0	138.8	221.1	194.4
	10	122.7	136.5	218.2	187.2

sTable 2 Maxima peaks of UV-vis and fluorescence spectra for nPF(3)PBx and compounds I.

X	UV-vis (nm)		FL (nm)	
	nPF(3)PBx	Compounds I ^[13]	nPF(3)PBx	Compounds I ^[13]
H	323	318	389	380
CH ₃	326	322	390	383
Cl	326	324	395	385
NO ₂	326	316	—	—

Note: n=7 for all compounds.

Figure 1. DSC traces and photomicrographs ($\times 200$) of $n\text{PF}(3)\text{PS}_x$. (a) DSC traces of $4\text{PF}(3)\text{PSH}$ at scanning rate $5^\circ\text{C}/\text{min}$; (b) DSC traces of $6\text{PF}(3)\text{PSM}$ at scanning rate $5^\circ\text{C}/\text{min}$; (c) a focal conic texture of $4\text{PF}(3)\text{PSH}$ at 140°C on heating; (d) a schlieren texture of $4\text{PF}(3)\text{PSH}$ at 147°C on heating; (e) a focal conic texture of $4\text{PF}(3)\text{PSH}$ at 130°C on cooling; (f) a schlieren texture of $4\text{PF}(3)\text{PSH}$ at 150°C on cooling; (g) a focal conic texture of $6\text{PF}(3)\text{PSM}$ at 119°C on heating; (h) a focal conic texture of $6\text{PF}(3)\text{PSM}$ at 110°C on cooling.

Spectroscopic data for Schiff base compounds (nPF(3)PSx):

4PF(3)PSH: yellow crystals, yield 98%; m.p. 132.8 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.73 (s, 1H), 7.98 (m, 2H), 7.67 (d, *J* = 8.4 Hz, 2H), 7.42-7.35 (m, 4H), 7.21 (m, 1H), 7.08-7.01 (m, 2H), 6.95-6.89 (m, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 1.89 (m, 2H), 1.46 (m, 2H), 0.97 (t, *J* = 7.2 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3441, 3040, 2958, 2931, 2871, 1621, 1604, 1585, 1557, 1532, 1506, 1483, 1405, 1378, 1307, 1291, 1267, 1244, 1212, 1183, 1148, 1132, 1032, 997, 968, 874, 832, 804, 791, 743, 518. EI-MS *m/z* (rel. int.): 363.20 (M⁺, 50), 306.15 (100), 188.07 (31), 120.06 (66).

5PF(3)PSH: yellow crystals, yield 97%; m.p. 132.8 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.73 (s, 1H), 7.98 (m, 2H), 7.67 (d, *J* = 8.4 Hz, 2H), 7.42-7.35 (m, 4H), 7.21 (m, 1H), 7.08-7.01 (m, 2H), 6.95-6.89 (m, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 1.89 (m, 2H), 1.46 (m, 4H), 0.97 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3439, 3360, 3052, 2975, 2941, 2870, 1623, 1588, 1559, 1533, 1507, 1482, 1404, 1382, 1307, 1290, 1271, 1244, 1226, 1185, 1134, 1059, 1035, 1012, 879, 833, 807, 795, 743, 604, 517. EI-MS *m/z* (rel. int.): 377.24 (M⁺, 60), 306.11 (100), 188.26 (40), 120.02 (47).

6PF(3)PSH: yellow crystals, yield 98%; m.p. 117.1 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.73 (s, 1H), 7.98 (m, 2H), 7.67 (d, *J* = 8.4 Hz, 2H), 7.41-7.31 (m, 4H), 7.21-7.18 (m, 1H), 7.08-7.01 (m, 2H), 6.95-6.89 (m, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 1.88 (m, 2H), 1.49-1.32 (m, 6H), 0.90 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3354, 3073, 3049, 2958, 2935, 2917, 2871, 2856, 1622, 1608, 1587, 1559, 1534, 1507, 1482, 1404, 1382, 1307, 1292, 1271, 1244, 1228, 1186, 1176, 1150, 1133, 1037, 1022, 993, 969, 928, 879, 833, 800, 742, 610, 517. EI-MS *m/z* (rel. int.): 391.19 (M⁺, 92), 306.20 (100), 188.12 (33), 120.14 (59).

7PF(3)PSH: yellow crystals, yield 98%; m.p. 129.6 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.73 (s, 1H), 7.99 (m, 2H), 7.67 (d, *J* = 8.4 Hz, 2H), 7.42-7.32 (m, 4H), 7.21-7.18 (m, 1H), 7.08-7.02 (m, 2H), 6.95-6.89 (m, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 1.88 (m, 2H), 1.49-1.32 (m, 8H), 0.90 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3361, 3074, 3052, 2973, 2941, 2918, 2869, 2852, 1623, 1606, 1588, 1559, 1534, 1508, 1482, 1404, 1382, 1307, 1291, 1271, 1244, 1226, 1184, 1134, 1039, 1010, 879, 833, 807, 744, 604, 517. EI-MS *m/z* (rel. int.): 405.20 (M⁺, 58), 306.19 (100), 188.17 (25), 119.99 (50).

