

Supporting Information

Synthesis and mesomorphic properties of laterally fluorinated alkyl 4''-alkylterphenyl-4-yl carbonate liquid crystals

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Experimental

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Used methods of synthesis, yields and properties of intermediates and products are described below. In table 5 and 6 there are listed phase transition for 4''-alkyl-4-hydroxyterphenyls and 4''-alkyl-4-alkoxyterphenyls. Synthetic procedures are described in main paper. Here is given used quantities. ¹HNMR, ¹³CNMR and HRMS spectroscopic studies are given to representatives of the series in order to confirm the structure of obtained compounds.

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Table 5 Phase transition for 4''-alkyl-4-hydroxyterphenyls.

No.	Core	n	Phase transition [°C]
69	I.1	3	Cr 265-7 Iso
86	I.2	3	Cr 215-6 SmA 235 Iso
87	I.2	5	Cr 210-211 Iso
76	I.3	3	Cr 164-165 N 174,5 Iso
77	I.3	5	Cr 156-157 N 164 Iso
24	I.4	2	Cr 179-180 Iso
25	I.4	3	Cr 177-178 N 184,5 Iso
26	I.4	5	Cr 168-169 N 176,5 Iso
79	I.5	5	Cr 168-169 Iso
82	I.6	3	Cr 166-167 N 168 Iso
83	I.6	5	Cr 162-163 Iso
46	I.7	3	Cr 186-187 Iso
47	I.7	5	Cr 185-186 Iso
27	I.8	3	Cr 186-187 (N 185) Iso
28	I.8	5	Cr 187-188 (SmA 186) Iso
95	I.10	3	Cr 150-151 (N 137) Iso
96	I.10	5	Cr 149-150 Iso
29	I.11	3	Cr 163-164 Iso
30	I.11	5	Cr 145-146 Iso
80	I.12	3	Cr 139-140 (N 115) Iso
56	I.13	5	Cr 138-139 (N 125) Iso
84	I.14	3	Cr 127-128 Iso
85	I.14	5	Cr 112-113 (N 103,5) Iso
45	I.15	3	Cr 178-179 Iso

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Table 6 Phase transition for 4''-alkyl-4-alkoxyterphenyls.

No.	Core	n	m	Phase transition [°C]
70	I.2	3	1	Cr 161,1 SmG 185,0 SmA 204,0 N 214,5 Iso
71	I.2	5	1	Cr 166,2 (SmG 165,7) SmA 195,3 N 201,5 Iso
17	I.4	2	2	Cr 116,0 SmA 150 N 194 Iso
18	I.4	3	2	Cr 139,0 N 203,2 Iso
19	I.4	5	2	Cr 123,0 N 197 Iso
72	I.6	3	2	Cr 139,1 N 195,8
73	I.6	5	2	Cr 103,3 SmC 132,9 N 185,2 Iso
43	I.7	3	1	Cr 86,5 N 175,7 Iso
44	I.7	5	1	Cr 83,3 N 159,6 Iso
20	I.8	3	2	Cr 151,7 N 201,1 Iso
21	I.8	5	2	Cr 122 SmC 148 N 196 Iso
93	I.10	3	1	Cr 78 N 148 Iso
94	I.10	5	1	Cr 62,2 N 139 Iso
22	I.11	3	1	Cr 83,8 N 141,8 Iso
23	I.11	5	1	Cr 47 N 134,8 Iso
54	I.13	5	2	Cr 55 N 167 Iso
42	I.15	3	1	Cr 70,5 N 128,5 Iso

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1-Ethyl-3-fluorobenzene (3). Quantities: compound (1) (219 g, 1.25 mol), magnesium (30.8 g, 1.267 mol), acetaldehyde (56 g, 1.28). The experimental procedure was as described for preparation of compound (4). Yield 78 g (50%); b.p. 138-140 °C at 1 atm; lit. 135-137°C / 740 mmHg [1]; MS(EI): m/z 124 (M+), 109, 96, 83, 51, 27.

1-Fluoro-3-pentylbenzene (5). Quantities: compound (1) (87.5 g, 0.5 mol), magnesium (12.5 g, 0.51 mol), pentanal (47.3 g, 0.55). The experimental procedure was as described for preparation of compound (4). Yield 27.3 g (33%); b.p. 101-104 °C at 20 mbar; MS(EI): m/z 166 (M+), 110, 123, 83, 57, 41, 29.

1,2-Difluoro-3-propylbenzene (6). Quantities: compound (2) (285 g, 2.0 mol), butyllithium (1560 ml 2.5M, 2.0 mol), propanal (121.8 g, 2.1 mol). The experimental procedure was as described for preparation of compound (4). Yield 257 g (66%); b.p. 114-115 °C at 200 mbar; Lit. 40 - 43°C / 8 mmHg [2]; MS(EI): m/z 156 (M+), 127, 101, 75, 27.

1,2-Difluoro-3-pentylbenzene (7). Quantities: compound (2) (32 g, 0.28 mol), butyllithium (120 ml 2.5M, 0.3 mol), pentanal (25.8 g, 0.3). The experimental procedure was as described for preparation of compound (4). Yield 18.5 g (48%); b.p. 90-92 °C at 20 mbar; Lit. 206 - 208°C / 1 atm [3]; MS(EI): m/z 184 (M+), 128, 101, 57, 41, 29.

4-Ethyl-2-fluoro-1-iodobenzene (8). Quantities: compound (3) (75.0 g, 0.6 mol), sec-butyllithium (507 ml 1.3M, 0.66 mol), iodide (166.0 g, 0.65 mol). The experimental procedure was as described for preparation of compound (9). Yield 115.0 g (77%); b.p. 130-134 °C at 80 mbar; MS(EI): m/z 250 (M+), 235, 127, 109, 103, 77, 51, 27.

2-Fluoro-1-iodo-4-pentylbenzene (10). Quantities: compound (5) (106.0 g, 0.64 mol), sec-butyl lithium (512 ml 1.3M, 0.665 mol), iodide (169.2 g, 0.67 mol). The experimental procedure was as described for preparation of compound (9). Yield 160.0 g (87%); b.p. 138-140 °C at 20 mbar; MS(EI): m/z 292 (M+), 235, 109, 57, 41, 29.

2,3-Difluoro-1-iodo-4-propylbenzene (11). Quantities: compound (6) (160.0 g, 1.0 mol), butyl lithium (656 ml 1.6M, 1.05 mol), iodide (255.0 g, 1.0 mol). The experimental procedure was as described for preparation of compound (9). Yield 260.0 g (91%); b.p. 138-139 °C at 40 mbar; MS(EI): m/z 282 (M+), 253, 126, 127, 75, 27.

2,3-Difluoro-1-iodo-4-pentylbenzene (12). Quantities: compound (7) (25.4 g, 0.125 mol), butyl lithium (55 ml 2.5M, 0.136 mol), iodide (35.0 g, 0.137 mol). The experimental procedure was as described for preparation of compound (9). Yield 28.6 g (74%); b.p. 165-168 °C at 20-30 mbar; MS(EI): m/z 310 (M+), 254, 140, 127, 107, 57, 41, 29.

3'-Fluoro-4-methoxybiphenyl (14). Quantities: (4-methoxyphenyl)boronic acid (13) (27.6 g, 0.182 mol), compound (1) (28.8 g, 0.165 mol), potassium carbonate (50.0 g, 0.362 mol). The experimental procedure was as described for preparation of compound (18). Yield 28.9 g (88%); m.p. 63-64 °C; Lit. 65-67°C [4]; MS(EI): m/z 202 (M+), 187, 159, 133, 107, 63.

(4'-Ethoxybiphenyl-4-yl)boronic acid (16). Quantities: 4-bromo-4'-ethoxybiphenyl (95.6 g, 0.345 mol), magnesium (8.4 g, 0.346 mol), tripropyl borate (65.0 g, 0.346 mol). The experimental procedure was as described for preparation of compound (50). Crystallization from ethanol/water. Yield 74.3 g (89%).

4''-Ethoxy-4-ethyl-2-fluoro-[1,1':4',1'']terphenyl (17). Quantities: compound (16) (26.0 g, 0.107 mol), 4-ethyl-2-fluoro-1-iodobenzene (25.0 g, 0.1 mol), potassium carbonate (27.6 g, 0.3 mol). The experimental procedure was as described for preparation of compound (18). Yield 30.4 g (95%); m.p. 116,0 SmA 150 N 194 Iso; MS(EI): m/z 320 (M+), 292, 277, 248, 183, 139, 29.

4''-Ethoxy-2-fluoro-4-pentyl-[1,1':4',1'']terphenyl (19). Quantities: compound (16) (6.76 g, 0.028 mol), compound (10) (6.8 g, 0.0233 mol), potassium carbonate (9.0 g, 0.066 mol). The experimental procedure was as described for preparation of compound (18). Yield 7.2 g (87%); m.p. 123,0 N 197 Iso; MS(EI): m/z 362 (M+), 334, 277, 133, 57, 55, 41, 28.

4''-Ethoxy-2,3-difluoro-4-propyl-[1,1':4',1'']terphenyl (20). Quantities: compound (16) (27.0 g, 0.11 mol), compound (11) (29.0 g, 0.102 mol), potassium carbonate (45.0 g, 0.32 mol). The experimental procedure was as described for preparation of compound (18). Yield 31.0 g (88%); m.p. 151,7 N 201,1 Iso; MS(EI): m/z 352 (M+), 324, 295, 266, 148, 29.

4''-Ethoxy-2,3-difluoro-4-pentyl-[1,1':4',1'']terphenyl (21). Quantities: compound (12) (12.7 g, 0.041 mol), compound (16) (11.0 g, 0.045 mol), potassium carbonate (18.7 g, 0.135 mol). The experimental procedure was as described for preparation of compound (18). Yield 14.6 g (94%); m.p. 122 SmC 148 N 196 Iso; MS(EI): m/z 380 (M+), 351, 323, 295,

266, 57, 41, 29.

2,2'-Difluoro-4"-methoxy-4-propyl-[1,1':4',1"]terphenyl (22). Quantities: compound (9) (18.0 g, 0.068 mol), compound (15) (20.0 g, 0.08 mol), potassium carbonate (34.0 g, 0.246 mol). The experimental procedure was as described for preparation of compound (18). Yield 19.4 g (85%); m.p. 83,8 N 141,8 Iso; MS(EI): m/z 338 (M+), 324, 295, 266, 148, 29.

2,2'-Difluoro-4"-methoxy-4-pentyl-[1,1':4',1"]terphenyl (23). Quantities: compound (10) (6.0 g, 0.0205 mol), compound (15) (5.5 g, 0.022 mol), potassium carbonate (8.3 g, 0.06 mol). The experimental procedure was as described for preparation of compound (18). Yield 5.4 g (78%); m.p. 47 N 134,8 Iso; MS(EI): m/z 352 (M+), 334, 277, 57, 41, 28.

