Supplementary information

Improved nematic mesophase stability of benzoxazole-liquid crystals via modification of inter-ring twist angle of biphenyl unit

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Table s1. Nematic mesophase range for compounds nPF(2)PBx and reference compounds I in heating process.

x	n	Nematic mesophase range (°C K)	
		nPF(2)PBx	Reference compounds I ^[17]
H	4	24	θ —
	5	21	θ —
	6	6	θ —
	7	6	θ —
	8	17	θ —
CH ₃	4	86	30
	5	70	18
	6	85	15
	7	80	8
	8	80	6
NO ₂	4	129	104
	5	115	96
	6	122	95
	7	13	94
	8	1	94
	10	θ —	θ —

Table s2. Maxima peaks of UV-vis and fluorescence spectra for nPF(2)PBx and reference compounds I.

X	UV-vis (nm)		FL (nm)	
	nPF(2)PBx	Reference compounds I ^[17]	nPF(2)PBx	Reference compounds I ^[17]
H	319	323	385	389
CH ₃	323	326	385	390
NO ₂	321	326	—	—

Note: n=7 for all compounds.

Spectroscopic data for 4-alkoxy-(1, 1'-biphenyl)-3-fluoro-4'-carboxaldehyde (nPF(2)PCHO):

2PF(2)PCHO: White crystals, yield 54%; m.p. 96.3-97.8°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.03 (s, 1H), 7.92 (d, J = 8.1 Hz, 2H), 7.68 (d, J = 6.9 Hz, 2H), 7.38 (t, J = 9.0 Hz, 1H), 6.75 (m, 2H), 4.06 (t, J = 6.9 Hz, 2H), 1.44 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3068, 2980, 2929, 2881, 2835, 2733, 2542, 2052, 1910, 1697, 1603, 1520, 1484, 1436, 1388, 1248, 1177, 1109, 1038, 946, 917, 882, 820, 744, 698, 624, 564, 525. EI-MS m/z (rel. int.): 244.17 (M⁺, 53), 216.15 (53), 170.14 (7), 159.12 (14), 133.10 (11).

3PF(2)PCHO: White crystals, yield 53%; m.p. 75.0-76.4°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.93 (d, J = 8.1 Hz, 2H), 7.69 (d, J = 6.9 Hz, 2H), 7.38 (t, J = 9.0 Hz, 1H), 6.76 (m, 2H), 3.96 (t, J = 6.6 Hz, 2H), 1.84 (m, 2H), 1.06 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3067, 2965, 2879, 2827, 2733, 1699, 1611, 1527, 1479, 1391, 1295, 1221, 1169, 1114, 994, 950, 840, 706, 632, 584, 516. EI-MS m/z (rel. int.): 258.19 (M⁺, 39), 216.15 (87), 170.14 (7), 159.12 (11), 133.10 (8).

4PF(2)PCHO: White crystals, yield 95%; m.p. 39.7-40.9°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.93 (d, J = 8.1 Hz, 2H), 7.69 (d, J = 6.9 Hz, 2H), 7.38 (t, J = 8.7 Hz, 1H), 6.76 (m, 2H), 4.00 (t, J = 6.3 Hz, 2H), 1.80 (m, 2H), 1.51 (m, 2H), 0.99 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3067, 2966, 2869, 1697, 1613, 1519, 1485, 1439, 1393, 1291, 1213, 1163, 1125, 1038, 1006, 834, 800, 742, 702, 632, 582, 508. EI-MS m/z (rel. int.): 272.21 (M⁺, 40), 216.15 (100), 170.14 (7), 159.12 (10), 133.10 (7).

5PF(2)PCHO: White crystals, yield 65%; m.p. 74.8-75.6°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.93 (d, J = 8.4 Hz, 2H), 7.67 (t, J = 7.8 Hz, 2H), 7.38 (t, J = 8.7 Hz, 1H), 6.76 (m, 2H), 3.99 (t, J = 6.6 Hz, 2H), 1.82 (m, 2H), 1.43 (m, 4H), 0.95 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3067, 2951, 2867, 2735, 1703, 1611, 1521, 1469, 1395, 1289, 1217, 1165, 1118, 1030, 1002, 845, 810, 740, 706, 632, 590, 548, 512. EI-MS m/z (rel. int.): 286.24 (M⁺, 28), 216.16 (100), 170.14 (6), 159.13 (8), 133.10 (5).

6PF(2)PCHO: White crystals, yield 75%; m.p. 53.5-54.7°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.92 (d, J = 8.4 Hz, 2H), 7.65 (m, 2H), 7.38 (t, J = 9.0 Hz, 1H), 6.76 (m, 2H), 3.99 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 1.40 (m, 6H), 0.93 (d, J = 6.6 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3061, 2937, 2863, 2737, 1701, 1615, 1521, 1469, 1395, 1285, 1213, 1161, 1120, 1030, 846, 804, 710, 628, 584, 554, 518. EI-MS m/z (rel. int.): 300.26 (M⁺, 18), 216.15 (100), 170.15 (5), 159.12 (6),

133.10 (4).

7PF(2)PCHO: White crystals, yield 30%; m.p. 96.7-97.5°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.92 (d, J = 8.1 Hz, 2H), 7.67 (t, J = 7.5 Hz, 2H), 7.38 (t, J = 8.7 Hz, 1H), 6.76 (m, 2H), 3.98 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 1.39 (m, 8H), 0.89 (d, J = 6.6 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3053, 2931, 2863, 2729, 1699, 1611, 1475, 1391, 1295, 1223, 1165, 1120, 1034, 838, 712, 628, 580, 518. EI-MS m/z (rel. int.): 314.27 (M⁺, 17), 216.15 (100), 170.13 (5), 159.12 (6), 133.09 (3).