8PF(3)PSH: yellow crystals, yield 98%; m.p. 114.9 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.66 (s, 1H), 7.91 (m, 2H), 7.60 (d, *J* = 8.1 Hz, 2H), 7.34-7.24 (m, 4H), 7.16-7.11 (m, 1H), 7.00-6.95 (m, 2H), 6.90-6.83 (m, 1H), 4.04 (t, *J* = 6.6 Hz, 2H), 1.81 (m, 2H), 1.44-1.26 (m, 10H), 0.84 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3360, 3062, 2955, 2917, 2852, 1623, 1581, 1532, 1507, 1484, 1431, 1404, 1383, 1358, 1311, 1288, 1269, 1241, 1222, 1179, 1133, 1082, 1038, 995, 915, 858, 834, 813, 797, 664, 517.

10PF(3)PSH: yellow crystals, yield 97%; m.p. 115.3 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.65 (s, 1H), 7.91 (m, 2H), 7.59 (d, *J* = 8.4 Hz, 2H), 7.34-7.24 (m, 4H), 7.16-7.11 (m, 1H), 7.00-6.94 (m, 2H), 6.87-6.82 (m, 1H), 4.03 (t, *J* = 6.6 Hz, 2H), 1.80 (m, 2H), 1.42-1.21 (m, 14H), 0.83 (t, *J* = 6.6 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3355, 3049, 2957, 2915, 2871, 2852, 1623, 1608, 1588, 1560, 1534, 1508, 1483, 1405, 1382, 1307, 1292, 1270, 1244, 1185, 1134, 1049, 1038, 1016, 879, 834, 809, 798, 742, 609, 517.

4PF(3)PSM: yellow crystals, yield 92%; m.p. 116.4 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.70 (s, 1H), 7.98 (d, *J* = 8.1 Hz, 2H), 7.66 (d, *J* = 7.8 Hz, 2H), 7.41-7.35 (m, 2H), 7.14-7.00 (m, 4H), 6.93 (d, *J* = 8.4 Hz, 1H), 4.12 (t, *J* = 6.6 Hz, 2H), 2.33 (s, 3H), 1.87-1.82 (m, 2H), 1.57-1.50 (m, 2H), 1.03 (t, *J* = 7.2 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3409, 3355, 3028, 2955, 2933, 2868, 1622, 1589, 1555, 1529, 1502, 1469, 1432, 1402, 1377, 1304, 1285, 1265, 1243, 1173, 1130, 821, 803, 790, 628, 615, 602, 517. EI-MS *m/z* (rel. int.): 377.25 (M⁺, 87), 320.18 (100), 188.11 (30), 134.03 (75).

5PF(3)PSM: yellow crystals, yield 93%; m.p. 111.7 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.71 (s, 1H), 7.98 (d, *J* = 8.1 Hz, 2H), 7.66 (d, *J* = 8.4 Hz, 2H), 7.41-7.35 (m, 2H), 7.14-7.00 (m, 4H), 6.93 (d, *J* = 8.1 Hz, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 2.33 (s, 3H), 1.89-1.84 (m, 2H), 1.46-1.42 (m, 4H), 0.97 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3426, 3028, 2955, 2933, 2866, 1624, 1600, 1581, 1532, 1505, 1473, 1402, 1381, 1313, 1286, 1268, 1240, 1218, 1192, 1179, 1133, 1008, 873, 838, 809, 530, 514. EI-MS *m/z* (rel. int.): 391.31 (M⁺, 82), 320.12 (100), 188.07 (26), 134.07 (81).

6PF(3)PSM: yellow crystals, yield 91%; m.p. 98.6 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.71 (s, 1H), 7.98 (d, *J* = 8.4 Hz, 2H), 7.66 (d, *J* = 8.4 Hz, 2H), 7.42-7.34 (m, 2H), 7.14-7.00 (m, 4H), 6.93 (d, *J* = 8.1 Hz, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 2.33 (s, 3H), 1.88-1.83 (m, 2H), 1.49-1.34 (m, 6H), 0.92 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3425, 3033, 2954, 2930, 2859, 1624, 1601, 1581, 1557, 1533, 1505, 1473, 1404, 1381, 1314, 1288, 1267, 1240, 1220, 1191, 1178, 1133, 1018, 873, 838, 809, 517. EI-MS *m/z* (rel. int.): 405.32 (M⁺, 94), 320.20 (100), 188.27 (17), 134.06 (66).

7PF(3)PSM: yellow crystals, yield 90%; m.p. 100.1 °C. ¹H-NMR (300 MHz, CDCl₃, TMS): δ (ppm) 8.71 (s, 1H), 7.98 (d, *J* = 8.4 Hz, 2H), 7.66 (d, *J* = 8.1 Hz, 2H), 7.42-7.34 (m, 2H), 7.14-7.00 (m, 4H), 6.93 (d, *J* = 8.4 Hz, 1H), 4.11 (t, *J* = 6.6 Hz, 2H), 2.33 (s, 3H), 1.88-1.83 (m, 2H), 1.49-1.32 (m, 8H), 0.90 (t, *J* = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3428, 3028, 2952, 2923, 2860, 1623, 1601, 1580, 1558, 1533, 1506, 1473, 1403, 1382, 1313, 1288, 1268, 1241, 1220, 1193, 1179, 1134, 1036, 1009, 985, 873, 838, 809, 515.