4"-Ethyl-2"-fluoro-4-hydroxy-[1,1':4',1"]terphenyl (24). Quantities: compound (17) (24.2 g, 0.076 mol), hydriodic acid (0.25 mol). The experimental procedure was as described for preparation of compound (25). Yield 20.2 g (91%); m.p. 179-180 °C; MS(EI): m/z 292 (M+), 277, 248, 183, 139, 29; ¹H NMR (200 MHz, CDCl₃) δ 9.28 (1 H, s, PhOH), 7.65-7.74 (2 H, q, Ph), 7.22-7.42 (5 H, m, Ph), 6.88-6.97 (2 H, m, Ph), 6.62-6.70 (2H, q, Ph), 2.60-2.72 (2H, q, CH₂Ph), 1.16-1.24 (3 H, t, CH₃).

2"-Fluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (26). Quantities: compound (19) (4.5 g, 0.0124 mol), hydriodic acid (0.15 mol). The experimental procedure was as described for preparation of compound (25). Yield 3.4 g (83%); m.p. 168 N 176,5 Iso; MS(EI): m/z 334 (M+), 277, 133, 76, 57, 41, 29; ¹H NMR (200 MHz, CDCl₃) δ 9.30 (1 H, s, PhOH), 7.65-7.72 (2 H, q, Ph), 7.21-7.42 (4 H, q, Ph), 7.06-7.14 (1 H, d, Ph), 6.90-6.96 (2 H, m, Ph), 6.75-6.80 (2H, q, Ph), 2.57-2.66 (2H, t, CH₂Ph), 1.60-1.81 (2 H, m, CH₂), 1.27-1.45 (4 H, m, CH₂), 0.83-0.95 (3 H, m, CH₃).

2",3"-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (27). Quantities: compound (20) (28.0 g, 0.08 mol), hydriodic acid (0.3 mol). The experimental procedure was as described for preparation of compound (25). Yield 22.8 g (89%); m.p. 186-187 (N 185) Iso; MS(EI): m/z 324 (M+), 295, 266, 201, 147, 29.

2",3"-Difluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (28). Quantities: compound (21) (14.5 g, 0.038 mol), hydriodic acid (0.15 mol). The experimental procedure was as described for preparation of compound (25). Yield 10.8 g (83%); m.p. 187-188 (SmA 186) Iso; MS(EI): m/z 352 (M+), 295, 266, 201, 147, 57, 41, 29.

2",3'-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (29). Quantities: compound (22) (15.1 g, 0.045 mol), hydriodic acid (0.2 mol). The experimental procedure was as described for preparation of compound (25). Yield 11.1 g (77%); m.p. 163-164 °C; MS(EI): m/z 324 (M+), 295, 266, 201, 29; ¹H NMR (200 MHz, CDCl₃) δ 9.27 (1 H, s, PhOH), 7.26-7.35 (3 H, m, Ph), 7.00-7.18 (4 H, m, Ph), 6.73-7.6.85 (3 H, m, Ph), 2.54-2.68 (2 H, t, CH₂Ph), 1.53-1.71 (2 H, m, CH₂), 0.90-0.99 (3 H, t, CH₃).

2",3'-Difluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (30). Quantities: compound (23) (5.3 g, 0.015 mol), hydriodic acid (0.1 mol). The experimental procedure was as described for preparation of compound (25). Yield 4.25 g (83%); m.p. 145-146 °C; MS(EI): m/z 352 (M+), 295, 266, 201, 57, 41, 29; ¹H NMR (200 MHz, CDCl₃) δ 9.26 (1 H, s, PhOH), 7.01-7.34 (7 H, m, Ph), 6.63-7.6.81 (3 H, m, Ph), 2.54-2.68 (2 H, t, CH₂Ph), 1.60-1.80 (2 H, m, CH₂), 1.27-1.45 (4 H, m, CH₂), 0.80-0.93 (3 H, m, CH₃).

(2,3-Difluorophenyl)boronic acid (31). Quantities: compound (2) (45.6 g, 0.4 mol), n-butyllithium (168 ml 2.5 M, 0.42 mol), tripropyl borate (79.0 g, 0.42 mol). The experimental procedure was as described for preparation of compound (15). Yield 51.2 g (81%).

(3-Fluorophenyl)boronic acid (32). Quantities: compound (1) (175 g, 1.0 mol), magnesium (24.5 g, 1.01 mol), tripropyl borate (189.0 g, 1.01 mol). The experimental procedure was as described for preparation of compound (50). Yield 127.0 g (91%).

2,2',3-Trifluoro-4'-propylbiphenyl (35). Quantities: compound (9) (42.8 g, 0.162 mol), compound (31) (41.1 g, 0.26 mol), potassium carbonate (67.0 g, 0.48 mol). The experimental procedure was as described for preparation of compound (18). Yield 28.8 g (72%); b.p. 165-168 °C at 20 mbar; MS(EI): m/z 250 (M+), 221, 201, 29.

2,3-Difluoro-4'-propylbiphenyl (36). Quantities: compound (33) (39.8 g, 0.2 mol), compound (31) (39.5 g, 0.25 mol), potassium carbonate (82.8 g, 0.6 mol). The experimental procedure was as described for preparation of compound (18). Yield 38.0 g (82%); b.p. 110-112 °C at 1 mmHg; MS(EI): m/z 232 (M+), 203, 183, 151, 29.

2,3-Difluoro-4'-pentylbiphenyl (37). Quantities: compound (34) (114.0 g, 0.502 mol), compound (31) (95.2 g, 0.6 mol), potassium carbonate (200.0 g, 1.48 mol). The experimental procedure was as described for preparation of compound (18). Yield 65.3 g (50%); b.p. 133 °C at 1 mmHg; MS(EI): m/z 260 (M+), 203, 183, 151, 57, 41, 29.

2,2',3-Trifluoro-4-iodo-4'-propylbiphenyl (38). Quantities: compound (35) (24.5 g, 0.098 mol), sec-butyllithium (77 ml 1.3M, 0.1 mol), iodide (25.4 g, 0.1 mol). The experimental procedure was as described for preparation of compound (9). Yield 27.1 g (74%); b.p. 140-142 °C at 1 mmHg; MS(EI): m/z 376 (M+), 347, 219, 202, 127, 29.

2,3-Difluoro-4-iodo-4'-propylbiphenyl (39). Quantities: compound (36) (38.0 g, 0.163 mol), n-butyllithium (68 ml 2.5M, 0.17 mol), iodide (43.2 g, 0.17 mol). The experimental procedure was as described for preparation of compound (9). Yield 47.2 g (81%); b.p. 149-152 °C at 1 mmHg; MS(EI): m/z 358 (M+), 329, 231, 127, 29.

2,3-Difluoro-4-iodo-4'-pentylbiphenyl (40). Quantities: compound (37) (63.2 g, 0.243 mol), n-butyllithium (100 ml 2.5M, 0.25 mol), iodide (61.5 g, 0.256 mol). The experimental procedure was as described for preparation of compound (9). Yield 71.0 g (78%); b.p. 169-172 °C at 1 mmHg; MS(EI): m/z 386 (M+), 329, 259, 201, 127, 57, 41, 29.

2,2',3'-Trifluoro-4"-methoxy-4-propyl-[1,1':4',1"]terphenyl (42). Quantities: compound (38) (26.0 g, 0.07 mol), compound (41) (11.7 g, 0.077 mol), potassium carbonate (29.0 g, 0.21 mol). The experimental procedure was as described for preparation of compound (18). Yield 19.4 g (78%); m.p. N 129,2 Iso °; MS(EI): m/z 356 (M+), 327, 284, 164, 142.

2',3'-Difluoro-4-methoxy-4"-propyl-[1,1':4',1"]terphenyl (43). Quantities: compound (39) (15.0 g, 0.042 mol), compound (41) (7.9 g, 0.05 mol), potassium carbonate (20.0 g, 0.15 mol). The experimental procedure was as described for preparation of compound (18). Yield 12.0 g (85%); MS(EI): m/z 338 (M+), 309, 266, 201, 29.

2',3'-Difluoro-4-methoxy-4"-pentyl-[1,1':4',1"]terphenyl (44). Quantities: compound (40) (31.6 g, 0.082 mol), compound (41) (15.0 g, 0.098 mol), potassium carbonate (22.0 g, 0.164 mol). The experimental procedure was as described for preparation of compound (18). Yield 27.0 g (90%); m.p. 93 N 166 °C; MS(EI): m/z 366 (M+), 309, 266, 201, 57, 41, 29.

2',2'',3'-Trifluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (45). Quantities: compound (42) (14.5 g, 0.038 mol), hydriodic acid (0.15 mol). The experimental procedure was as described for preparation of compound (25). Yield 10.8 g (83%); m.p. 178 °C; MS(EI): m/z 352 (M+), 313, 284, 29; ¹H NMR (200MHz, CDCl₃) δ 9.36 (1 H, s, PhOH), 7.28-7.34 (1 H, d, Ph), 7.08-7.18 (2 H, m, Ph) 6.84-6.93 (2 H, m, Ph), 6.64-7.6.74 (2 H, q, PhF), 6.44-6.51 (2 H, m, Ph), 2.56-2.65 (2 H, t, CH₂Ph), 1.55-1.74 (2 H, m, CH₂), 0.90-0.98 (3 H, t, CH₃).

2',3'-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (46). Quantities: compound (43) (10.5 g, 0.031 mol), hydriodic acid (0.10 mol). The experimental procedure was as described for preparation of compound (25). Yield 8.6 g (86%); m.p. 186-187 °C; MS(EI): m/z 324 (M+), 295, 266, 29; ¹H NMR (200MHz, CDCl₃) δ 9.45 (1 H, s, PhOH), 7.03-7.27 (4 H, m, Ph), 6.86-6.93 (2 H, m, Ph), 6.62-6.77 (2 H, m, PhF), 6.44-6.50 (2 H, q, PhO), 2.53-2.62 (2 H, m, CH₂Ph), 1.62-1.71 (2 H, m, CH₂), 0.90-0.98 (3 H, t, CH₃).

2',3'-Difluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (47). Quantities: compound (44) (25.5 g, 0.07 mol), hydriodic acid (0.15 mol). The experimental procedure was as described for preparation of compound (25). Yield 19.8 g (81%); m.p. 185-186 °C; MS(EI): m/z 352 (M+), 295, 266, 57, 41, 29; ¹H NMR (200MHz, CDCl₃) δ 9.43 (1 H, s, PhOH), 7.03-7.25 (4 H, m, Ph), 6.70-6.92 (4 H, m, Ph), 6.43-6.49 (2 H, q, Ph), 2.53-2.69 (2 H, m, CH₂Ph), 1.64-1.83 (2 H, m, CH₂), 1.24-1.42 (4 H, m, CH₂) 0.90-0.98 (3 H, m, CH₃).