8PF(2)PCHO: White crystals, yield 43%; m.p. 38.0-39.2°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.93 (d, J = 8.1 Hz, 2H), 7.69 (t, J = 7.2 Hz, 2H), 7.38 (t, J = 9.0 Hz, 1H), 6.76 (m, 2H), 3.99 (t, J = 6.3 Hz, 2H), 1.81 (m, 2H), 1.37 (m, 10H), 0.88 (d, J = 6.6 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3057, 2927, 2859, 2733, 1705, 1611, 1523, 1469, 1397, 1291, 1217, 1167, 1118, 1036, 994, 958, 838, 806, 712, 628, 576, 516. EI-MS m/z (rel. int.): 328.30 (M⁺, 19), 216.15 (100), 170.13 (5), 159.12 (5), 133.09 (3).

10PF(2)PCHO: White crystals, yield 41%; m.p. 98.3-99.6°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 10.04 (s, 1H), 7.93 (d, J = 8.1 Hz, 2H), 7.67 (t, J = 7.2 Hz, 2H), 7.38 (t, J = 8.7 Hz, 1H), 6.76 (m, 2H), 3.98 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 1.28 (m, 14H), 0.88 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 2925, 2853, 2737, 1699, 1605, 1521, 1473, 1387, 1287, 1213, 1161, 1118, 1030, 842, 810, 710, 628, 584, 516. EI-MS m/z (rel. int.): 356.36 (M⁺, 12), 216.17 (100), 170.15 (4), 159.13 (4), 133.10 (2).

Spectroscopic data for Schiff base compounds (nPF(2)PSx):

2PF(2)PSH: ~~White~~ Yellow crystals, yield 89%; m.p. 138.7°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.73 (s, 1H), 7.97 (d, J = 8.1 Hz, 2H), 7.65 (m, 2H), 7.28 (m, 4H), 7.03 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 3.99 (t, J = 6.6 Hz, 2H), 0.88 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3309, 3039, 2977, 2920, 2875, 1689, 1603, 1482, 1424, 1380, 1291, 1240, 1167, 1109, 1039, 962, 925, 812, 744, 676, 616, 568, 524. EI-MS m/z (rel. int.): 335.24 (M⁺, 100), 306.20 (11), 188.11 (24), 120.02 (89).

3PF(2)PSH: ~~White~~ Yellow crystals, yield 93%; m.p. 129.2°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.73 (s, 1H), 7.97 (d, J = 8.1 Hz, 2H), 7.64 (m, 2H), 7.27 (m, 4H), 7.03 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 4.01 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 0.88 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹):

3305, 3053, 2967, 2925, 2873, 1615, 1585, 1481, 1373, 1279, 1235, 1199, 1167, 1122, 984, 848, 796, 740, 688, 626, 582, 514. EI-MS m/z (rel. int.): 349.26 (M^+ , 100), 306.19 (29), 188.11 (26), 120.04 (64).

4PF(2)PSH: ~~White~~ Yellow crystals, yield 90%; m.p. 107.2°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.73 (s, 1H), 7.97 (d, $J = 8.1$ Hz, 2H), 7.65 (m, 2H), 7.29 (m, 4H), 7.03 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.3$ Hz, 2H), 1.80 (m, 2H), 1.53 (m, 2H), 1.00 (t, $J = 7.5$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3293, 3046, 2957, 2873, 1615, 1585, 1479, 1375, 1281, 1229, 1161, 1120, 1030, 972, 838, 796, 738, 684, 622, 580, 518. EI-MS m/z (rel. int.): 363.29 (M^+ , 100), 306.20 (49), 188.13 (32), 120.03 (73).

5PF(2)PSH: ~~White~~ Yellow crystals, yield 90%; m.p. 124.3°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.73 (s, 1H), 7.97 (d, $J = 8.4$ Hz, 2H), 7.65 (m, 2H), 7.29 (m, 4H), 7.03 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 3.99 (t, $J = 6.6$ Hz, 2H), 1.82 (m, 2H), 1.43 (m, 4H), 0.95 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3386, 3051, 2939, 2867, 1583, 1485, 1375, 1311, 1231, 1163, 1104, 1018, 960, 830, 740, 574, 516. EI-MS m/z (rel. int.): 377.30 (M^+ , 100), 306.21 (67), 188.12 (39), 120.04 (86).

6PF(2)PSH: ~~White~~ Yellow crystals, yield 90%; m.p. 89.5°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.74 (s, 1H), 7.97 (d, $J = 6.6$ Hz, 2H), 7.65 (d, $J = 6.9$ Hz, 2H), 7.24 (m, 4H), 7.03 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 1.81 (m, 2H), 1.39 (m, 6H), 0.92 (t, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3394, 3048, 2929, 2861, 1615, 1581, 1479, 1371, 1311, 1227, 1159, 1104, 1026, 958, 830, 742, 580, 518. EI-MS m/z (rel. int.): 391.30 (M^+ , 100), 306.20 (63), 188.12 (33), 120.03 (70).

7PF(2)PSH: ~~White~~ Yellow crystals, yield 80%; m.p. 82.8°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.73 (s, 1H), 7.97 (d, $J = 8.1$ Hz, 2H), 7.65 (d, $J = 6.9$ Hz, 2H), 7.27 (m, 4H), 7.03 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 3.99 (t, $J = 6.6$ Hz, 2H), 1.81 (m, 2H), 1.42 (m, 8H), 0.91 (t, $J = 6.3$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3371, 3051, 2927, 2853, 1619, 1585, 1481, 1377, 1309, 1283, 1229, 1161, 1104, 1028, 996, 958, 826, 748, 618, 588, 520. EI-MS m/z (rel. int.): 405.37 (M^+ , 100), 306.23 (61), 188.15 (31), 120.06 (57).