10PF(3)PSM: yellow crystals, yield 90%; m.p. 96.2 °C. ¹H-NMR (300 MHz, CDCl₃,

TMS): δ (ppm) 8.70 (s, 1H), 7.97 (d, J = 8.1 Hz, 2H), 7.66 (d, J = 8.1 Hz, 2H), 7.40-7.34 (m, 2H), 7.13-7.00 (m, 4H), 6.93 (d, J = 8.1 Hz, 1H), 4.10 (t, J = 6.6 Hz, 2H), 2.33 (s, 3H), 1.87-1.82 (m, 2H), 1.49-1.28 (m, 14H), 0.90 (t, J = 6.6 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3429, 3033, 2955, 2919, 2851, 1623, 1601, 1581, 1559, 1534, 1506, 1474, 1403, 1381, 1314, 1300, 1288, 1268, 1240, 1220, 1192, 1178, 1133, 1035, 1013, 982, 874, 839, 810, 798, 531, 516.

7PF(3)PSC: yellow crystals, yield 80%; m.p. 119.0 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.65 (s, 1H), 7.95 (t, J = 8.1 Hz, 2H), 7.65 (d, J = 8.1 Hz, 2H), 7.40-7.25 (m, 4H), 7.17 (m, 1H), 7.06-6.93 (m, 2H), 4.10 (t, J = 6.6 Hz, 2H), 1.87 (m, 2H), 1.49-1.30 (m, 8H), 0.89 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3353, 3063, 2953, 2917, 2854, 1624, 1581, 1534, 1506, 1483, 1431, 1404, 1383, 1359, 1311, 1288, 1269, 1243, 1225, 1181, 1133, 1079, 1036, 1009, 915, 858, 814, 798, 664, 579, 516, 456.

8PF(3)PSC: yellow crystals, yield 80%; m.p. 118.0 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.65 (s, 1H), 7.95 (t, J = 8.1 Hz, 2H), 7.65 (d, J = 8.1 Hz, 2H), 7.40-7.25 (m, 4H), 7.17 (m, 1H), 7.06-6.93 (m, 2H), 4.10 (t, J = 6.6 Hz, 2H), 1.87 (m, 2H), 1.49-1.30 (m, 10H), 0.89 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3354, 3049, 2958, 2916, 2870, 2853, 1623, 1607, 1588, 1560, 1534, 1508, 1484, 1405, 1382, 1307, 1292, 1272, 1244, 1229, 1186, 1176, 1135, 1041, 998, 880, 834, 810, 798, 609, 518.

10PF(3)PSC: yellow crystals, yield 79%; m.p. 113.7 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.65 (s, 1H), 7.95 (t, J = 8.1 Hz, 2H), 7.65 (d, J = 8.1 Hz, 2H), 7.40-7.25 (m, 4H), 7.17 (m, 1H), 7.06-6.93 (m, 2H), 4.09 (t, J = 6.6 Hz, 2H), 1.87 (m, 2H), 1.48-1.28 (m, 14H), 0.90 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3365, 3063, 2956, 2917, 2870, 2851, 1623, 1581, 1534, 1507, 1484, 1471, 1430, 1403, 1382, 1358, 1311, 1288, 1269, 1244, 1223, 1180, 1133, 1014, 974, 914, 858, 828, 813, 797, 717, 701, 664, 579, 516, 459.

Spectroscopic data for lateral monofluoro substituted compounds (nPF(3)PBx):

4PF(3)PBH: pale white crystals, yield 80%; m.p. 124.1 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.32 (d, J = 8.4 Hz, 2H), 7.80 (m, 1H), 7.71 (d, J = 8.4 Hz, 2H), 7.61 (m, 1H), 7.43-7.35 (m, 4H), 7.07 (t, J = 8.4 Hz, 1H), 4.11 (t, J = 6.6 Hz, 2H), 1.86 (m, 2H), 1.57 (m, 2H), 1.03 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3042, 2960, 2936, 2873, 1612, 1570, 1550, 1522, 1496, 1464, 1451, 1431, 1404, 1392, 1307, 1291, 1277, 1265, 1243, 1181, 1135, 1059, 1030, 964, 846, 809, 786, 765, 752, 522. EI-MS m/z (rel. int.): 361.19 (M^+ , 13), 305.16 (100), 276.12 (5), 157.09 (4), 64.04 (4). Elemental analysis: Calc. for $\text{C}_{23}\text{H}_{20}\text{FNO}_2$: C 76.44, H 5.58, N 3.88; Found: C 75.98, H 5.23, N 3.77.