(2-Fluoro-4-propylphenyl)boronic acid (48). Quantities: compound (4) (12.0 g, 0.085 mol), sec-butyl-lithium (68 ml of 1.3M, 0.09 mol), tripropyl borate (16.7 g, 0.09 mol). The experimental procedure was as described for preparation of compound (15). Yield 13.2 g (88%).

(2-Fluoro-4-pentylphenyl)boronic acid (49). Quantities: compound (5) (23.2 g, 0.14 mol), sec-butyl-lithium (110 ml, 0.143 mol), tripropyl borate (26.3 g, 0.14 mol). The experimental procedure was as described for preparation of compound (15). Yield 24.0 g (83%).

4'-Chloro-4-ethoxy-2-fluorobiphenyl (52). Quantities: compound (50) (19.0 g, 0.12 mol), 1-bromo-4-ethoxy-2-fluorobenzene (51) (21.9 g, 0.1 mol), potassium carbonate (41.0 g, 0.3 mol). The experimental procedure was as described

for preparation of compound (18). Yield 20.0 g (80%); MS(EI): m/z 250 (M⁺), 222, 193, 157, 133, 29.

4-Ethoxy-2,2''-difluoro-4''-propyl-[1,1':4',1'']terphenyl (53). Quantities: compound (52) (2.0 g, 0.008 mol), compound (48) (1.8 g, 0.01 mol), caesium carbonate (7.0 g, 0.05 mol). The experimental procedure was as described for preparation of compound but with the additional use of SPhos (18). Yield 1.2 g (43%); MS(EI): m/z 352 (M⁺), 323, 295, 266, 244, 29.

4-Ethoxy-2,2''-difluoro-4''-pentyl-[1,1':4',1'']terphenyl (54). Quantities: compound (52) (13.8 g, 0.055 mol), compound (49) (13.9 g, 0.066 mol), caesium carbonate (21.0 g, 0.15 mol). The experimental procedure was as described for preparation of compound but with the additional use of SPhos (18). Yield 12.6 g (62%); m.p. 55 N 167 Iso; MS(EI): m/z 380 (M⁺), 351, 323, 295, 266, 57, 41, 29.

2,2''-Difluoro-4-hydroxy-4''-propyl-[1,1':4',1'']terphenyl (55). Quantities: compound (53) (1.2 g, 0.0034 mol), tribromoborane (8 ml 1M, 0.008 mol). Yield 0.9 g (81%); MS(EI): m/z 324 (M⁺), 295, 266, 183, 29.

2,2''-Difluoro-4-hydroxy-4''-pentyl-[1,1':4',1'']terphenyl (56). Quantities: compound (54) (6.0 g, 0.015 mol), tribromoborane (23 ml 1M, 0.023 mol). Yield 3.7 g (67%); m.p. 138 (N 125) °C; MS(EI): m/z 324 (M⁺), 295, 266, 183, 29; ¹H NMR (200MHz, CDCl₃) δ 7.76 (1 H, s, PhOH), 7.22-7.36 (3 H, m, Ph), 7.02-7.12 (2 H, m, Ph), 6.75-7.6.86 (4 H, m, Ph), 6.43-6.50 (1 H, q, Ph), 2.55-2.69 (2 H, m, CH₂Ph), 1.60-1.81 (2 H, m, CH₂), 1.26-1.46 (4 H, m, CH₂), 0.80-0.94 (3 H, m, CH₃).

4-Bromo-4'-propylbiphenyl (57). Quantities: 4-bromobiphenyl (116.5 g, 0.5 mol), aluminium chloride (100 g, 0.75 mol), propanoyl chloride (55.5 g, 0.6 mol), hydrazine hydrate 80% (93.8 g, 1.5 mol), potassium hydroxide (112.0 g, 2.0 mol). The experimental procedure was as described for preparation of compound (58). Yield 78.9 g (56%); m.p. 102-104 °C; MS(EI): m/z 276, 274 (M⁺), 245, 247, 165, 29.

3-Fluoro-4'-propylbiphenyl (59). Quantities: compound (48) (19 g, 0.11 mol), compound (1) (17.5 g, 0.1 mol), potassium carbonate (40.0 g, 0.29 mol). The experimental procedure was as described for preparation of compound (18). Yield 17.1 g (80%); b.p. 178-182 °C at 20 mbar; MS(EI): m/z 214 (M⁺), 185, 165, 133.

3-Fluoro-4'-pentylbiphenyl (60). Quantities: compound (49) (26.9 g, 0.14 mol), compound (1) (17.5 g, 0.1 mol), potassium carbonate (40.0 g, 0.29 mol). The experimental procedure was as described for preparation of compound (18). Yield 18.0 g (75%); b.p. 195-197 °C at 20 mbar; MS(EI): m/z 242 (M⁺), 185, 170, 166, 133.

(4'-Propylbiphenyl-4-yl)boronic acid (61). Quantities: compound (57) (55 g, 0.2 mol), magnesium (5.1 g, 0.21 mol), tripropyl borate (41.4 g, 0.22 mol). The experimental procedure was as described for preparation of compound (50). Yield 42.5 g (88%).

(4'-Pentylbiphenyl-4-yl)boronic acid (62). Quantities: compound (58) (80 g, 0.264 mol), magnesium (6.56 g, 0.27 mol), tripropyl borate (52.6 g, 0.28 mol). The experimental procedure was as described for preparation of compound (50). Yield 60 g (85%).

(3-Fluoro-4'-propylbiphenyl-4-yl)boronic acid (63). Quantities: compound (59) (17.0 g, 0.079 mol), sec-butyllithium (73 ml, 0.095 mol), tripropyl borate (16.2 g, 0.086 mol). The experimental procedure was as described for preparation of compound (15). Yield 10.0 g (49%).

(3-Fluoro-4'-pentylbiphenyl-4-yl)boronic acid (64). Quantities: compound (60) (18 g, 0.074 mol), sec-butyllithium (65 ml, 0.085 mol), tripropyl borate (15.0 g, 0.08 mol). The experimental procedure was as described for preparation of compound (15). Yield 19.0 g (90%).

4-Hydroxy-4''-propyl-[1,1':4',1'']terphenyl (69). Quantities: compound (61) (13.2 g, 0.055 mol), 4-bromophenol (66) (8.65 g, 0.05 mol), potassium carbonate (20.7 g, 0.15 mol). The experimental procedure was as described for preparation of compound (18). Yield 10.0 g (70%); m.p. 266-267 °C; MS(EI): m/z 288 (M⁺), 259, 165, 129, 29; ¹H NMR (200MHz, CDCl₃) δ 9.41 (1 H, s, PhOH), 7.62-7.84 (4 H, m, Ph), 7.10-7.41 (6 H, m, Ph), 6.85-6.98 (2H, t, PhO), 2.60-2.68 (2H, t, CH₂Ph), 1.56-1.73 (2 H, m, CH₂), 0.94-0.99 (3 H, t, CH₃).

3-Fluoro-4-methoxy-4''-propyl-[1,1':4',1'']terphenyl (70). Quantities: compound (61) (20.6 g, 0.086 mol), 4-bromo-2-fluoro-1-methoxybenzene (67) (16.0 g, 0.078 mol), potassium carbonate (32.3 g, 0.234 mol). The experimental procedure

was as described for preparation of compound (18). Yield 20.0 g (80%); m.p. 161,1 SmG 185,0 SmA 204.0 N 214.5 Iso; MS(EI): m/z 320 (M+), 291, 276, 248, 145, 124, 29.

3-Fluoro-4-methoxy-4"-pentyl-[1,1':4',1"]terphenyl (71). Quantities: compound (62) (23.05 g, 0.086 mol), 4-bromo-2-fluoro-1-methoxybenzene (67) (16.0 g, 0.078 mol), potassium carbonate (32.3 g, 0.234 mol). The experimental procedure was as described for preparation of compound (18). Yield 26.6 g (88%); m.p. 166.2 (165.7 SmG) SmA 195.3 N 201.5 Iso; MS(EI): m/z 348 (M+), 291, 276, 248, 57, 41, 29.

4-Ethoxy-2,3-difluoro-4"-propyl-[1,1':4',1"]terphenyl (72). Quantities: compound (61) (20.4 g, 0.085 mol), 1-ethoxy-2,3-difluoro-4-iodobenzene (68) (21.9 g, 0.077 mol), potassium carbonate (31.9 g, 0.23 mol). The experimental procedure was as described for preparation of compound (18). Yield 21.4 g (80%); m.p. 120.9 SmC 139.1 N 195.0 Iso; Lit. Cr 139 N 197 Izo [6]; MS(EI): m/z 352 (M+), 323, 295, 266, 244, 165, 147, 29.

4-Ethoxy-2,3-difluoro-4"-pentyl-[1,1':4',1"]terphenyl (73). Quantities: compound (62) (15.0 g, 0.056 mol), 1-ethoxy-2,3-difluoro-4-iodobenzene (68) (13,3 g, 0,0468 mol), potassium carbonate (20.0 g, 0.144 mol). The experimental procedure was as described for preparation of compound (18). Yield 13.8 g (77%); m.p. 103.3 SmC 132.9 N 185.2 Iso; Lit. Cr 105 SmC 135 N 185 Izo [5]; MS(EI): m/z 380 (M+), 323, 295, 266, 244, 165, 147, 57, 41, 29.

4-Ethoxy-2,2',3-trifluoro-4"-propyl-[1,1':4',1"]terphenyl (74). Quantities: compound (63) (5.0 g, 0.02 mol), compound (68) (5.0 g, 0.018 mol), potassium carbonate (8.4 g, 0.06 mol). The experimental procedure was as described for preparation of compound (18). Yield 4.8 g (74%); m.p. 102,9 N 142,0 Iso; MS(EI): m/z 370 (M+), 341, 313, 284, 262, 183, 156, 29.

4-Ethoxy-2,2',3-trifluoro-4"-pentyl-[1,1':4',1"]terphenyl (75). Quantities: compound (64) (9.4 g, 0.033 mol), compound (68) (7.6 g, 0.027 mol), potassium carbonate (11.8 g, 0.086 mol). The experimental procedure was as described for preparation of compound (18). Yield 7.7 g (75%); m.p. 67,6 N 131,3 Iso; MS(EI): m/z 398 (M+), 370, 341, 313, 284, 183, 157, 57, 41, 29.

2'-Fluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (76). Quantities: compound (63) (14.4 g, 0.06 mol), compound (66) (8.6 g, 0.05 mol), potassium carbonate (20.7 g, 0.15 mol). The experimental procedure was as described for preparation of compound (18). Yield 13.7 g (89 %); m.p. 164-165 N 174,5 Iso; MS(EI): m/z 306 (M+), 277, 207, 183, 29; ¹H NMR (200MHz, CDCl₃) δ 9.46 (1 H, s, PhOH), 7.38-7.46 (2 H, q, Ph), 7.16-7.24 (2 H, q, Ph), 6.85-6.98 (5 H, m, Ph), 6.42-6.50 (2H, m, Ph), 2.52-2.62 (2H, m, CH₂Ph), 1.54-1.72 (2 H, m, CH₂), 0.90-0.97 (3 H, t, CH₃).