8PF(2)PSH: ~~White~~ Yellow crystals, yield 80%; m.p. 59.5°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.68 (s, 1H), 7.97 (d, $J = 8.1$ Hz, 2H), 7.65 (m, 2H), 7.28 (m, 4H), 7.01 (m, 1H), 6.92 (m, 1H), 6.74 (m, 2H), 4.01 (t, $J = 6.6$ Hz, 2H), 1.81 (m, 2H), 1.29 (t, $J = 8.1$ Hz, 10H), 0.88 (d, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3363, 3309, 3047, 2923, 2853, 1623, 1579, 1485, 1429, 1379, 1317,

1285, 1235, 1165, 1104, 1036, 998, 958, 826, 738, 674, 626, 580, 518. EI-MS m/z (rel. int.): 419.39 (M^+ , 100), 306.23 (48), 188.15 (23), 120.06 (38).

2PF(2)PSM: ~~White~~ Yellow crystals, yield 90%; m.p. 137.2°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.71 (s, 1H), 7.96 (d, $J = 8.4$ Hz, 2H), 7.64 (d, $J = 6.9$ Hz, 2H), 7.40 (t, $J = 8.7$ Hz, 1H), 7.13 (m, 2H), 7.00 (m, 1H), 6.92 (d, $J = 2.4$ Hz, 1H), 6.76 (m, 2H), 4.01 (t, $J = 6.6$ Hz, 2H), 2.33 (s, 3H), 1.09 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3343, 3036, 2975, 2920, 2872, 1887, 1748, 1603, 1495, 1430, 1390, 1288, 1243, 1183, 1115, 1043, 976, 925, 876, 809, 738, 695, 576, 516. EI-MS m/z (rel. int.): 349.28 (M^+ , 100), 320.25 (10), 188.14 (19), 134.10 (95).

3PF(2)PSM: ~~White~~ Yellow crystals, yield 72%; m.p. 107.4°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.71 (s, 1H), 7.96 (d, $J = 8.1$ Hz, 2H), 7.64 (d, $J = 6.9$ Hz, 2H), 7.39 (t, $J = 8.7$ Hz, 1H), 7.12 (m, 2H), 7.01 (m, 1H), 6.93 (d, $J = 2.1$ Hz, 1H), 6.76 (m, 2H), 4.01 (t, $J = 6.6$ Hz, 2H), 2.33 (s, 3H), 1.82 (m, 2H), 1.02 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3317, 3029, 2961, 2869, 1615, 1575, 1497, 1373, 1317, 1229, 1163, 1098, 1010, 958, 818, 676, 628, 576, 516. EI-MS m/z (rel. int.): 363.29 (M^+ , 100), 320.22 (34), 188.12 (25), 134.09 (88).

4PF(2)PSM: ~~White~~ Yellow crystals, yield 49%; m.p. 89.4°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.71 (s, 1H), 7.96 (d, $J = 8.1$ Hz, 2H), 7.64 (d, $J = 6.9$ Hz, 2H), 7.40 (t, $J = 9.0$ Hz, 1H), 7.13 (d, $J = 7.8$ Hz, 2H), 7.02 (m, 1H), 6.92 (d, $J = 2.4$ Hz, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 2.33 (s, 3H), 1.80 (m, 2H), 1.57 (s, 2H), 1.00 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3324, 2917, 2863, 1615, 1495, 1373, 1321, 1285, 1233, 1165, 1114, 1026, 982, 810, 742, 679, 578, 516. EI-MS m/z (rel. int.): 377.30 (M^+ , 99), 320.23 (48), 188.12 (29), 134.09 (100).

5PF(2)PSM: ~~White~~ Yellow crystals, yield 76%; m.p. 78.5°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.71 (s, 1H), 7.96 (d, $J = 8.1$ Hz, 2H), 7.64 (m, 2H), 7.39 (t, $J = 9.0$ Hz, 1H), 7.12 (d, $J = 7.5$ Hz, 2H), 7.02 (m, 1H), 6.92 (d, $J = 2.1$ Hz, 1H), 6.76 (m, 2H), 3.99 (t, $J = 6.6$ Hz, 2H), 2.33 (s, 3H), 1.82 (m, 2H), 1.43 (m, 4H), 0.95 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3327, 3025, 2931, 2861, 1617, 1499, 1427, 1385, 1317, 1285, 1229, 1161, 1113, 1026, 1000, 966, 810, 738, 670, 626, 580, 518. EI-MS m/z (rel. int.): 391.32 (M^+ , 100), 320.22 (46), 188.12 (24), 134.09 (78).

6PF(2)PSM: ~~White~~ Yellow crystals, yield 66%; m.p. 59.8°C. $^1\text{H-NMR}$ (300 MHz, CDCl_3 , TMS): 8.72 (s, 1H), 7.96 (d, $J = 8.4$ Hz, 2H), 7.64 (d, $J = 6.9$ Hz, 2H), 7.40 (t, $J = 8.7$ Hz, 1H), 7.12 (d, $J = 9.6$ Hz, 2H), 7.02 (m, 1H), 6.92 (m, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 2.33 (s, 3H),

1.80 (m, 2H), 1.39 (m, 6H), 0.92 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3412, 3031, 2953, 2919, 2863, 1615, 1499, 1463, 1401, 1321, 1279, 1227, 1175, 1114, 1020, 960, 842, 808, 740, 626, 580, 526. EI-MS m/z (rel. int.): 405.34 (M^+ , 100), 320.21 (37), 188.12 (19), 134.09 (60).

7PF(2)PSM: ~~White~~ Yellow crystals, yield 84%; m.p. 81.4°C . ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.67 (s, 1H), 7.71 (t, $J = 7.5$ Hz, 2H), 7.53 (t, $J = 7.5$ Hz, 3H), 7.13 (s, 1H), 7.01 (m, 4H), 6.92 (d, $J = 8.1$ Hz, 1H), 4.01 (t, $J = 6.3$ Hz, 2H), 2.33 (s, 3H), 1.82 (m, 2H), 1.36 (m, 8H), 0.89 (d, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3397, 2913, 2857, 1613, 1493, 1461, 1429, 1397, 1315, 1283, 1225, 1106, 1022, 954, 844, 812, 734, 592, 520. EI-MS m/z (rel. int.): 419.38 (M^+ , 100), 320.24 (32), 188.14 (16), 134.12 (45).