5PF(3)PBH: pale white crystals, yield 81%; m.p. 120.7 °C. ^1H -NMR (300 MHz, CDCl_3 ,

TMS): δ (ppm) 8.32 (d, $J = 8.4$ Hz, 2H), 7.80 (m, 1H), 7.71 (d, $J = 8.4$ Hz, 2H), 7.61 (m, 1H), 7.43-7.36 (m, 4H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.86 (m, 2H), 1.44 (m, 4H), 0.97 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3051, 2954, 2932, 2867, 1614, 1571, 1553, 1531, 1499, 1473, 1453, 1404, 1315, 1295, 1279, 1247, 1184, 1134, 1059, 1032, 1008, 923, 842, 811, 761, 746, 733, 516. EI-MS m/z (rel. int.): 375.21 (M^+ , 14), 305.12 (100), 276.11 (7), 157.07 (3), 64.02 (3). Elemental analysis: Calc. for $\text{C}_{24}\text{H}_{22}\text{FNO}_2$: C 76.78, H 5.91, N 3.73; Found: C 76.78, H 5.49, N 3.73.

6PF(3)PBH: pale white crystals, yield 80%; m.p. 110.6 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.33 (d, $J = 8.7$ Hz, 2H), 7.81 (m, 1H), 7.71 (d, $J = 8.7$ Hz, 2H), 7.62 (m, 1H), 7.43-7.36 (m, 4H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.52 (m, 2H), 1.37 (m, 4H), 0.94 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3054, 2944, 2928, 2869, 1610, 1570, 1551, 1526, 1494, 1471, 1450, 1435, 1405, 1308, 1292, 1275, 1240, 1184, 1132, 1109, 1056, 1033, 1013, 935, 922, 892, 847, 808, 751, 519. EI-MS m/z (rel. int.): 389.27 (M^+ , 14), 305.15 (100), 276.14 (6), 157.10 (4), 64.04 (3). Elemental analysis: Calc. for $\text{C}_{25}\text{H}_{24}\text{FNO}_2$: C 77.10, H 6.21, N 3.60; Found: C 76.80, H 6.09, N 3.51.

7PF(3)PBH: pale white crystals, yield 79%; m.p. 115.0 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.35 (d, $J = 8.1$ Hz, 2H), 7.83 (m, 1H), 7.73 (d, $J = 8.1$ Hz, 2H), 7.63 (m, 1H), 7.44-7.37 (m, 4H), 7.08 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.49 (m, 2H), 1.34 (m, 6H), 0.92 (t, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3051, 2951, 2922, 2860, 1614, 1571, 1552, 1531, 1499, 1470, 1451, 1403, 1315, 1295, 1282, 1247, 1184, 1134, 1060, 1035, 1008, 923, 893, 873, 840, 811, 760, 746, 731, 516. EI-MS m/z (rel. int.): 403.25 (M^+ , 17), 305.14 (100), 276.23 (6), 157.12 (3), 64.03 (3). Elemental analysis: Calc. for $\text{C}_{26}\text{H}_{26}\text{FNO}_2$: C 77.39, H 6.49, N 3.47; Found: C 76.70, H 6.05, N 3.39.

8PF(3)PBH: pale white crystals, yield 80%; m.p. 113.4 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.32 (d, $J = 8.4$ Hz, 2H), 7.81 (m, 1H), 7.71 (d, $J = 8.4$ Hz, 2H), 7.62 (m, 1H), 7.43-7.35 (m, 4H), 7.08 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.49 (m, 2H), 1.33 (m, 8H), 0.90 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3053, 2954, 2920, 2851, 1614, 1571, 1552, 1531, 1499, 1472, 1452, 1404, 1315, 1296, 1280, 1248, 1184, 1134, 1060, 1033, 1011, 996, 923, 894, 874, 841, 812, 800, 760, 746, 732, 516. EI-MS m/z (rel. int.): 417.52 (M^+ , 8), 305.12 (100), 276.16 (7), 64.06 (2). Elemental analysis: Calc. for $\text{C}_{27}\text{H}_{28}\text{FNO}_2$: C 77.67, H 6.76, N 3.35; Found: C 77.41, H 6.35, N 3.31.

10PF(3)PBH: pale white crystals, yield 81%; m.p. 113.7 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.32 (d, $J = 8.1$ Hz, 2H), 7.81 (m, 1H), 7.71 (d, $J = 8.4$ Hz, 2H), 7.62 (m, 1H), 7.43-7.35 (m, 4H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.49 (m,

2H), 1.33 (m, 12H), 0.91 (t, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3053, 2954, 2918, 2849, 1614, 1571, 1553, 1531, 1499, 1472, 1452, 1404, 1316, 1295, 1280, 1249, 1184, 1134, 1060, 1033, 1011, 997, 923, 894, 874, 842, 812, 800, 761, 746, 732, 516. EI-MS m/z (rel. int.): 445.25 (M^+ , 8), 305.14 (100), 276.14 (5), 64.12 (2). Elemental analysis: Calc. for $C_{29}H_{32}FNO_2$: C 78.17, H 7.24, N 3.14; Found: C 78.47, H 7.04, N 3.03.