2'-Fluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (77). Quantities: compound (64) (5.0 g, 0.018 mol), compound (66) (2,5 g, 0,014 mol), potassium carbonate (6.0 g, 0.044 mol). The experimental procedure was as described for preparation of compound (18). Yield 3.4 g (72%); m.p. 156-157 N 164 Iso; MS(EI): m/z 334 (M+), 277, 207, 183, 57, 41, 29; ¹H NMR (200MHz, CDCl₃) δ 9.42 (1 H, s, PhOH), 7.38-7.46 (2 H, q, Ph), 7.16-7.22 (2 H, q, Ph), 6.74-6.94 (5 H, m, Ph), 6.41-6.49 (2H, m, Ph), 2.52-2.68 (2H, m, CH₂Ph), 1.65-1.79 (2 H, m, CH₂), 1.29-1.43 (4 H, m, CH₂), 0.84-0.94 (3 H, m, CH₃).

2-Fluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (78). Quantities: compound (61) (2.2 g, 0.009 mol), compound (65) (1.3 g, 0.007 mol), potassium carbonate (2.9 g, 0.021 mol). The experimental procedure was as described for preparation of compound (18). Yield 1.5 g (67%); MS(EI): m/z 306 (M+), 277, 165, 138, 29.

2-Fluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (79). Quantities: compound (62) (10.1 g, 0.038 mol), compound (65) (5.5 g, 0.029 mol), potassium carbonate (13.8 g, 0.1 mol). The experimental procedure was as described for preparation of compound (18). Yield 8.0 g (83%); m.p. 168-169 °C; MS(EI): m/z 334 (M+), 277, 226, 165, 138, 57, 41, 29; ¹H NMR (200MHz, CDCl₃) δ 7.78 (1 H, s, PhOH), 7.45-7.64 (4 H, m, Ph), 7.00-7.32 (4 H, m, Ph), 6.78-6.86 (2 H, q, Ph), 6.43-6.48 (1 H, d, Ph), 2.53-2.69 (2H, m, CH₂Ph), 1.61-1.79 (2 H, m, CH₂), 1.27-1.44 (4 H, m, CH₂), 0.83-0.94 (3 H, m, CH₃).

2,2'-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (80). Quantities: compound (64) (5.0 g, 0.019 mol), compound (65) (3.1 g, 0.016 mol), potassium carbonate (7,8 g, 0,057 mol). The experimental procedure was as described for preparation of compound (18). Yield 3.85 g (75%); m.p. 139 (N 115) Iso; MS(EI): m/z 324 (M+), 295, 266, 244, 207, 183, 29; ¹H NMR (200MHz, CDCl₃) δ 9.28 (1 H, s, PhOH), 7.26-7.37 (3 H, m, Ph), 7.01-7.17 (4 H, m, Ph), 6.73-7.6.86 (3 H, m, Ph), 2.57-2.65 (2 H, t, CH₂Ph), 1.55-1.75 (2 H, m, CH₂), 0.90-0.98 (3 H, m, CH₃).

3,2'-Difluoro-4-methoxy-4"-propyl-[1,1':4',1"]terphenyl (81). Quantities: compound (63) (15.2 g, 0.059 mol), 4-bromo-2-fluoro-1-methoxybenzene (67) (11.0 g, 0.053 mol) potassium carbonate (20.0 g, 0.15 mol). The experimental procedure was as described for preparation of compound (18). Yield 13g (73%); MS(EI): m/z 338 (M+), 295, 266, 244, 165, 29.

2,3-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (82). Quantities: compound (72) (18.1 g, 0.051 mol), hydriodic acid (0.2 mol). The experimental procedure was as described for preparation of compound (25). Yield 14.9 g (90%); m.p. 166-167 N 168 Iso; MS(EI): m/z 324 (M+), 295, 165, 147, 29; ¹H NMR (200MHz, CDCl₃) δ 7.69-7.77 (2 H, m, Ph), 7.42-7.48 (2 H, m, Ph), 7.08-7.22 (3 H, m, Ph), 6.78-6.86 (2 H, m, Ph), 6.63-6.69 (1 H, q, Ph), 4.70 (1 H, s, PhOH), 2.53-2.62 (2H, m, CH₂Ph), 1.62-1.71 (2 H, m, CH₂), 0.90-0.98 (3 H, t, CH₃).

2,3-Difluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (83). Quantities: compound (73) (12.3 g, 0.032 mol), hydriodic acid (0.25 mol). The experimental procedure was as described for preparation of compound (25). Yield 9.5 g (84%); m.p. 162-163 °C; MS(EI): m/z 352 (M+), 295, 266, 244, 165 57, 43, 29; ¹H NMR (200MHz, CDCl₃) δ 7.66-7.70 (2 H, m, Ph), 7.46-7.52 (2 H, m, Ph), 7.07-7.18 (3 H, m, Ph), 6.78-6.86 (2 H, m, Ph), 6.64-6.70 (1 H, q, Ph), 4.68 (1 H, s, PhOH), 2.57-2.66 (2H, m, CH₂Ph), 1.62-1.82 (2 H, m, CH₂), 1.28-1.45 (4 H, m, CH₂), 0.82-0.92 (3 H, m, CH₃).

2,2',3-Trifluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (84). Quantities: compound (74) (4.0 g, 0.01 mol), hydriodic acid (0.08 mol). The experimental procedure was as described for preparation of compound (25). Yield 2.6 g (78%); m.p. 127-128 °C; MS(EI): m/z 342 (M+), 313, 244, 183, 156, 29; ¹H NMR (200MHz, CDCl₃) δ 7.38-7.45 (2 H, m, Ph), 7.15-7.26 (2 H, m, Ph), 6.62-7.01 (5 H, m, Ph), 4.68 (1 H, s, PhOH), 2.52-2.62 (2 H, m, CH₂Ph), 1.53-1.72 (2 H, m, CH₂), 0.90-0.97 (3 H, t, CH₃).

2,2',3-Trifluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (85). Quantities: compound (75) (7.0 g, 0.018 mol), hydriodic acid (0.1 mol). The experimental procedure was as described for preparation of compound (25). Yield 6.3 g (97%); m.p. 112-113 (N 103,5) Iso; MS(EI): m/z 370 (M+), 313, 244, 183, 57, 41, 29; ¹H NMR (200MHz, CDCl₃) δ 7.36-7.44 (2 H, m, Ph), 7.12-7.21 (2 H, m, Ph), 6.94-6.99 (1 H, m, Ph), 6.61-6.82 (4 H, m, Ph), 4.67 (1 H, s, PhOH), 2.55-2.69 (2 H, m, CH₂Ph), 1.60-1.81 (2 H, m, CH₂), 1.26-1.46 (4 H, m, CH₂), 0.80-0.94 (3 H, m, CH₃).

3-Fluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (86). Quantities: compound (70) (13.0 g, 0.0406 mol), hydriodic acid (0.15 mol). The experimental procedure was as described for preparation of compound (25). Yield 11.1 g (89%); m.p. 215 N 235 Iso; MS(EI): m/z 306 (M+), 277, 165, 138, 29; ¹H NMR (200MHz, CDCl₃) δ 7.60-7.82 (4 H, m, Ph), 7.42-7.49 (2 H, d, PhR), 7.16-7.22 (2 H, d, PhR), 6.65-6.92 (3H, m, PhFO), 5.01 (1 H, s, PhOH), 2.58-2.67 (2H, t, CH₂Ph), 1.55-1.70 (2 H, m, CH₂), 0.92-0.98 (3 H, t, CH₃).

3-Fluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (87). Quantities: compound (71) (25.3 g, 0.0727 mol), hydriodic acid (0.2 mol). The experimental procedure was as described for preparation of compound (25). Yield 21.1 g (87%); m.p. 210 °C; MS(EI): m/z 334 (M+), 277, 226, 165, 138, 57, 41, 29; ¹H NMR (200MHz, CDCl₃) δ 7.62-7.74 (4 H, m, Ph), 7.43-7.50 (2 H, d, PhR), 7.15-7.20 (2 H, d, PhR), 6.68-6.94 (3H, m, PhFO), 5.02 (1 H, s, PhOH), 2.54-2.69 (2H, q, CH₂Ph), 1.59-1.80 (2 H, m, CH₂), 1.28-1.41 (4 H, m, CH₂), 0.80-0.96 (3 H, m, CH₃).

3,2'-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (88). Quantities: compound (81) (13.0 g, 0.38 mol), hydriodic acid (0.2 mol). The experimental procedure was as described for preparation of compound (25). Yield 9 g (75%); MS(EI): m/z 324 (M+), 295, 165, 147, 29.

2,3'-Difluoro-4-propylbiphenyl (89). Quantities: compound (9) (23.0 g, 0.087 mol), (3-fluorophenyl)boronic acid (32) (14.0 g, 0.1 mol), potassium carbonate (36.0 g, 0.26 mol). The experimental procedure was as described for preparation of compound (18). Yield 18.1 g (90%); MS(EI): m/z 232 (M+), 203, 184, 29.

2,3'-Difluoro-4-pentylbiphenyl (90). Quantities: compound (10) (22.5 g, 0.077 mol), compound (32) (11.9 g, 0.085 mol), potassium carbonate (32.0 g, 0.23 mol). The experimental procedure was as described for preparation of compound (18). Yield 16.5 g (83%); MS(EI): m/z 260 (M+), 203, 184, 29.

2,3'-Difluoro-4'-iodo-4-propylbiphenyl (91). Quantities: compound (89) (18.1 g, 0.078 mol), sec-butyllithium (65 ml 1.3M, 0.085 mol), iodide (21.9 g, 0.085 mol). The experimental procedure was as described for preparation of compound (9). Yield 25.1 g (90%); b.p. 140-142 °C at 1 mmHg; MS(EI): m/z 358 (M+), 329, 202, 127, 29.

2,3'-Difluoro-4'-iodo-4-pentylbiphenyl (92). Quantities: compound (90) (16.5 g, 0.063 mol), sec-butyllithium (60 ml

1.3M, 0.078 mol), iodide (20.0 g, 0.079 mol). The experimental procedure was as described for preparation of compound (9). Yield 18.0 g (74%); b.p. 159-161 °C at 1 mmHg; MS(EI): m/z 386 (M⁺), 329, 202, 127, 57, 43, 29.

2,3'-Difluoro-4"-methoxy-4-propyl-[1,1':4',1"]terphenyl (93). Quantities: compound (91) (25.0 g, 0.07 mol), compound (41) (13.5 g, 0.088 mol), potassium carbonate (37.0 g, 0.27 mol). The experimental procedure was as described for preparation of compound (18). Yield 15.0 g (63%); m.p. 78 N 148 Iso; MS(EI): m/z 338 (M⁺), 309, 294, 266, 29.