8PF(2)PSM: ~~White~~ Yellow crystals, yield 79%; m.p. 85.1°C . ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.66 (s, 1H), 7.70 (t, $J = 8.1$ Hz, 2H), 7.54 (d, $J = 7.2$ Hz, 3H), 7.13 (s, 1H), 7.01 (m, 4H), 6.92 (d, $J = 9.0$ Hz, 1H), 4.01 (t, $J = 6.6$ Hz, 2H), 2.33 (s, 3H), 1.82 (m, 2H), 1.31 (m, 10H), 0.89 (d, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3414, 3093, 2915, 2849, 1615, 1501, 1469, 1397, 1327, 1285, 1233, 1175, 1116, 1026, 958, 822, 726, 596, 524. EI-MS m/z (rel. int.): 433.42 (M^+ , 100), 320.24 (31), 188.15 (16), 134.12 (43).

2PF(2)PSN: ~~Pale~~ Yellow crystals, yield 85%; m.p. 203.5°C . ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.84 (s, 1H), 8.28 (d, $J = 2.4$ Hz, 1H), 8.15 (dd, $J_1 = 2.4$ Hz, $J_2 = 9.0$ Hz, 1H), 8.01 (d, $J = 8.4$ Hz, 2H), 7.69 (d, $J = 7.5$ Hz, 2H), 7.41 (t, $J = 9.0$ Hz, 1H), 7.26 (s, 1H), 7.10 (d, $J = 9.0$ Hz, 1H), 6.77 (m, 2H), 4.08 (t, $J = 6.3$ Hz, 2H), 1.46 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3267, 3084, 2980, 2920, 2877, 2534, 2412, 1893, 1787, 1689, 1611, 1575, 1496, 1436, 1394, 1340, 1249, 1160, 1118, 1042, 984, 900, 823, 747, 702, 639, 588, 520.

3PF(2)PSN: ~~Pale~~ Yellow crystals, yield 85%; m.p. 155.2°C . ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.84 (s, 1H), 8.28 (d, $J = 2.4$ Hz, 1H), 8.15 (dd, $J_1 = 2.4$ Hz, $J_2 = 8.7$ Hz, 1H), 8.01 (d, $J = 8.4$ Hz, 2H), 7.69 (d, $J = 7.2$ Hz, 2H), 7.41 (t, $J = 9.0$ Hz, 1H), 7.26 (s, 1H), 7.10 (d, $J = 9.0$ Hz, 1H), 6.78 (m, 2H), 3.97 (t, $J = 6.6$ Hz, 2H), 1.85 (m, 2H), 1.07 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3079, 2939, 2877, 1623, 1577, 1489, 1443, 1395, 1339, 1271, 1215, 1155, 1104, 986, 948, 872, 824, 742, 650, 574, 512.

4PF(2)PSN: ~~Pale~~ Yellow crystals, yield 41%; m.p. 130.0°C . ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.84 (s, 1H), 8.28 (d, $J = 2.4$ Hz, 1H), 8.15 (dd, $J_1 = 2.4$ Hz, $J_2 = 8.7$ Hz, 1H), 8.01 (d, $J = 8.4$ Hz,

2H), 7.69 (d, J = 6.9 Hz, 2H), 7.41 (t, J = 8.7 Hz, 1H), 7.26 (s, 1H), 7.10 (d, J = 9.0 Hz, 1H), 6.77 (m, 2H), 4.01 (t, J = 6.3 Hz, 2H), 1.81 (m, 2H), 1.53 (m, 2H), 1.00 (t, J = 7.2 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3329, 3077, 2963, 2875, 1621, 1585, 1495, 1395, 1343, 1281, 1227, 1161, 1108, 1046, 975, 892, 824, 740, 620, 516.

5PF(2)PSN: **Pale Yellow** crystals, yield 72%; m.p. 131.7°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.84 (s, 1H), 8.28 (d, J = 2.4 Hz, 1H), 8.16 (m, 1H), 8.01 (d, J = 8.4 Hz, 2H), 7.69 (d, J = 6.9 Hz, 2H), 7.41 (t, J = 9.0 Hz, 1H), 7.26 (s, 1H), 7.11 (d, J = 9.0 Hz, 1H), 6.77 (m, 2H), 4.00 (t, J = 6.6 Hz, 2H), 1.83 (m, 2H), 1.44 (m, 4H), 0.95 (t, J = 6.6 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3277, 3083, 2943, 2875, 1623, 1587, 1507, 1445, 1393, 1333, 1275, 1223, 1161, 1114, 1030, 958, 880, 822, 738, 638, 582, 518.

6PF(2)PSN: **Pale Yellow** crystals, yield 72%; m.p. 125.9°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.85 (s, 1H), 8.28 (d, J = 3.0 Hz, 1H), 8.16 (m, 1H), 8.01 (d, J = 8.4 Hz, 2H), 7.69 (d, J = 7.2 Hz, 2H), 7.41 (t, J = 8.7 Hz, 1H), 7.26 (s, 1H), 7.11 (d, J = 8.7 Hz, 1H), 6.78 (m, 2H), 4.00 (t, J = 6.6 Hz, 2H), 1.82 (m, 2H), 1.25 (m, 6H), 0.92 (t, J = 6.6 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3287, 3083, 2921, 2857, 1625, 1593, 1505, 1447, 1395, 1337, 1279, 1215, 1163, 1114, 1040, 996, 956, 876, 818, 742, 716, 632, 584, 520.

7PF(2)PSN: **Pale Yellow** crystals, yield 65%; m.p. 106.3°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.80 (s, 1H), 8.28 (d, J = 2.4 Hz, 1H), 8.17 (m, 1H), 7.76 (m, 2H), 7.58 (m, 3H), 7.26 (s, 1H), 7.12 (d, J = 6.0 Hz, 1H), 7.01 (d, J = 8.7 Hz, 2H), 4.02 (t, J = 6.6 Hz, 2H), 1.82 (m, 2H), 1.34 (m, 8H), 0.89 (d, J = 6.9 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3231, 3085, 2913, 2849, 1625, 1577, 1501, 1441, 1385, 1337, 1285, 1211, 1155, 1118, 1040, 952, 902, 872, 816, 746, 706, 630, 584, 520.