4PF(3)PBM: pale white crystals, yield 75%; m.p. 139.8 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.29 (d, $J = 8.4$ Hz, 2H), 7.69 (d, $J = 8.4$ Hz, 2H), 7.56 (s, 1H), 7.47-7.35 (m, 3H), 7.17 (q, $^3J = 8.1$ Hz, $^4J = 0.9$ Hz, 1H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 2.49 (s, 3H), 1.86 (m, 2H), 1.57 (m, 2H), 1.02 (t, $J = 7.5$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3064, 3050, 2956, 2938, 2920, 2872, 1603, 1569, 1551, 1518, 1496, 1483, 1465, 1429, 1403, 1394, 1305, 1291, 1278, 1262, 1239, 1183, 1132, 1064, 1029, 964, 848, 808, 785, 745, 702, 526. EI-MS m/z (rel. int.): 375.21 (M^+ , 18), 319.18 (100), 290.17 (4), 213.08 (7), 78.07 (7). Elemental analysis: Calc. for $C_{24}H_{22}FNO_2$: C 76.78, H 5.91, N 3.73; Found: C 76.29, H 5.39, N 3.48.

5PF(3)PBM: pale white crystals, yield 76%; m.p. 133.7 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.30 (d, $J = 8.4$ Hz, 2H), 7.70 (d, $J = 8.4$ Hz, 2H), 7.57 (s, 1H), 7.48-7.35 (m, 3H), 7.18 (q, $^3J = 8.1$ Hz, $^4J = 0.9$ Hz, 1H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 2.49 (s, 3H), 1.88 (m, 2H), 1.46 (m, 4H), 0.97 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3071, 3055, 2964, 2943, 2933, 2872, 2860, 1605, 1571, 1552, 1525, 1495, 1472, 1426, 1404, 1306, 1291, 1280, 1264, 1184, 1136, 1124, 1055, 1009, 846, 806, 744, 518. EI-MS m/z (rel. int.): 389.19 (M^+ , 22), 319.15 (100), 290.23 (4), 213.03 (6), 77.98 (4). Elemental analysis: Calc. for $C_{25}H_{24}FNO_2$: C 77.10, H 6.21, N 3.60; Found: C 76.78, H 6.03, N 3.49.

6PF(3)PBM: pale white crystals, yield 75%; m.p. 121.0 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.22 (d, $J = 8.4$ Hz, 2H), 7.62 (d, $J = 8.4$ Hz, 2H), 7.49 (s, 1H), 7.40-7.28 (m, 3H), 7.11 (q, $^3J = 8.4$ Hz, $^4J = 0.9$ Hz, 1H), 6.99 (t, $J = 8.4$ Hz, 1H), 4.03 (t, $J = 6.6$ Hz, 2H), 2.42 (s, 3H), 1.82 (m, 2H), 1.45 (m, 2H), 1.31 (m, 4H), 0.87 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3051, 2948, 2927, 2859, 1604, 1569, 1550, 1521, 1496, 1470, 1430, 1403, 1307, 1292, 1279, 1265, 1242, 1185, 1133, 1062, 1032, 1013, 939, 847, 809, 744, 701, 524. EI-MS m/z (rel. int.): 403.29 (M^+ , 16), 319.19 (100), 290.14 (5), 213.11 (5), 78.03 (4). Elemental analysis: Calc. for $C_{26}H_{18}FNO_2$: C 77.39, H 6.49, N 3.47; Found: C 76.65, H 6.34, N 3.31.

7PF(3)PBM: pale white crystals, yield 74%; m.p. 108.2 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.32 (d, $J = 8.4$ Hz, 2H), 7.71 (d, $J = 8.1$ Hz, 2H), 7.58 (s, 1H), 7.49-7.36 (m, 3H), 7.19 (q, $^3J = 8.1$ Hz, $^4J = 0.9$ Hz, 1H), 7.08 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 2.50 (s, 3H), 1.88 (m, 2H), 1.52 (m, 2H), 1.33 (m, 6H), 0.92 (t, $J = 6.6$ Hz, 3H). IR (KBr,

pellet, cm^{-1}): 2938, 2871, 2856, 1608, 1571, 1552, 1523, 1497, 1464, 1404, 1308, 1293, 1279, 1266, 1246, 1184, 1136, 1121, 1059, 1050, 1014, 846, 829, 805, 743, 701, 520. EI-MS m/z (rel. int.): 417.28 (M^+ , 14), 319.16 (100), 290.10 (3), 213.20 (4), 78.11 (4). Elemental analysis: Calc. for $\text{C}_{27}\text{H}_{28}\text{FNO}_2$: C 77.67, H 6.76, N 3.35; Found: C 77.41, H 6.65, N 3.14.