2,3'-Difluoro-4"-methoxy-4-pentyl-[1,1':4',1"]terphenyl (94). Quantities: compound (92) (10.4 g, 0.027 mol), compound (41) (6.5 g, 0.042 mol), potassium carbonate (17.0 g, 0.12 mol). The experimental procedure was as described for preparation of compound (18). Yield 8.1 g (84%); m.p. 62.2 N 139 Iso; MS(EI): m/z 366 (M⁺), 309, 266, 57, 41, 29.

2',2"-Difluoro-4-hydroxy-4"-propyl-[1,1':4',1"]terphenyl (95). Quantities: compound (93) (14.0 g, 0.041 mol), tribromoboran (60 ml 1M, 0.06 mol). Yield 9.7 g (72%); MS(EI): m/z 324 (M⁺), 295, 165, 147, 29; ¹H NMR (200MHz, CDCl₃) δ 9.46 (1 H, s, PhOH), 7.13-7.39 (4 H, m, Ph), 6.70-7.699 (4 H, m, Ph), 6.41-6.48 (2 H, m, Ph), 2.56-2.64 (2 H, t, CH₂Ph), 1.54-1.72 (2 H, m, CH₂), 0.90-0.98 (3 H, t, CH₃).

2',2"-Difluoro-4-hydroxy-4"-pentyl-[1,1':4',1"]terphenyl (96). Quantities: compound (94) (7.6 g, 0.02 mol), tribromoboran (30 ml 1M, 0.03 mol). Yield 6.3 g (86%); MS(EI): m/z 352 (M⁺), 295, 266, 244, 165, 57, 43, 29; ¹H NMR (200MHz, CDCl₃) δ 9.46 (1 H, s, PhOH), 7.12-7.36 (3 H, m, Ph), 6.69-7.694 (5 H, m, Ph), 6.41-6.48 (2 H, m, Ph), 2.54-2.67 (2 H, t, CH₂Ph), 1.61-1.76 (2 H, m, CH₂), 1.23-1.45 (4 H, m, CH₂), 0.80-0.95 (3 H, m, CH₃).

Methyl 4"- propyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.1.31). The experimental procedure was as described for preparation of carbonates. Yield 85%; m.p. 92.5 SmE 232.1 SmA 245.1 N 261.6 Iso; MS(EI): m/z 346 (M⁺), 317, 273, 230, 59.

Ethyl 4"- propyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.1.32). Yield 95%; m.p. 85.5 SmE 225 SmA 240.8 N 249.1 Iso; MS(EI): m/z 360 (M⁺), 316, 288, 259, 230, 29; ¹H NMR (200MHz, CDCl₃) δ 7.67-7.52 (8H, m, Ph), 7.29-7.26 (4H, d, Ph), 4.38-4.27 (2H, q, OCH₂), 2.66-2.59 (2H, t, PhCH₂), 1.77-1.59 (2H, m, CH₂), 1.42-1.35 (3H, t, CH₃), 1.01-0.93 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.24-14.27 (2 C,d, CH₃), 24.62 (1 C, s, CH₂), 37.70 (1 C, s, CH₂Ph), 62.88 (1 C, s, CH₂O), 117.75 (2 C, s, Ph), 125.22 (2 C, s, Ph), 126.70 (2 C, s, Ph), 130.55 (1 C, s, Ph), 130.86 (2 C, s, Ph), 131.19 (2 C, s, Ph), 131.94 (2 C, s, Ph), 132.91 (1 C, s, Ph), 137.15 (1 C, s, Ph), 140.12 (1 C, s, Ph), 143.33 (1 C, s, Ph), 151.70 (1 C, s, OCOO), 159.07 (1 C, s, PhO); HRMS calc. for C₂₄H₂₄O₃: [M⁺] 360.1720, found: 360.1728.

Propyl 4"-propyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.1.33). Yield 95%; m.p. 79.2 SmE 220.8 SmB 225 SmA 235.5 N 238.5 Iso; MS(EI): m/z 374 (M⁺), 288, 259, 230, 43, 29.

3-Fluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl methyl carbonate (I.2.31). Yield 89%; m.p. 141.6 SmE 172.5 SmA 212.8 Iso; MS(EI): m/z 364 (M⁺), 335, 306, 391, 248, 59.

Ethyl 3-fluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.2.32). Yield 93%; m.p. 125.5 SmE 165.5 SmB 168 SmA 209.4 N 211,7 Iso; MS(EI): m/z 378 (M⁺), 334, 306, 277, 248, 29; ¹H NMR (200MHz, CDCl₃) δ 7.66 – 7.51 (6H, m, Ph), 7.45-7.34 (2H, m, RPh), 7.30-7.23 (3H, t, FPh), 4.40-4.29 (2H, q, OCH₂), 2.66-2.58 (2H, t, PhCH₂), 1.77-1.58 (2H, m, CH₂), 1.43-1.36 (3H, t, CH₃), 1.00-0.93 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.24 (2 C, s, CH₃), 24.64 (1 C, s, CH₂), 37.74 (1 C, s, CH₂Ph), 62.83 (1 C, s, CH₂O), 116.4-116.6 (1 C, d, Ph), 119.9-120.0 (1 C, d, Ph), 124.19 (2 C, s, Ph), 126.83 (2 C, s, Ph), 129.8-129.9 (1 C, d, Ph), 130.86 (2 C, s, Ph), 131.94 (2 C, s, Ph), 132.88 (1 C, s, Ph), 134.2-134.3 (1 C, d, Ph), 136.1-136.5 (1 C, d, Ph), 137.21 (1 C, s, Ph), 139.6-139.7 (1 C, d, Ph), 143.32 (1 C, s, Ph), 148.2, 153.4 (1 C, d, PhF), 149.66-149.70 (1 C,d, OCOO) ; HRMS calc. for C₂₄H₂₃O₃F: [M⁺] 378.1626, found: 378.1618.

3-Fluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl propyl carbonate (I.2.33). Yield 90%; m.p. 119.8 SmE 157.0 SmB 162.0 SmA 200.6 Iso; MS(EI): m/z 392 (M⁺), 306, 277, 248, 165, 41, 29.

3-Fluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl methyl carbonate (I.2.51). Yield 87%; m.p. 86.2 SmE 154.7 SmB 166 SmA 207.2Iso; MS(EI): m/z 392 (M⁺), 362, 334, 305, 277, 248, 59.

Ethyl 3-fluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.2.52). Yield 95%; m.p. 91.9 SmE 144.9 SmB 163.8 SmA 203.8Iso; MS(EI): m/z 406 (M⁺), 362, 334, 305, 277, 248, 57, 29.

3-Fluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl propyl carbonate (I.2.53). Yield 93%; m.p. 95.9 SmE 140.3 SmB 162

SmA 197.3Iso; MS(EI): m/z 420 (M+), 362, 334, 277, 248, 57, 43.

2'-Fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.3.31). Yield 82%; m.p. 110.1 N 210.1 Iso; MS(EI): m/z 364 (M+), 335, 306, 291, 277, 248, 59.

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Ethyl 2'-fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.3.32). Yield 90%; m.p. 106.3 N 195.8 Iso; MS(EI): m/z 378 (M+), 334, 306, 277, 248, 29; ¹H NMR (200MHz, CDCl₃) δ 7.63 – 7.58 (2H, m, Ph), 7.56 – 7.50 (2H, m, Ph), 7.48-7.34 (3H, m, PhF), 7.30-7.23 (4H, m, PhO), 4.40-4.29 (2H, q, OCH₂), 2.67-2.60 (2H, t, PhCH₂), 1.77-1.55 (2H, m, CH₂), 1.44-1.37 (3H, t, CH₃), 1.01-0.94 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.23 (2 C, s, CH₃), 24.62 (1 C, s, CH₂), 37.71 (1 C, s, CH₂Ph), 62.85 (1 C, s, CH₂O), 110.2-110.5 (1 C, d, Ph), 117.70 (2 C, s, Ph), 125.8-128.1 (3 C, m, Ph), 129.83 (2 C, s, Ph), 131.6-134.4 (6 C, m, Ph), 140.86 (1 C, s, Ph), 143.34 (1 C, s, Ph), 151.76 (1 C, d, OCOO), 154.42-156.89 (1 C, d, PhF), 158.01 (1 C, s, PhO); HRMS calc. for C₂₄H₂₃O₃F: [M⁺] 378.1626, found: 378.1630.

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2'-Fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.3.33). Yield 92%; m.p. 99.3 N 181.9 Iso; MS(EI): m/z 392 (M+), 348, 306, 277, 248, 43, 28.

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Butyl 2'-fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.3.34). Yield 82%; m.p. 79.7 N 174.2 Iso; MS(EI): m/z 406 (M+), 362, 306, 277, 248, 57, 41, 29.

2'-Fluoro-4"-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.3.51). Yield 86%; m.p. 88.3 SmA 123.0 N 194.8 Iso; MS(EI): m/z 392 (M+), 335, 291, 278, 248, 59.

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Ethyl 2'-fluoro-4"-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.3.52). Yield 82%; m.p. 76.2 SmA 126.6 N 182.7 Iso; MS(EI): m/z 406 (M+), 362, 334, 305, 277, 248, 220, 183, 29.

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2'-Fluoro-4"-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.3.53). Yield 89%; m.p. 67.8 SmA 125.3 N 171.0 Iso; MS(EI): m/z 420 (M+), 376, 334, 277, 248, 220, 183, 43.

4"-Ethyl-2"-fluoro-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.4.21). Yield 88%; m.p. 102.0 N 184.2 Iso; MS(EI): m/z 350 (M+), 291, 277, 248, 124, 59.

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Ethyl 4"-ethyl-2"-fluoro-[1,1':4',1'']terphenyl-4-yl carbonate (I.4.22). Yield 91%; m.p. 88.4 N 200.4 Iso; MS(EI): m/z 364 (M+), 320, 292, 277, 248, 183, 29.

4"-Ethyl-2"-fluoro-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.4.23). Yield 93%; m.p. 91.6 (71.1 SmG) N 168.0 Iso; MS(EI): m/z 378 (M+), 320, 292, 277, 248, 183, 43, 29.

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Butyl 4"-ethyl-2"-fluoro-[1,1':4',1'']terphenyl-4-yl carbonate (I.4.24). Yield 90%; m.p. 57.0 SmG 62.2 N 159.8 Iso; MS(EI): m/z 392 (M+), 320, 292, 277, 183, 57, 43, 29.

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2"-Fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.4.31). Yield 87%; m.p. 85.0 N 207.0 Iso; MS(EI): m/z 364 (M+), 335, 305, 291, 276, 248, 220, 59.