8PF(2)PSN: **Pale Yellow** crystals, yield 85%; m.p. 78.3°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.85 (s, 1H), 8.28 (d, J = 2.7 Hz, 1H), 8.16 (m, 1H), 8.01 (d, J = 8.4 Hz, 2H), 7.69 (d, J = 6.9 Hz, 2H), 7.41 (t, J = 8.7 Hz, 1H), 7.26 (s, 1H), 7.11 (d, J = 9.0 Hz, 1H), 6.77 (m, 2H), 4.00 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 1.32 (m, 10H), 0.89 (d, J = 6.9 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3247, 3085, 2915, 2855, 1621, 1579, 1495, 1391, 1339, 1275, 1213, 1151, 1042, 870, 816, 744, 693, 580, 518.

10PF(2)PSN: **Pale Yellow** crystals, yield 60%; m.p. 94.4°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.84 (s, 1H), 8.28 (d, J = 2.4 Hz, 1H), 8.16 (m, 1H), 8.01 (d, J = 8.1 Hz, 2H), 7.69 (d, J = 7.2 Hz, 2H), 7.41 (t, J = 9.0 Hz, 1H), 7.26 (s, 1H), 7.10 (m, 1H), 6.77 (m, 2H), 4.00 (t, J = 6.6 Hz, 2H), 1.80 (m, 2H), 1.29 (m, 14H), 0.88 (d, J = 6.6 Hz, 3H). IR (KBr, pellet, cm^{-1}): 3231, 3083, 2921,

2853, 1623, 1577, 1487, 1387, 1335, 1271, 1213, 1155, 1114, 1038, 996, 958, 876, 816, 738, 666, 628, 582, 518. MS (MALDI-TOF) m/z calculated for $C_{29}H_{33}FN_2O_4$ (M^+): 492.58, Found: 492.13.

Spectroscopic data for benzoxazole compounds (nPF(2)PBx):

2PF(2)PBH: White crystals, yield 58%; m.p. 164.7 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.30 (d, $J = 8.4$ Hz, 2H), 7.82-7.77 (m, 1H), 7.70-7.68 (m, 2H), 7.59 (m, 1H), 7.38 (m, 3H), 6.81-6.70 (m, 2H), 4.07 (d, $J = 6.9$ Hz, 2H), 1.45 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3048, 2983, 2935, 2875, 1607, 1550, 1521, 1484, 1445, 1394, 1343, 1300, 1252, 1178, 1113, 1047, 1000, 926, 877, 846, 815, 739, 653, 625, 585, 556, 522. EI-MS m/z (rel. int.): 333.24 (M^+ , 100), 305.21 (97), 276.19 (16), 157.10 (7).

3PF(2)PBH: White crystals, yield 74%; m.p. 124.1 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.31 (d, $J = 8.7$ Hz, 2H), 7.79 (m, 1H), 7.69 (m, 2H), 7.60-7.57 (m, 1H), 7.42-7.35 (m, 3H), 6.77 (m, 2H), 3.97 (t, $J = 6.6$ Hz, 2H), 1.85 (m, 2H), 1.07 (t, $J = 7.5$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3079, 2967, 2931, 2875, 1613, 1483, 1457, 1399, 1285, 1233, 1165, 1118, 1054, 988, 860, 810, 740, 628, 582, 522. EI-MS m/z (rel. int.): 347.27 (M^+ , 57), 305.22 (100), 276.20 (10), 157.11 (4), 92.07 (2). **EA: Elemental analysis:** Calc. for $C_{22}H_{18}FNO_2$: C 76.07, H 5.22, N 4.03; Found: C 76.45, H 5.01, N 4.09.

4PF(2)PBH: White crystals, yield 75%; m.p. 106.8 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.30 (d, $J = 6.9$ Hz, 2H), 7.82-7.76 (m, 1H), 7.69 (m, 2H), 7.60 (m, 1H), 7.38-7.33 (m, 3H), 6.76 (m, 2H), 4.00 (t, $J = 6.3$ Hz, 2H), 1.80 (m, 2H), 1.51 (m, 2H), 1.00 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3067, 2957, 2869, 1611, 1481, 1453, 1397, 1287, 1235, 1116, 1026, 994, 964, 928, 834, 800, 746, 632, 582, 524. EI-MS m/z (rel. int.): 361.28 (M^+ , 34), 305.21 (100), 276.20 (10), 157.11 (4). **EA: Elemental analysis:** Calc. for $C_{23}H_{20}FNO_2$: C 76.44, H 5.58, N 3.87; Found: C 77.03, H 5.25, N 4.01.

5PF(2)PBH: White crystals, yield 76%; m.p. 106.1 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.30 (d, $J = 8.4$ Hz, 2H), 7.78 (m, 1H), 7.69 (m, 2H), 7.60 (m, 1H), 7.38 (m, 3H), 6.76 (m, 2H), 4.01 (t, $J = 6.3$ Hz, 2H), 1.84 (m, 2H), 1.48 (m, 4H), 1.03 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3061, 2937, 2863, 1611, 1575, 1469, 1401, 1291, 1231, 1165, 1112, 1066, 1014, 962, 842, 744, 628, 582, 520. EI-MS m/z (rel. int.): 375.30 (M^+ , 28), 305.21 (100), 276.19 (9), 157.10 (3). **EA: Elemental analysis:** Calc. for $C_{24}H_{22}FNO_2$: C 76.78, H 5.91, N 3.73; Found: C 77.28, H 5.57, N 3.79.