10PF(3)PBM: pale white crystals, yield 75%; m.p. 95.9 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.31 (d, $J = 8.4$ Hz, 2H), 7.70 (d, $J = 8.4$ Hz, 2H), 7.57 (s, 1H), 7.48-7.35 (m, 3H), 7.18 (q, $^3J = 8.1$ Hz, $^4J = 0.9$ Hz, 1H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.10 (t, $J = 6.6$ Hz, 2H), 2.49 (s, 3H), 1.87 (m, 2H), 1.51 (m, 2H), 1.33 (m, 12H), 0.90 (t, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 2952, 2918, 2848, 1607, 1572, 1554, 1528, 1496, 1471, 1426, 1404, 1337, 1309, 1296, 1280, 1262, 1185, 1136, 1054, 1035, 1013, 922, 895, 871, 841, 827, 817, 797, 742, 725, 700, 516. EI-MS m/z (rel. int.): 459.30 (M^+ , 12), 319.14 (100), 290.15 (4), 213.18 (3), 77.97 (4). Elemental analysis: Calc. for $\text{C}_{30}\text{H}_{34}\text{FNO}_2$: C 78.40, H 7.46, N 3.05; Found: C 78.55, H 7.23, N 3.06.

4PF(3)PBC: pale white crystals, yield 65%; m.p. 116.9 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.29 (d, $J = 8.1$ Hz, 2H), 7.75 (d, $J = 2.1$ Hz, 1H), 7.70 (d, $J = 8.4$ Hz, 2H), 7.52 (d, $J = 8.7$ Hz, 1H), 7.42-7.31 (m, 3H), 7.07 (t, $J = 8.7$ Hz, 1H), 4.12 (t, $J = 6.6$ Hz, 2H), 1.87 (m, 2H), 1.57 (m, 2H), 1.03 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3068, 3049, 2955, 2937, 2903, 2870, 1609, 1585, 1568, 1550, 1521, 1494, 1471, 1451, 1425, 1403, 1309, 1280, 1261, 1241, 1179, 1129, 1066, 1055, 1033, 1002, 965, 917, 895, 875, 844, 824, 808, 788, 743, 701, 599, 524. EI-MS m/z (rel. int.): 395.14 (M^+ , 20), 339.07 (100), 310.10 (6), 213.07 (3). Elemental analysis: Calc. for $\text{C}_{23}\text{H}_{19}\text{ClFNO}_2$: C 69.78, H 4.84, N 3.54; Found: C 69.54, H 4.62, N 3.39.

5PF(3)PBC: pale white crystals, yield 66%; m.p. 88.6 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.29 (d, $J = 8.4$ Hz, 2H), 7.76 (d, $J = 2.1$ Hz, 1H), 7.71 (d, $J = 8.4$ Hz, 2H), 7.52 (d, $J = 8.7$ Hz, 1H), 7.42-7.31 (m, 3H), 7.07 (t, $J = 8.4$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.86 (m, 2H), 1.44 (m, 4H), 0.97 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3095, 3079, 3054, 2954, 2933, 2866, 1610, 1569, 1555, 1529, 1499, 1473, 1450, 1404, 1317, 1294, 1282, 1263, 1253, 1184, 1135, 1121, 1067, 1050, 1033, 1009, 923, 874, 837, 810, 744, 701, 516. EI-MS m/z (rel. int.): 409.18 (M^+ , 17), 339.07 (100), 310.12 (6), 213.11 (3). Elemental analysis: Calc. for $\text{C}_{24}\text{H}_{21}\text{ClFNO}_2$: C 70.33, H 5.16, N 3.42; Found: C 70.07, H 5.13, N 3.30.

6PF(3)PBC: pale white crystals, yield 65%; m.p. 90.1 °C. ^1H -NMR (300 MHz, CDCl_3 , TMS): δ (ppm) 8.29 (d, $J = 8.4$ Hz, 2H), 7.75 (d, $J = 2.1$ Hz, 1H), 7.71 (d, $J = 8.4$ Hz, 2H), 7.52 (d, $J = 8.7$ Hz, 1H), 7.43-7.31 (m, 3H), 7.07 (t, $J = 8.7$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.52 (m, 2H), 1.38 (m, 4H), 0.94 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}):

3098, 3051, 2951, 2927, 2860, 1690, 1610, 1583, 1568, 1551, 1529, 1521, 1496, 1471, 1450, 1404, 1308, 1294, 1279, 1264, 1255, 1183, 1134, 1065, 1051, 1032, 1014, 994, 937, 920, 893, 873, 846, 810, 793, 744, 701, 597, 519. EI-MS m/z (rel. int.): 423.24 (M^+ , 10), 339.13 (100), 310.11 (5), 213.12 (2). Elemental analysis: Calc. for $C_{25}H_{23}ClFNO_2$: C 70.83, H 5.47, N 3.30; Found: C 70.74, H 5.38, N 3.11.