Ethyl 2"-fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.4.32). Yield 88%; m.p. 88.0 (64 SmG) N 193.0 Iso; MS(EI): m/z 378 (M+), 334, 306, 277, 248, 220, 183, 138, 29; ¹H NMR (200MHz, CDCl₃) δ 7.66 – 7.59 (6H, m, Ph), 7.42-7.34 (1H, m, PhF), 7.31-7.23 (2H, m, PhO), 7.06-6.96 (2H, m, PhF), 4.39-4.29 (2H, q, OCH₂), 2.66-2.58 (2H, t, PhCH₂), 1.77-1.55 (2H, m, CH₂), 1.44-1.37 (3H, t, CH₃), 1.01-0.94 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.01-14.18 (2 C, d, CH₃), 24.66 (1 C, s, CH₂), 39.30 (1 C, s, CH₂Ph), 62.84 (1 C, s, CH₂O), 114.9-115.1 (1 C, d, Ph), 117.68 (2 C, s, Ph), 125.87 (2 C, s, Ph), 126.80 (2 C, s, Ph), 127.7-132.7 (6 C, m, Ph), 135.11 (1 C, s, Ph), 139.20 (1 C, s, Ph), 148.15 (1 C, s, PhR), 151.75 (1 C, d, OCOO), 159.03 (1 C, s, PhO), 160.4-163.2 (1 C, d, PhF); HRMS calc. for C₂₄H₂₃O₃F: [M⁺] 378.1626, found: 378.1620.

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2"-Fluoro-4"-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.4.33). Yield 82%; m.p. 82.0 (80,7 SmG) N 173.0 Iso; MS(EI): m/z 392 (M+), 306, 277, 248, 220, 183, 43.

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2"-Fluoro-4"-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.4.51). Yield 85%; m.p. 84.0 N 195.8 Iso; MS(EI): m/z 392 (M+), 333, 291, 248, 59, 41, 29.

Ethyl 2''-fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.4.52). Yield 89%; m.p. 72.0 N 180.0 Iso; MS(EI): m/z 406 (M+), 362, 334, 277, 248, 57, 41, 29.

2''-Fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.4.53). Yield 79%; m.p. 67.0 (SmG 55 SmC 66) N 169.0 Iso; MS(EI): m/z 420 (M+), 334, 277, 248, 183, 43, 28.

Butyl 2''-fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.4.54). Yield 85%; m.p. 58.0 SmG 65.8 SmC 76.5 N 162.0 Iso; MS(EI): m/z 434 (M+), 334, 277, 248, 57, 41, 29.

2-Fluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.5.33). Yield 93%; m.p. 107.0 N 181.3 Iso; MS(EI): m/z 392 (M+), 306, 277, 248, 220, 138, 43, 29.

2-Fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.5.51). Yield 82%; m.p. 67.1 SmB 86.7 SmA 113.9 N 192.5 Iso; MS(EI): m/z 392 (M+), 335, 291, 277, 248, 59.

Ethyl 2-fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.5.52). Yield 87%; m.p. 87.8 (SmB 83.0) SmA 104.2 N 179.6 Iso; MS(EI): m/z 406 (M+), 362, 334, 305, 277, 248, 29; ¹H NMR (200MHz, CDCl₃) δ 7.68 – 7.64 (2H, m, Ph), 7.60-7.43 (5H, m, Ph), 7.28-7.22 (2H, m, RPh), 7.11-7.04 (2H, m, Ph), 4.39-4.29 (2H, q, OCH₂), 2.68-2.61 (2H, t, PhCH₂), 1.73-1.53 (2H, m, CH₂), 1.44-1.26 (7H, m, CH), 0.94-0.87 (3H, m, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.0-14.2 (2 C, d, CH₃), 22.48 (1 C, s, CH₂), 31.03 (1 C, s, CH₂), 31.49 (1 C, s, CH₂), 35.62 (1 C, s, CH₂Ph), 62.85 (1 C, s, CH₂O), 104.6-104.9.1 (1 C, d, Ph), 114.38 (1 C, s, Ph), 125.24 (2 C, s, Ph), 127.5-131.9 (8 C, m, Ph), 137.13 (1 C, s, Ph), 137.8-137.9 (1 C, d, Ph), 139.20 (1 C, s, Ph), 143.18 (1 C, s, PhR), 151.72 (1 C, d, OCOO), 153.9-154.0 (1 C, d, PhO), 160.5-163.3 (1 C, d, PhF); HRMS calc. for C₂₄H₂₃O₃F: [M⁺] 378.1626, found: 378.1634.

2-Fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.5.53). Yield 90%; m.p. 76.6 (SmB 78.0) SmA 97.1 N 167.7 Iso; MS(EI): m/z 420 (M+), 334, 277, 248, 41, 29.

Butyl 2-fluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.5.54). Yield 85%; m.p. 56.2 SmB 66.9 SmA 72.1 N 161.8 Iso; MS(EI): m/z 434 (M+), 334, 277, 248, 53, 41, 29.

2,3-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.6.31). Yield 92%; m.p. 155.2 SmA 155.7 N 198 Iso; MS(EI): m/z 382 (M+), 353, 324, 309, 294, 266, 244, 165, 59.

2,3-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.6.32). Yield 90%; m.p. 122.8 SmA 149.9 N 187.7 Iso; MS(EI): m/z 396 (M+), 352, 324, 295, 266, 244, 165, 29; ¹H NMR (200MHz, CDCl₃) δ 7.69-7.65 (2H, d, Ph), 7.59 – 7.52 (4H, m, RPh), 7.28-7.18 (3H, m, Ph), 7.12-7.04 (1H, m, FPhO), 4.42-4.31 (2H, q, OCH₂), 2.67-2.59 (2H, t, PhCH₂), 1.77-1.5 (2H, m, CH₂), 1.44-1.37 (3H, t, CH₃), 1.01-0.94 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.22 (2 C, s, CH₃), 24.65 (1 C, s, CH₂), 37.75 (1 C, s, CH₂Ph), 62.82 (1 C, s, CH₂O), 115.7-115.8 (1 C, d, Ph), 124.26 (2 C, s, Ph), 124.25-124.66 (1 C, dd, Ph-Ph), 127.84 (2 C, s, Ph), 130.96 (2 C, s, Ph), 131.4-131.6 (1 C, dd, Ph), 131.97 (3 C, s, Ph), 136.6-140.5 (4 C, m, Ph), 143.34 (1 C, s, PhR), 148.8-149.1, 151.4-151.7 (1 C, dd, PhF), 149.9 (1 C, s, OCOO); HRMS calc. for C₂₄H₂₂O₃F₂: [M⁺] 396.1532, found: 396.1518.

2,3-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.6.33). Yield 85%; m.p. 106.5 SmA 139.0 N 174.7 Iso; MS(EI): m/z 410 (M+), 324, 295, 266, 244, 165, 43, 29.

2,3-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.6.51). Yield 89%; m.p. 119.8 SmA 160.0 N 183.9 Iso; MS(EI): m/z 410 (M+), 353, 309, 294, 266, 244, 165, 59.

2,3-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.6.52). Yield 81%; m.p. 100.6 SmA 152.8 N 174.0 Iso; MS(EI): m/z 424 (M+), 380, 352, 323, 395, 266, 244, 165, 43, 29.

2,3-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.6.53). Yield 86%; m.p. 84.9 SmA 144.4 N 164.3 Iso; MS(EI): m/z 438 (M+), 394, 352, 295, 266, 244, 165, 57, 41, 29.

2,3-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl nonyl carbonate (I.6.59). Yield 86%; m.p. 66.4 SmC 95.8 N 132.6 Iso; MS(EI): m/z 522 (M+), 352, 295, 266, 165, 71, 56, 43.

2',3'-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.7.31). Yield 90%; m.p. 139.0 N 200.8 Iso;

MS(EI): m/z 382 (M+), 353, 309, 295, 266, 59.

2',3'-Difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl ethyl carbonate (I.7.32). Yield 92%; m.p. 119.4 N 188.5 Iso; MS(EI): m/z 396 (M+), 353, 309, 295, 266, 29.

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2',3'-Difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl propyl carbonate (I.7.33). Yield 86%; m.p. 95.3 N 171.1 Iso; MS(EI): m/z 410 (M+), 324, 295, 266, 201, 43.

2',3'-Difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl methyl carbonate (I.7.51). Yield 92%; m.p. 78.0 N 183.5 Iso; MS(EI): m/z 410 (M+), 353, 309, 266, 201, 59, 41, 29.

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2',3'-Difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl ethyl carbonate (I.7.52). Yield 85%; m.p. 73.4 N 171.0 Iso; MS(EI): m/z 424 (M+), 380, 352, 295, 266, 29; ¹H NMR (200MHz, CDCl₃) δ 7.63 – 7.58 (2H, m, OPh), 7.53-7.48 (2H, m, RPh), 7.33-7.22 (6H, m, Ph), 4.40-4.29 (2H, q, OCH₂), 2.70-2.62 (2H, t, PhCH₂), 1.70-1.55 (2H, m, CH₂), 1.45-1.32 (7H, m, CH₂, CH₃), 0.95-0.88 (3H, m, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.0-14.2 (2 C, d, CH₃), 22.47 (1 C, s, CH₂), 31.03 (1 C, s, CH₂), 31.60 (1 C, s, CH₂), 35.80 (1 C, s, CH₂Ph), 62.88 (1 C, s, CH₂O), 116.61 (2 C, s, Ph), 124.3-125.4 (2 C, m, Ph), 127.44 (2 C, s, Ph), 128.52 (2 C, s, Ph), 129.5-130.2 (2 C, m, Ph), 131.84 (2 C, s, Ph), 133.7-133.9 (1 C, q, Ph), 135.1-135.3 (1 C, q, Ph), 143.00 (1 C, s, PhR), 144.5-145.3 (1 C, q, PhF), 147.0-148.0 (1 C, q, PhF), 151.79 (1 C, s, OCOO), 158.08 (1 C, s, PhO); HRMS calc. for C₂₆H₂₆O₃F₂: [M⁺] 424.1845, found: 424.1852.

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2',3'-Difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl propyl carbonate (I.7.53). Yield 88%; m.p. 68.9 N 158.8 Iso; MS(EI): m/z 438 (M+), 352, 295, 266, 201, 43, 27.

Butyl 2',3'-difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.7.54). Yield 83%; m.p. 54.9 N 152.5 Iso; MS(EI): m/z 452 (M+), 352, 295, 266, 201, 57, 41, 29.

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2",3"-Difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl methyl carbonate (I.8.31). Yield 92%; m.p. 112.0 SmA 118.1 N 206.8 Iso; MS(EI): m/z 382 (M+), 353, 338, 324, 309, 294, 266, 59, 28.