6PF(2)PBH: White crystals, yield 80%; m.p. 123.2°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.30 (d, J = 8.7 Hz, 2H), 7.79 (m, 1H), 7.69 (m, 2H), 7.59 (m, 1H), 7.37 (m, 3H), 6.76 (m, 2H), 3.99 (t, J = 6.9 Hz, 2H), 1.81 (m, 2H), 1.42 (m, 6H), 0.92 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3045, 2947, 2861, 1609, 1573, 1483, 1459, 1401, 1313, 1231, 1165, 1114, 1056, 1022, 958, 836, 742, 628, 582, 526. EI-MS m/z (rel. int.): 389.29 (M⁺, 29), 305.19 (100), 276.19 (12), 157.10 (4). **EA: ~~Elemental analysis~~:** Calc. for C₂₅H₂₄FNO₂: C 77.10, H 6.21, N 3.60; Found: C 77.20, H 5.90, N 3.61.

7PF(2)PBH: White crystals, yield 91%; m.p. 119.5°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.30 (d, J = 8.4 Hz, 2H), 7.79 (m, 1H), 7.69 (m, 2H), 7.59 (m, 1H), 7.39 (m, 3H), 6.76 (m, 2H), 3.99 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 1.38 (m, 8H), 0.91 (t, J = 6.3 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3055, 2931, 2859, 1613, 1573, 1485, 1453, 1401, 1323, 1231, 1171, 1110, 1022, 958, 830, 742, 626, 584, 528. EI-MS m/z (rel. int.): 403.29 (M⁺, 41), 305.18 (100), 276.17 (9), 157.07 (3). **EA: ~~Elemental analysis~~:** Calc. for C₂₆H₂₆FNO₂: C 77.39, H 6.49, N 3.47; Found: C 77.45, H 6.53, N 3.52.

8PF(2)PBH: White crystals, yield 83%; m.p. 116.7°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.31 (d, J = 8.7 Hz, 2H), 7.79 (m, 1H), 7.69 (m, 2H), 7.60 (m, 1H), 7.38 (m, 3H), 6.77 (m, 2H), 3.99 (t, J = 6.6 Hz, 2H), 1.81 (m, 2H), 1.39 (m, 10H), 0.90 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3051, 2931, 2859, 1613, 1573, 1483, 1457, 1401, 1323, 1231, 1169, 1114, 1026, 956, 834, 742, 628, 582, 524. EI-MS m/z (rel. int.): 417.36 (M⁺, 33), 305.20 (100), 276.19 (7), 157.10 (2). **EA: ~~Elemental analysis~~:** Calc. for C₂₇H₂₈FNO₂: C 77.67, H 6.76, N 3.35; Found: C 77.80, H 6.75, N 3.37.

2PF(2)PBM: White crystals, yield 81%; m.p. 140.0°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.26 (d, J = 8.4 Hz, 2H), 7.65 (m, 2H), 7.55 (s, 1H), 7.40 (m, 2H), 7.16 (m, 1H), 6.73 (m, 2H), 4.03 (m, 2H), 2.47 (s, 3H), 1.42 (t, J = 6.9 Hz, 3H). IR (KBr, pellet, cm⁻¹): 3074, 3031, 2980, 2932, 2887, 2057, 1941, 1600, 1555, 1478, 1396, 1340, 1302, 1254, 1174, 1118, 1047, 945, 880, 806, 727, 639, 582, 537. EI-MS m/z (rel. int.): 347.27 (M⁺, 100), 319.23 (52), 290.22 (14), 213.14 (10), 78.08 (7). **EA: ~~Elemental analysis~~:** Calc. for C₂₂H₁₈FNO₂: C 76.06, H 5.22, N 4.03; Found: C 76.37, H 5.32, N 4.15.

3PF(2)PBM: White crystals, yield 86%; m.p. 113.6°C. ¹H-NMR (300 MHz, CDCl₃, TMS): 8.28 (d, J = 8.4 Hz, 2H), 7.68 (d, J = 7.2 Hz, 2H), 7.56 (s, 1H), 7.43 (m, 2H), 7.17 (d, J = 7.8 Hz, 1H), 6.76 (m, 2H), 3.96 (t, J = 6.6 Hz, 2H), 2.49 (s, 3H), 1.84 (m, 2H), 1.06 (t, J = 7.2 Hz, 3H). IR (KBr,

pellet, cm^{-1}): 3069, 3017, 2965, 2871, 1729, 1693, 1619, 1575, 1487, 1465, 1399, 1261, 1233, 1197, 1157, 1102, 1054, 1030, 998, 958, 828, 802, 752, 704, 628, 582, 518. EI-MS m/z (rel. int.): 361.29 (M^+ , 49), 319.23 (100), 290.22 (11), 213.15 (11), 78.08 (7). ~~EA: Elemental analysis:~~ Calc. for $\text{C}_{23}\text{H}_{20}\text{FNO}_2$: C 76.44, H 5.58, N 3.87; Found: C 76.90, H 5.31, N 3.90.

4PF(2)PBM: White crystals, yield 86%; m.p. 115.2°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.28 (d, $J = 8.4$ Hz, 2H), 7.67 (d, $J = 7.2$ Hz, 2H), 7.56 (s, 1H), 7.42 (m, 2H), 7.16 (d, $J = 8.1$ Hz, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.3$ Hz, 2H), 2.49 (s, 3H), 1.80 (m, 2H), 1.51 (m, 2H), 0.99 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3057, 2959, 2869, 1735, 1693, 1615, 1573, 1477, 1405, 1327, 1285, 1225, 1163, 1112, 1030, 998, 966, 838, 802, 748, 706, 632, 582, 520. EI-MS m/z (rel. int.): 375.29 (M^+ , 35), 319.23 (100), 290.21 (10), 213.14 (9), 78.08 (5). ~~EA: Elemental analysis:~~ Calc. for $\text{C}_{24}\text{H}_{22}\text{FNO}_2$: C 76.78, H 5.91, N 3.73; Found: C 77.07, H 5.58, N 3.77.