7PF(3)PBC: pale white crystals, yield 66%; m.p. 93.5 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.29 (d, J = 8.1 Hz, 2H), 7.75 (m, 3H), 7.52 (d, J = 8.7 Hz, 1H), 7.42-7.31 (m, 3H), 7.07 (t, J = 8.7 Hz, 1H), 4.10 (t, J = 6.6 Hz, 2H), 1.88 (m, 2H), 1.51-1.33 (m, 8H), 0.92 (t, J = 6.6 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3095, 3079, 3054, 2952, 2922, 2860, 1690, 1610, 1569, 1554, 1530, 1500, 1472, 1451, 1405, 1317, 1294, 1282, 1263, 1253, 1184, 1135, 1068, 1051, 1035, 1009, 922, 894, 873, 837, 810, 744, 701, 596, 517. EI-MS m/z (rel. int.): 437.21 (M^+ , 10), 339.08 (100), 310.07 (5), 213.13 (2). Elemental analysis: Calc. for $C_{26}H_{25}ClFNO_2$: C 71.31, H 5.75, N 3.20; Found: C 71.06, H 5.50, N 3.16.

8PF(3)PBC: pale white crystals, yield 65%; m.p. 92.5 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.28 (d, J = 8.4 Hz, 2H), 7.75 (d, J = 2.1 Hz, 1H), 7.70 (d, J = 8.4 Hz, 2H), 7.52 (d, J = 8.4 Hz, 1H), 7.42-7.31 (m, 3H), 7.07 (t, J = 8.7 Hz, 1H), 4.10 (t, J = 6.6 Hz, 2H), 1.88 (m, 2H), 1.49 (m, 2H), 1.32 (m, 8H), 0.89 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3095, 3077, 3053, 2954, 2920, 2852, 1610, 1569, 1554, 1530, 1500, 1472, 1451, 1405, 1318, 1294, 1282, 1262, 1195, 1183, 1135, 1068, 1050, 1035, 1013, 997, 923, 893, 873, 837, 811, 744, 702, 596, 516. EI-MS m/z (rel. int.): 451.20 (M^+ , 9), 339.13 (100), 310.02 (6). Elemental analysis: Calc. for $C_{27}H_{27}ClFNO_2$: C 71.75, H 6.02, N 3.10; Found: C 71.73, H 5.75, N 3.10.

10PF(3)PBC: pale white crystals, yield 64%; m.p. 98.8 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.29 (d, J = 8.4 Hz, 2H), 7.75 (d, J = 2.1 Hz, 1H), 7.70 (d, J = 8.4 Hz, 2H), 7.52 (d, J = 8.4 Hz, 1H), 7.42-7.31 (m, 3H), 7.07 (t, J = 8.4 Hz, 1H), 4.10 (t, J = 6.6 Hz, 2H), 1.87 (m, 2H), 1.49 (m, 2H), 1.33 (m, 12H), 0.89 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3094, 3078, 3053, 2954, 2918, 2850, 1610, 1568, 1554, 1530, 1500, 1472, 1451, 1404, 1318, 1294, 1282, 1263, 1252, 1184, 1135, 1067, 1050, 1032, 1012, 996, 923, 894, 873, 837, 810, 743, 701, 596, 517. EI-MS m/z (rel. int.): 479.24 (M^+ , 15), 339.08 (100), 310.12 (7). Elemental analysis: Calc. for $C_{29}H_{31}ClFNO_2$: C 72.56, H 6.51, N 2.92; Found: C 72.54, H 6.25, N 2.91.

4PF(3)PBN: pale white crystals, yield 67%; m.p. 141.1 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.66 (d, J = 2.1 Hz, 1H), 8.35-8.30 (m, 3H), 7.74 (q, ^3J = 10.5 Hz, ^4J = 9.0 Hz, 3H), 7.44-7.37 (m, 2H), 7.09 (t, J = 8.7 Hz, 1H), 4.13 (t, J = 6.6 Hz, 2H), 1.87 (m, 2H), 1.58 (m, 2H), 1.03 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3109, 3086, 2962, 2937, 2874, 1616,

1571, 1555, 1528, 1494, 1455, 1434, 1404, 1347, 1316, 1294, 1284, 1259, 1239, 1186, 1136, 1042, 1005, 894, 879, 841, 823, 799, 748, 735, 530. EI-MS m/z (rel. int.): 406.23 (M^+ , 29), 350.11 (100), 304.15 (34), 91.09 (46). Elemental analysis: Calc. for $C_{23}H_{19}FN_2O_4$: C 67.97, H 4.71, N 6.89; Found: C 67.86, H 4.69, N 6.84.

5PF(3)PBN: pale white crystals, yield 68%; m.p. 137.9 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.65 (d, $J = 2.1$ Hz, 1H), 8.34-8.29 (m, 3H), 7.74 (q, $^3J = 10.2$ Hz, $^4J = 9.0$ Hz, 3H), 7.44-7.37 (m, 2H), 7.09 (t, $J = 8.7$ Hz, 1H), 4.11 (t, $J = 6.6$ Hz, 2H), 1.89 (m, 2H), 1.48 (m, 4H), 0.98 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3110, 3071, 3052, 2957, 2934, 2861, 1615, 1556, 1530, 1527, 1498, 1469, 1433, 1405, 1346, 1310, 1280, 1259, 1180, 1132, 1073, 1050, 1032, 1012, 987, 883, 836, 823, 798, 744, 691, 511. EI-MS m/z (rel. int.): 420.18 (M^+ , 14), 350.09 (100), 304.19 (27), 91.06 (33). Elemental analysis: Calc. for $C_{24}H_{21}FN_2O_4$: C 68.56, H 5.03, N 6.66; Found: C 68.30, H 5.06, N 6.58.