2",3"-Difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl ethyl carbonate (I.8.32). Yield 96%; m.p. 121.8 (SmC 114.2) N 191.5 Iso; MS(EI): m/z 396 (M+), 352, 324, 309, 295, 266, 29; ¹H NMR (200MHz, CDCl₃) δ 7.66 – 7.56 (6H, m, Ph), 7.30-7.23 (2H, m, PhO), 7.18-7.09 (1H, m, FPhF), 7.03-6.95 (1H, m, FPhF), 4.39-4.28 (2H, q, OCH₂), 2.72-2.64 (2H, t, PhCH₂), 1.77-1.56 (2H, m, CH₂), 1.44-1.37 (3H, t, CH₃), 1.02-0.95 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.0-14.2 (2 C, d, CH₃), 25.88 (1 C, s, CH₂), 33.7-33.8 (1 C, q, CH₂Ph), 62.88 (1 C, s, CH₂O), 117.61 (2 C, s, Ph), 125.0-125.4 (1 C, q, Ph), 125.84 (2 C, s, Ph), 126.0-126.1 (2 C, d, Ph), 126.5-126.6 (1 C, q, Ph), 128.3-128.6 (1 C, q, Ph), 130.64 (1 C, s, Ph), 131.21 (2 C, s, Ph), 131.8-132.0 (1 C, q, Ph), 136.5-136.6 (1 C, q, Ph), 139.15 (1 C, s, Ph), 147.5-150.2 (1 C, q, PhF), 151.76 (1 C, s, OCOO), 152.3-155.2 (1 C, q, PhF), 158.92 (1 C, s, PhO); HRMS calc. for C₂₄H₂₂O₃F₂: [M⁺] 396.1532, found: 396.1526.

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2",3"-Difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl propyl carbonate (I.8.33). Yield 88%; m.p. 113.6 SmC 121.1 N 177.6 Iso; MS(EI): m/z 410 (M+), 366, 324, 295, 266, 43, 28.

Butyl 2",3"-difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.8.34). Yield 94%; m.p. 79.3 SmH 101.4 SmG 103.9 SmC 125.8 N 169.8 Iso; MS(EI): m/z 424 (M+), 324, 295, 266, 41, 29.

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2",3"-Difluoro-4"-propyl-[1,1':4',1"]terphenyl-4-yl heptyl carbonate (I.8.37). Yield 97%; m.p. 67.5 SmG 87.5 SmC 126.6 N 153.5 Iso; MS(EI): m/z 466 (M+), 422, 324, 295, 57, 43, 29.

2",3"-Difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl methyl carbonate (I.8.51). Yield 90%; m.p. 105.2 N 194.9 Iso; MS(EI): m/z 410 (M+), 366, 351, 309 294, 266, 59, 41, 29.

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2",3"-Difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl ethyl carbonate (I.8.52). Yield 91%; m.p. 86.8 SmC 112.0 N 182.8 Iso; MS(EI): m/z 424 (M+), 380, 352, 308 294, 266, 29.

2",3"-Difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl propyl carbonate (I.8.53). Yield 94%; m.p. 73.3 SmC 122.9 N 172.0 Iso; MS(EI): m/z 438 (M+), 394, 352, 295, 266, 43, 41.

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Butyl 2",3"-difluoro-4"-pentyl-[1,1':4',1"]terphenyl-4-yl carbonate (I.8.54). Yield 96%; m.p. 82.7 (SmG 65.8) SmC

127.2 N 162.1 Iso; MS(EI): m/z 452 (M+), 408, 352, 295, 266, 57, 41, 29.

2'',3''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl heptyl carbonate (I.8.57). Yield 92%; m.p. 67.6 SmG 77.3 SmC
133.2 N 149.6 Iso; MS(EI): m/z 494, (M+), 450, 352, 295, 266, 57, 43, 29.

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2'',3-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.9.32). Yield 91%; m.p. 89 SmA118.5 N 166.6
Iso; MS(EI): m/z 396 (M+), 352, 324, 296, 266, 29.

2'',3-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.9.33). Yield 87%; m.p. 77.5 SmA 109.5 N
10 153.1 Iso; MS(EI): m/z 410 (M+), 324, 295, 266, 43; ¹H NMR (200MHz, CDCl₃) δ 7.55 – 7.50 (2H, m, RPh), 7.45-7.38
(4H, m, RPh, FPh), 7.34-7.23 (4H, m, FPh), 4.41-4.31 (2H, q, OCH₂), 2.67-2.59 (2H, t, PhCH₂), 1.77-1.55 (2H, m, CH₂),
1.44-1.37 (3H, t, CH₃), 1.01-0.93 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 9.89 (1 C, s, CH₃), 14.22 (1 C, s, CH₃),
22.08 (1 C, s, CH₂), 24.64 (1 C, s, CH₂), 37.71 (1 C, s, CH₂Ph), 69.18 (1 C, s, CH₂O), 109.2-109.5 (1 C, d, Ph), 119.21 (1
15 C, s, Ph), 123.1-123.4 (1 C, q, Ph), 124.73 (1 C, s, Ph), 126.2-126.5 (1 C, q, Ph), 128.0-128.1 (1 C, d, Ph), 129.87 (2 C, s,
Ph), 130.1-130.2 (1 C, q, Ph), 131.96 (2 C, s, Ph), 132.8-133.0 (1 C, d, Ph), 135.3-135.6 (1 C, d, Ph), 137.06 (1 C, s, Ph),
140.12 (1 C, s, Ph), 143.24 (1 C, s, PhR), 148.6-151.5 (2 C, m, OCOO, Ph), 154.3-157.2 (1 C, d, PhF); HRMS calc. for
C₂₅H₂₄O₃F₂: [M⁺] 410.1688, found: 410.1680.

2'',2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.10.31). Yield 85%; m.p. 111.8 N 176.1 Iso;
20 MS(EI): m/z 382 (M+), 352, 324, 309, 295, 266, 59, 28.

2'',2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.10.32). Yield 89%; m.p. 80.7 N 159.0 Iso;
MS(EI): m/z 396 (M+), 352, 324, 296, 266, 29.

25 **2'',2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.10.33).** Yield 85%; m.p. 59.6 N 142.7 Iso;
MS(EI): m/z 410 (M+), 324, 295, 266, 43.

Butyl 2'',2''-difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.10.34). Yield 90%; m.p. 53.7 N 135.7 Iso;
MS(EI): m/z 424 (M+), 324, 295, 266, 57, 41, 29.

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2'',2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.10.51). Yield 78%; m.p. 78.7 N 161.0 Iso;
MS(EI): m/z 410 (M+), 352, 295, 278, 266, 59.

2'',2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.10.52). Yield 98%; m.p. 58.8 N 147.7 Iso;
35 MS(EI): m/z 424 (M+), 352, 295, 266, 29; ¹H NMR (200MHz, CDCl₃) δ 7.63 – 7.58 (2H, m, OPh), 7.52-7.24 (6H, m, Ph),
7.06-6.96 (2H, m, Ph), 4.40-4.29 (2H, q, OCH₂), 2.68-2.60 (2H, t, PhCH₂), 1.72-1.56 (2H, m, CH₂), 1.44-1.30 (7H, m, CH₂,
CH₃), 0.95-0.88 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.01 (1 C, s, CH₃), 14.24 (1 C, s, CH₃), 22.49 (1 C, s, CH₂),
30.99 (1 C, s, CH₂), 31.55 (1 C, s, CH₃), 37.73 (1 C, s, CH₂Ph), 62.86 (1 C, s, CH₂O), 112.46-112.78 (1 C, d, Ph), 115.1-
115.4 (1 C, d, Ph), 117.62 (2 C, s, Ph), 125.2-125.5 (1 C, d, Ph), 126.25 (1 C, s, Ph), 128.0-128.2 (1 C, d, Ph), 128.7-128.9
40 (1 C, d, Ph), 129.5-129.6 (1 C, d, Ph), 130.4-130.5 (1 C, t, Ph), 131.62 (2 C, s, Ph), 134.3-134.4 (1 C, d, Ph), 136.4-136.6
(1 C, t, Ph), 149.5-149.6 (1 C, d, PhR), 151.75 (1 C, d, OCOO), 154.5-156.6 (1 C, d, PhF), 157.0-159.5 (1 C, d, PhF),
158.05 (1 C, d, PhO); HRMS calc. for C₂₆H₂₆O₃F₂: [M⁺] 424.1845, found: 424.1838.

2'',2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.10.53). Yield 72%; m.p. 56.5 N 134.0 Iso;
45 MS(EI): m/z 438 (M+), 352, 295, 278, 266, 43.

Butyl 2'',2''-difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.10.54). Yield 78%; m.p. 52.2 N 128.6 Iso;
MS(EI): m/z 452 (M+), 352, 295, 266, 57, 41, 29.

50 **2'',3'-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.11.31).** Yield 77%; m.p. 86.2 N 165.3 Iso;
MS(EI): m/z 382 (M+), 338, 323, 309, 294, 266, 59.

2'',3'-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.11.32). Yield 85%; m.p. 96.3 N 148.9 Iso;
MS(EI): m/z 396 (M+), 352, 324, 295, 266, 29.

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2'',3'-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.11.33). Yield 85%; m.p. 79.5 N 130.9 Iso;
MS(EI): m/z 410 (M+), 366, 324, 295, 266, 43.

Butyl 2'',3''-difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.11.34). Yield 93%; m.p. 75.1 N 122.3 Iso; MS(EI): m/z 424 (M+), 324, 295, 266, 57, 41, 29.

2'',3''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.11.51). Yield 88%; m.p. 65.1 N 150.4 Iso; MS(EI): m/z 410 (M+), 352, 309, 295, 266, 59.

2'',3''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.11.52). Yield 84%; m.p. 62.4 N 137.5 Iso; MS(EI): m/z 424 (M+), 380, 352, 295, 266, 201, 57, 41 29; ¹H NMR (200MHz, CDCl₃) δ 7.65 – 7.58 (2H, m, OPh), 7.49-7.25 (6H, m, Ph), 7.07-6.98 (2H, m, FPh), 4.40-4.29 (2H, q, OCH₂), 2.69-2.61 (2H, t, PhCH₂), 1.74-1.56 (2H, m, CH₂), 1.45-1.31 (7H, m, CH₂, CH₃), 0.95-0.88 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.0-14.2 (2 C, d, CH₃), 22.49 (1 C, s, CH₂), 30.90 (1 C, s, CH₂), 31.53 (1 C, s, CH₂), 37.73 (1 C, s, CH₂Ph), 62.88 (1 C, s, CH₂O), 111.9-112.1 (1 C, d, Ph), 113.5-113.7 (1 C, d, Ph), 116.69 (2 C, s, Ph), 123.3-124.5 (2 C, m, Ph), 127.3-127.6 (2 C, m, Ph) 129.4-129.6 (1 C, q, Ph), 130.2-130.4 (1 C, m, Ph), 130.79 (2 C, s, Ph), 136.7-136.8 (1 C, d, Ph), 140.07 (1 C, s, Ph), 148.4-148.5 (1 C, d, Ph), 151.77 (1 C, s, OCOO), 156.5-156.7 (1 C, q, PhF), 159.1-159.5 (2 C, m, OCOO, PhF) ; HRMS calc. for C₂₆H₂₆O₃F₂: [M⁺] 424.1845, found: 424.1860.