5PF(2)PBM: White crystals, yield 83%; m.p. 118.0°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.28 (d, $J = 8.4$ Hz, 2H), 7.67 (d, $J = 7.2$ Hz, 2H), 7.56 (s, 1H), 7.43 (m, 2H), 7.16 (d, $J = 8.1$ Hz, 1H), 6.76 (m, 2H), 3.99 (t, $J = 6.3$ Hz, 2H), 2.49 (s, 3H), 1.81 (m, 2H), 1.44 (m, 4H), 0.95 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3065, 3019, 2931, 2865, 1731, 1695, 1617, 1573, 1483, 1461, 1403, 1323, 1285, 1225, 1161, 1112, 1056, 1028, 998, 958, 930, 834, 802, 742, 702, 632, 578, 520. EI-MS m/z (rel. int.): 389.31 (M^+ , 33), 319.23 (100), 290.21 (10), 213.14 (7), 78.08 (5). ~~EA: Elemental analysis:~~ Calc. for $\text{C}_{25}\text{H}_{24}\text{FNO}_2$: C 77.10, H 6.21, N 3.60; Found: C 77.44, H 5.96, N 3.65.

6PF(2)PBM: White crystals, yield 83%; m.p. 102.3°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.28 (d, $J = 8.7$ Hz, 2H), 7.68 (m, 2H), 7.56 (s, 1H), 7.43 (m, 2H), 7.17 (d, $J = 6.9$ Hz, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 2.50 (s, 3H), 1.81 (m, 2H), 1.42 (m, 6H), 0.92 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3093, 2943, 2865, 1757, 1685, 1611, 1573, 1485, 1403, 1317, 1259, 1229, 1167, 1118, 1060, 1030, 958, 838, 798, 750, 706, 632, 590, 526. EI-MS m/z (rel. int.): 403.31 (M^+ , 40), 319.21 (100), 290.20 (8), 213.13 (7), 78.07 (6). ~~EA: Elemental analysis:~~ Calc. for $\text{C}_{26}\text{H}_{18}\text{FNO}_2$: C 77.39, H 6.49, N 3.47; Found: C 77.43, H 6.70, N 3.50.

7PF(2)PBM: White crystals, yield 81%; m.p. 97.4°C. ^1H -NMR (300 MHz, CDCl_3 , TMS): 8.28 (d, $J = 8.4$ Hz, 2H), 7.68 (m, 2H), 7.56 (s, 1H), 7.43 (m, 2H), 7.17 (d, $J = 8.4$ Hz, 1H), 6.76 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 2.50 (s, 3H), 1.81 (m, 2H), 1.44 (m, 8H), 0.91 (t, $J = 6.6$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3089, 3035, 2927, 2855, 1761, 1725, 1689, 1613, 1571, 1483, 1397, 1319, 1261,

1227, 1169, 1114, 1026, 960, 830, 798, 746, 710, 630, 584, 526. EI-MS m/z (rel. int.): 417.30 (M^+ , 46), 319.19 (100), 290.18 (9), 213.11 (6), 78.05 (4). ~~EA: Elemental analysis:~~ Calc. for $C_{27}H_{28}FNO_2$: C 77.67, H 6.76, N 3.35; Found: C 77.76, H 6.75, N 3.37.

8PF(2)PBM: White crystals, yield 82%; m.p. 95.8°C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.28 (d, $J = 8.7$ Hz, 2H), 7.68 (m, 2H), 7.56 (s, 1H), 7.43 (m, 2H), 7.16 (m, 1H), 6.76 (m, 2H), 3.99 (t, $J = 6.6$ Hz, 2H), 2.49 (s, 3H), 1.81 (m, 2H), 1.39 (m, 10H), 0.90 (t, $J = 6.3$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3089, 3033, 2929, 2859, 1733, 1611, 1571, 1477, 1401, 1323, 1235, 1173, 1116, 1026, 958, 830, 750, 706, 634, 588, 524. EI-MS m/z (rel. int.): 431.36 (M^+ , 15), 319.22 (27), 290.21 (6), 213.15 (5), 78.08 (4). ~~EA: Elemental analysis:~~ Calc. for $C_{28}H_{30}FNO_2$: C 77.93, H 7.01, N 3.25; Found: C 78.15, H 7.07, N 3.30.

2PF(2)PBN: Pale yellow crystals, yield 54%; m.p. 198.6°C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.66 (d, $J = 2.1$ Hz, 1H), 8.33 (m, 3H), 7.71 (t, $J = 9.0$ Hz, 3H), 7.42 (t, $J = 9.0$ Hz, 1H), 6.78 (m, 2H), 4.09 (q, $J = 6.9$ Hz, 2H), 1.16 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3091, 2980, 2929, 2878, 1895, 1765, 1603, 1523, 1475, 1333, 1248, 1183, 1121, 1047, 936, 882, 814, 741, 693, 645, 590, 531. EI-MS m/z (rel. int.): 378.25 (M^+ , 71), 350.22 (100), 304.21 (36), 91.05 (37). ~~EA: Elemental analysis:~~ Calc. for $C_{21}H_{15}FN_2O_4$: C 66.66, H 4.00, N 7.40; Found: C 66.94, H 3.99, N 7.43.

3PF(2)PBN: Pale yellow crystals, yield 82%; m.p. 132.5°C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.67 (d, $J = 2.1$ Hz, 1H), 8.33 (m, 3H), 7.72 (m, 3H), 7.42 (t, $J = 9.0$ Hz, 1H), 6.78 (m, 2H), 3.97 (t, $J = 6.6$ Hz, 2H), 1.85 (m, 2H), 1.07 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3099, 2971, 2937, 2877, 1611, 1569, 1527, 1481, 1335, 1277, 1229, 1155, 1110, 1066, 994, 942, 896, 858, 812, 738, 632, 582, 522. EI-MS m/z (rel. int.): 392.26 (M^+ , 34), 350.21 (100), 304.20 (23), 91.05 (21). ~~EA: Elemental analysis:~~ Calc. for $C_{22}H_{17}FN_2O_4$: C 67.34, H 4.37, N 7.14; Found: C 67.74, H 4.20, N 7.24.