6PF(3)PBN: pale white crystals, yield 68%; m.p. 132.8 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.66 (d, $J = 2.1$ Hz, 1H), 8.35-8.30 (m, 3H), 7.74 (m, 3H), 7.44-7.38 (m, 2H), 7.09 (t, $J = 8.7$ Hz, 1H), 4.12 (t, $J = 6.6$ Hz, 2H), 1.89 (m, 2H), 1.53 (m, 2H), 1.38 (m, 4H), 0.94 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3114, 3087, 3049, 2958, 2936, 2916, 2858, 1691, 1615, 1570, 1555, 1530, 1494, 1455, 1433, 1403, 1346, 1315, 1294, 1281, 1259, 1234, 1184, 1134, 1120, 1072, 1050, 1037, 1023, 1012, 994, 918, 894, 873, 842, 824, 810, 797, 749, 736, 716, 691, 531. EI-MS m/z (rel. int.): 434.24 (M^+ , 12), 350.16 (100), 304.14 (26), 91.09 (29). Elemental analysis: Calc. for $C_{24}H_{21}FN_2O_4$: C 69.11, H 5.34, N 6.45; Found: C 69.20, H 5.05, N 6.35.

7PF(3)PBN: pale white crystals, yield 67%; m.p. 130.1 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.67 (d, $J = 2.1$ Hz, 1H), 8.35-8.30 (m, 3H), 7.75-7.68 (m, 3H), 7.44-7.38 (m, 2H), 7.09 (t, $J = 8.7$ Hz, 1H), 4.12 (t, $J = 6.6$ Hz, 2H), 1.89 (m, 2H), 1.50 (m, 2H), 1.38 (m, 6H), 0.93 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3111, 2960, 2931, 2921, 2857, 1617, 1572, 1557, 1531, 1495, 1456, 1436, 1405, 1346, 1313, 1284, 1261, 1238, 1186, 1138, 1122, 1072, 1050, 1037, 1012, 986, 918, 895, 873, 838, 824, 805, 748, 735, 692, 531, 516, 450, 419. EI-MS m/z (rel. int.): 448.19 (M^+ , 24), 350.13 (100), 304.35 (22), 90.95 (35). Elemental analysis: Calc. for $C_{26}H_{25}FN_2O_4$: C 69.63, H 5.62, N 6.25; Found: C 69.01, H 5.44, N 5.98.

8PF(3)PBN: pale white crystals, yield 68%; m.p. 127.0 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.66 (d, $J = 2.1$ Hz, 1H), 8.35-8.30 (m, 3H), 7.74-7.68 (m, 3H), 7.44-7.37 (m, 2H), 7.09 (t, $J = 8.7$ Hz, 1H), 4.12 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.50 (m, 2H), 1.33 (m, 8H), 0.90 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3109, 2957, 2917, 2855, 1617, 1572, 1556, 1536, 1493, 1471, 1455, 1435, 1405, 1347, 1314, 1286, 1261, 1240, 1184, 1138, 1122,

1070, 1039, 1012, 995, 917, 894, 872, 840, 824, 810, 796, 748, 736, 713, 692, 532, 517, 450. EI-MS m/z (rel. int.): 462.16 (M^+ , 12), 350.14 (100), 304.35 (15), 91.07 (33). Elemental analysis: Calc. for $C_{27}H_{27}FN_2O_4$: C 70.11, H 5.88, N 6.06; Found: C 70.15, H 5.60, N 6.02.

10PF(3)PBN: pale white crystals, yield 66%; m.p. 122.7 °C. ^1H -NMR (300 MHz, $CDCl_3$, TMS): δ (ppm) 8.66 (d, $J = 2.1$ Hz, 1H), 8.35-8.30 (m, 3H), 7.74-7.68 (m, 3H), 7.44-7.37 (m, 2H), 7.09 (t, $J = 8.7$ Hz, 1H), 4.12 (t, $J = 6.6$ Hz, 2H), 1.88 (m, 2H), 1.50 (m, 2H), 1.33 (m, 12H), 0.89 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3113, 2954, 2914, 2871, 2850, 1617, 1557, 1543, 1528, 1499, 1471, 1435, 1406, 1346, 1310, 1292, 1281, 1268, 1259, 1182, 1134, 1073, 1051, 1033, 1015, 984, 939, 883, 836, 824, 798, 744, 715, 692, 513. Elemental analysis: Calc. for $C_{29}H_{31}FN_2O_4$: C 71.00, H 6.37, N 5.71; Found: C 71.25, H 5.99, N 5.71.