2'',3''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.11.53). Yield 72%; m.p. 50.1 N 121.2 Iso; MS(EI): m/z 438, 394, 352, 295, 266, 43.

Butyl 2'',3''-difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.11.54). Yield 78%; m.p. 53.3 N 115.6 Iso; MS(EI): m/z 452 (M+), 408, 352, 295, 266, 57, 41, 29.

2,2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.12.31). Yield 86%; m.p. 120.0 N 168.3 Iso; MS(EI): m/z 382 (M+), 353, 324, 309, 295, 266, 244, 183, 59.

2,2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.12.32). Yield 90%; m.p. 115.8 N 152.1 Iso; MS(EI): m/z 396 (M+), 352, 324, 295, 266, 244, 183, 147; ¹H NMR (200MHz, CDCl₃) δ 7.55 – 7.49 (2H, m, RPh), 7.47-7.23 (6H, m, RPh, FPh), 7.12-7.06 (2H, m, FPh), 4.40-4.29 (2H, q, OCH₂), 2.67-2.59 (2H, t, PhCH₂), 1.77-1.61 (2H, m, CH₂), 1.43-1.36 (3H, t, CH₃), 1.01-0.93 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.21 (2 C, s, CH₃), 24.51 (1 C, s, CH₂), 37.71 (1 C, s, CH₂Ph), 62.85 (1 C, s, CH₂O), 104.7-105.0 (1 C, d, Ph), 112.3-112.8 (1 C, d, Ph), 114.56 (1 C, s, Ph), 124.0-125.0 (2 C, m, Ph), 127.24 (2 C, s, Ph), 128.5-128.9 (3 C, m, Ph), 129.6-129.9 (1 C, q, Ph), 131.7-131.9 (1 C, q, Ph), 136.2-136.3 (1 C, d, Ph), 139.5-139.6 (1 C, d, Ph), 143.87 (1 C, s, PhR), 151.75 (1 C, s, OCOO), 153.1-153.2 (1 C, d, PhO), 155.8-158.6 (1 C, d, PhF), 162.0-164.6 (1 C, d, PhF) ; HRMS calc. for C₂₄H₂₂O₃F₂: [M⁺] 396.1532, found: 396.1528.

2,2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.12.33). Yield 85%; m.p. 83.0 N 136.5 Iso; MS(EI): m/z 410 (M+), 324, 295, 266, 244, 183, 43.

2,2''-Difluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.13.32). Yield 90%; m.p. 77.4 N 155.7 Iso; MS(EI): m/z 396 (M+), 352, 324, 295, 266, 183, 29; ¹H NMR (200MHz, CDCl₃) δ 7.63 – 7.56 (2H, m, Ph), 7.54 – 7.35 (4H, m, Ph), 7.12-6.96 (4H, m, Ph), 4.41-4.30 (2H, q, OCH₂), 2.67-2.59 (2H, t, PhCH₂), 1.78-1.59 (2H, m, CH₂), 1.44-1.38 (3H, t, CH₃), 1.02-0.94 (3H, t, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.0-14.2 (2 C, d, CH₃), 24.67 (1 C, s, CH₂), 39.28 (1 C, s, CH₂Ph), 62.91 (1 C, s, CH₂O), 104.2-104.9 (1 C, d, Ph), 114.1-115.1 (2 C, q, Ph), 126.0-126.1 (2 C, d, Ph), 127.6-127.7 (2 C, d, Ph), 127.9-128.0 (1 C, d, Ph), 128.6-129.7 (2 C, q, Ph), 131.3-131.5 (1 C, d, Ph), 131.7-131.9 (1 C, d, Ph), 135.0-135.2 (1 C, d, Ph), 136.8-137.0 (1 C, d, Ph), 148.1-148.3 (1 C, d, PhR), 151.79 (1 C, s, OCOO), 153.8-154.0 (1 C, d, PhO), 158.7-165.2 (2 C, dd, Ph) ; HRMS calc. for C₂₄H₂₂O₃F₂: [M⁺] 396.1532, found: 396.1538.

2,2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.13.51). Yield 94%; m.p. 86.6 N 159.2 Iso; MS(EI): m/z 410 (M+), 352, 295, 266, 59.

2,2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.13.52). Yield 96%; m.p. 69.5 N 145.1 Iso; MS(EI): m/z 424 (M+), 352, 295, 266, 29.

2,2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.13.53). Yield 93%; m.p. 63.3 N 132.8 Iso; MS(EI): m/z 438 (M+), 352, 295, 266, 43.

Butyl 2,2''-difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.13.54). Yield 86%; m.p. 42.0 N 127.2 Iso; MS(EI): m/z 452 (M+), 352, 295, 266, 57, 41, 29.

2,2''-Difluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl pentyl carbonate (I.13.55). Yield 96%; m.p. 52.2 N 122.5 Iso; MS(EI): m/z 466 (M+), 352, 295, 266, 71, 55, 43, 29.

2,2',3-Trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.14.32). Yield 78%; m.p. 100.2 N 141.7 Iso; MS(EI): m/z 414 (M+), 342, 313, 284, 183, 29.

2,2',3-Trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.14.33). Yield 89%; m.p. 92.6 N 127.7 Iso; MS(EI): m/z 428 (M+), 342, 313, 284, 183, 43, 41, 29; ¹H NMR (200MHz, CDCl₃) δ 7.55 – 7.47 (2H, m, RPh), 7.44-7.37 (3H, m, RPh, FPh), 7.29-7.25 (2H, m, FPh), 7.20-7.06 (2H, m, FPh), 4.31-4.25 (2H, t, OCH₂), 2.67-2.60 (2H, t, PhCH₂), 1.90-1.55 (4H, m, CH₂), 1.07-0.94 (6H, m, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 9.89 (1 C, s, CH₃), 14.22 (1 C, s, CH₃), 22.14 (1 C, s, CH₂), 24.65 (1 C, s, CH₂), 37.71 (1 C, s, CH₂Ph), 69.15 (1 C, s, CH₂O), 109.0-109.7 (1 C, d, Ph), 114.9-115.2 (1 C, dd, Ph), 117.1-118.1 (1 c, dt,Ph), 124.4-125.1 (2 C, m, Ph), 129.4-129.6 (1 C, dd, Ph), 129.86 (2 C, s, Ph), 131.4-131.7 (1 C, d, Ph), 131.99 (2 C, s, Ph), 133.1-133.4 (1 C, m, Ph), 134.9-136.0 (2 C, m, Ph), 140.1-140.2 (1 C, d, Ph), 143.32 (1 C, s, PhR), 148.7-148.9 (1 C, m, PhO), 149.8-156.0 (1 C, qd, PhF), 153.7-160.1 (1 C, dd, PhF); HRMS calc. for C₂₅H₂₃O₃F₃: [M⁺] 428.1594, found: 428.1608.

Butyl 2,2',3-trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.14.34). Yield 86%; m.p. 73.6 N 120.4 Iso; MS(EI): m/z 442 (M+), 313, 284, 183, 57, 41, 29.

2,2',3-Trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl pentyl carbonate (I.14.35). Yield 82%; m.p. 73.6 N 112.2 Iso; MS(EI): m/z 456 (M+), 342, 313, 284, 183, 71, 55, 41, 41, 29.

2,2',3-Trifluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.14.51). Yield 91%; m.p. 86.3 N 141.7 Iso; MS(EI): m/z 428 (M+), 370, 313, 284, 183 59.

Ethyl 2,2',3-trifluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.14.52). Yield 93%; m.p. 81.2 N 132.6 Iso; MS(EI): m/z 442 (M+), 370, 313, 284, 183, 29.

2,2',3-Trifluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.14.53). Yield 86%; m.p. 68.2 N 120.5 Iso; MS(EI): m/z 456 (M+), 370, 313, 284, 183, 43.

Butyl 2,2',3-trifluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl carbonate (I.14.54). Yield 92%; m.p. 70.7 N 114.4 Iso; MS(EI): m/z 470 (M+), 370, 313, 284, 183, 57, 41, 29.

2,2',3-Trifluoro-4''-pentyl-[1,1':4',1'']terphenyl-4-yl pentyl carbonate (I.14.55). Yield 96%; m.p. 76.5 N 107.6 Iso; MS(EI): m/z 484 (M+), 370, 313, 284, 183 71, 55, 43, 41, 29.

2',2'',3'-Trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl methyl carbonate (I.15.31). Yield 91%; m.p. 106.3 N 162.3 Iso; MS(EI): m/z 400 (M+), 371, 356, 341, 312, 284, 262, 219, 59.

2',2'',3'-Trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl ethyl carbonate (I.15.32). Yield 88%; m.p. 102.6 N 147.5 Iso; MS(EI): m/z 414 (M+), 370, 342, 313, 284, 262, 219, 157, 29; ¹H NMR (200MHz, CDCl₃) δ 7.63 – 7.57(2H, m, OPh), 7.36-7.20 (5H, m, Ph), 7.08-6.99 (2H, m, Ph), 4.28-4.22 (2H, t, OCH₂), 2.68-2.61 (2H, t, PhCH₂), 1.89-1.56 (4H, m, CH₂), 1.07-0.95 (6H, m, CH₃); ¹³C NMR δ_C (50 MHz; CDCl₃), 14.0-14.2 (2 C, d, CH₃), 24.64 (1 C, s, CH₂), 39.3-39.4 (1 C, d, CH₂Ph), 69.14 (1 C, s, CH₂O), 113.7-114.5 (1 C, d, Ph), 115.7-116.4 (3 C, m, Ph), 123.7-124.4 (1 C, q, Ph), 124.9-125.8 (1 C, dq, Ph), 126.8-126.9 (1 C, d, Ph), 129.2-129.8 (2 C, m, Ph), 131.5-13.6 (2 C, d, Ph), 135.0-135.3 (1 C, q, Ph), 136.5-136.9 (1 C, m, Ph), 142.3-143.4 (1 C, m, PhF), 147.1-147.3 (1 C, d, PhR), 148.8-14.9 (1 C, m, PhF), 150.84 (1 C, s, OCOO), 158.06 (1 C, s, PhO), 160.0-166.3 (1 C, q, PhF); HRMS calc. for C₂₄H₂₁O₃F₃: [M⁺] 414.1437, found: 414.1432.

2',2'',3'-Trifluoro-4''-propyl-[1,1':4',1'']terphenyl-4-yl propyl carbonate (I.15.33). Yield 83%; m.p. 89.9 N 128.9 Iso; MS(EI): m/z 428 (M+), 384, 342, 313, 284, 262, 43.

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