4PF(2)PBN: Pale yellow crystals, yield 84%; m.p. 111.3°C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.65 (d, $J = 2.1$ Hz, 1H), 8.32 (m, 3H), 7.70 (t, $J = 8.4$ Hz, 3H), 7.41 (t, $J = 8.7$ Hz, 1H), 6.77 (m, 2H), 4.01 (t, $J = 6.3$ Hz, 2H), 1.81 (m, 2H), 1.53 (m, 2H), 1.00 (t, $J = 7.5$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3093, 2931, 2873, 1617, 1571, 1525, 1483, 1331, 1257, 1231, 1161, 1106, 1058, 1022, 984, 948, 900, 818, 734, 696, 637, 676, 508. EI-MS m/z (rel. int.): 406.28 (M^+ , 34), 350.20 (100),

304.20 (19), 91.06 (15). ~~EA: Elemental analysis~~: Calc. for $C_{23}H_{19}FN_2O_4$: C 67.97, H 4.71, N 6.89; Found: C 68.23, H 6.454, N 6.96.

5PF(2)PBN: Pale yellow crystals, yield 75%; m.p. 116.1 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.66 (d, $J = 2.1$ Hz, 1H), 8.33 (m, 3H), 7.72 (m, 3H), 7.42 (s, 1H), 6.78 (m, 2H), 4.00 (t, $J = 6.3$ Hz, 2H), 1.81 (m, 2H), 1.44 (m, 4H), 0.95 (t, $J = 7.2$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3099, 2943, 2873, 1617, 1523, 1489, 1401, 1339, 1281, 1259, 1229, 1167, 1124, 1026, 966, 872, 818, 742, 698, 636, 572, 520. EI-MS m/z (rel. int.): 420.28 (M^+ , 31), 350.19 (100), 304.18 (17), 91.05 (12). ~~EA: Elemental analysis~~: Calc. for $C_{24}H_{21}FN_2O_4$: C 68.56, H 5.03, N 6.66; Found: C 69.00, H 4.81, N 6.71.

6PF(2)PBN: Pale yellow crystals, yield 88%; m.p. 102.2 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.66 (d, $J = 2.1$ Hz, 1H), 8.33 (m, 3H), 7.72 (m, 3H), 7.42 (t, $J = 8.1$ Hz, 1H), 6.78 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 1.82 (m, 2H), 1.41 (m, 6H), 0.92 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3101, 2937, 2859, 1611, 1513, 1475, 1339, 1281, 1229, 1167, 1120, 1036, 954, 900, 816, 732, 634, 580, 524. EI-MS m/z (rel. int.): 434.28 (M^+ , 26), 350.18 (100), 304.18 (17), 91.04 (10). ~~EA: Elemental analysis~~: Calc. for $C_{24}H_{21}FN_2O_4$: C 69.11, H 5.34, N 6.45; Found: C 69.29, H 5.41, N 6.38.

7PF(2)PBN: Pale yellow crystals, yield 70%; m.p. 100.1 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.66 (d, $J = 2.1$ Hz, 1H), 8.32 (m, 3H), 7.71 (t, $J = 7.8$ Hz, 3H), 7.42 (t, $J = 8.7$ Hz, 1H), 6.78 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 1.82 (m, 2H), 1.42 (m, 8H), 0.90 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3095, 2931, 2859, 1625, 1527, 1479, 1337, 1281, 1175, 1127, 1030, 810, 732, 632, 578, 520. EI-MS m/z (rel. int.): 448.28 (M^+ , 20), 350.15 (100), 304.15 (13), 91.04 (8). ~~EA: Elemental analysis~~: Calc. for $C_{26}H_{25}FN_2O_4$: C 69.63, H 5.62, N 6.24; Found: C 69.72, H 5.66, N 6.23.

8PF(2)PBN: Pale yellow crystals, yield 90%; m.p. 100.1 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.67 (d, $J = 2.1$ Hz, 1H), 8.33 (m, 3H), 7.72 (m, 3H), 7.42 (t, $J = 9.0$ Hz, 1H), 6.78 (m, 2H), 4.00 (t, $J = 6.6$ Hz, 2H), 1.82 (m, 2H), 1.37 (m, 10H), 0.90 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet, cm^{-1}): 3111, 2927, 2859, 1617, 1515, 1401, 1345, 1291, 1245, 1165, 1125, 1036, 832, 738, 632, 584, 512. EI-MS m/z (rel. int.): 462.34 (M^+ , 14), 350.19 (100), 304.20 (13), 91.08 (10). ~~EA: Elemental analysis~~: Calc. for $C_{27}H_{27}FN_2O_4$: C 70.12, H 5.88, N 6.06; Found: C 70.02, H 5.88, N 6.07.

10PF(2)PBN: Pale yellow crystals, yield 84%; m.p. 99.8 °C. 1H -NMR (300 MHz, $CDCl_3$, TMS): 8.64 (d, $J = 2.1$ Hz, 1H), 8.30 (m, 3H), 7.69 (t, $J = 9.0$ Hz, 3H), 7.40 (t, $J = 9.0$ Hz, 1H), 6.76 (m, 2H), 3.99 (t, $J = 6.6$ Hz, 2H), 1.81 (m, 2H), 1.41 (m, 14H), 0.89 (t, $J = 6.9$ Hz, 3H). IR (KBr, pellet,

cm⁻¹): 3101, 2915, 2853, 1621, 1533, 1477, 1335, 1287, 1225, 1155, 1116, 1036, 952, 884, 818, 732, 634, 576, 512. MS (MALDI-TOF) m/z calculated for C₂₉H₃₁FN₂O₄ (M⁺): 490.57, Found: 490.37. ~~EA: Elemental analysis:~~ Calc. for C₂₉H₃₁FN₂O₄: C 71.00, H 6.37, N 5.71; Found: C 71.06, H 6.39, N 5.71.