Supplementary material

Recognition of specific monosaccharides by fluorescence change through the suppression on Excited State Intermolecular Proton Transfer reactions

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1. Experimentals

1-aminopyrene (80.7 mg, 0.37 mmol) and 3- (Trifluoromethyl) phenyl isocyanate (105 μL, 0.74 mmol) were stirred in dry tetrahydrofuran (THF; 6 mL) at 80 ℃ under N_2 for 24 h. The pure desired product was obtained by recrystallization of the residue from ethanol to produce a white needle-like solid (22.9 mg, 15.3%). ^{1}H NMR (DMSO-d_6, 400 MHz): δ 7.35 (d, J = 7.4 Hz, 1H), 7.56 (d, J =7.8 Hz, 1H), 7.65 (d, J = 8.3 Hz, 1H), 8.05 (d, J = 7.6 Hz, 1H), 8.15 (d, J =8.8 Hz, 1H), 8.27 (d, J = 9.1 Hz), 8.27-8.30 (m, 3H), 8.33 (d, J = 9.3 Hz, 1H), 8.54 (d, J = 8.4 Hz, 1H), 9.26 (s, 1H), 9.46 (s, 1H). Anal. Calcd for $C_{24}H_{15}F_3N_2O$: C,71.28; H, 3.74; N, 6.93; found: C, 70.95; H, 3.57; N, 6.93.

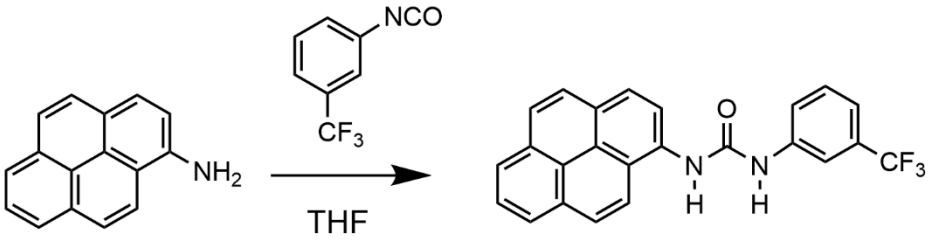

Fig. S1. The synthetic route of *m*-CF_3-1PUP.[1]

2. Absorption spectra of *m*-CF_3-1PUP in DMF in the presence of TBAAc

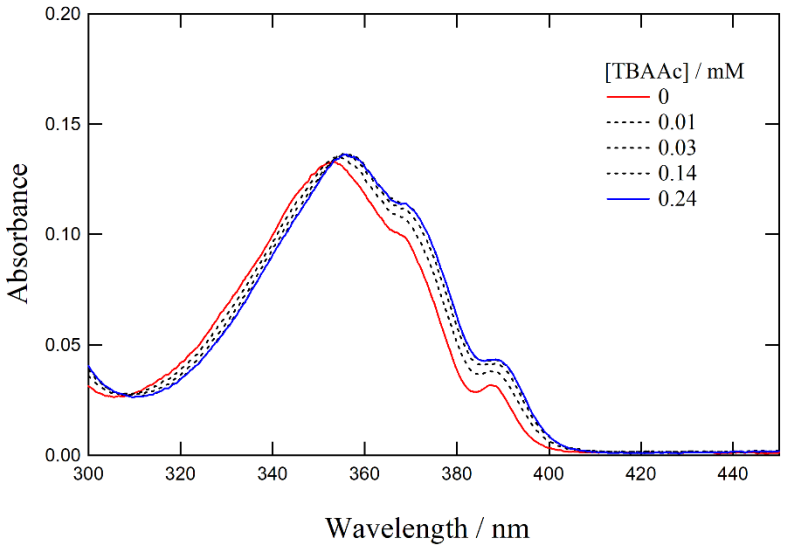

Fig. S2. Absorption spectra of *m*-CF_3-1PUP in various concentrations of TBAAc in DMF.

3. Fluorescence spectra of *m*-CF_3-1PUP in DMF in the presence of TBAAc

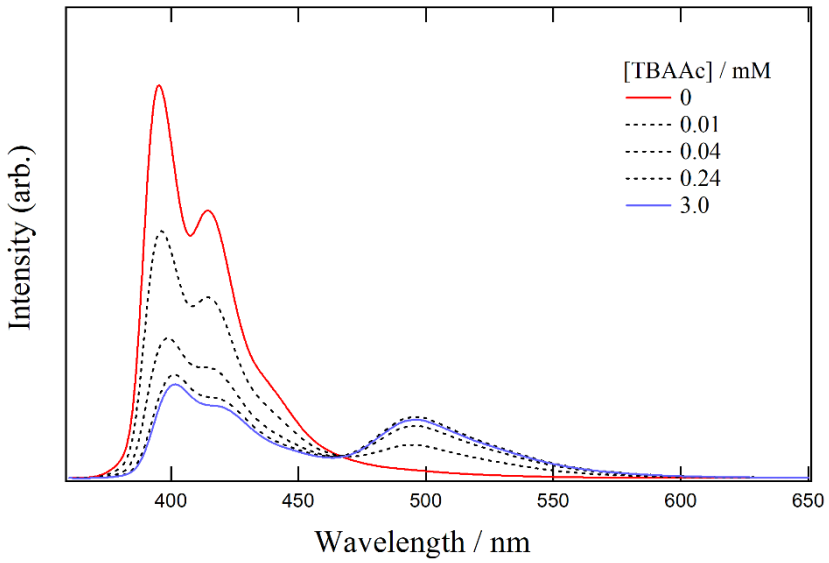

Fig. S3. Fluorescence spectra of *m*-CF_3-1PUP in various concentrations of TBAAc in DMF.

4. Fluorescence spectra of *m*-CF_3-1PUP in DMF in the presence of hydroxy compounds without TBAAc

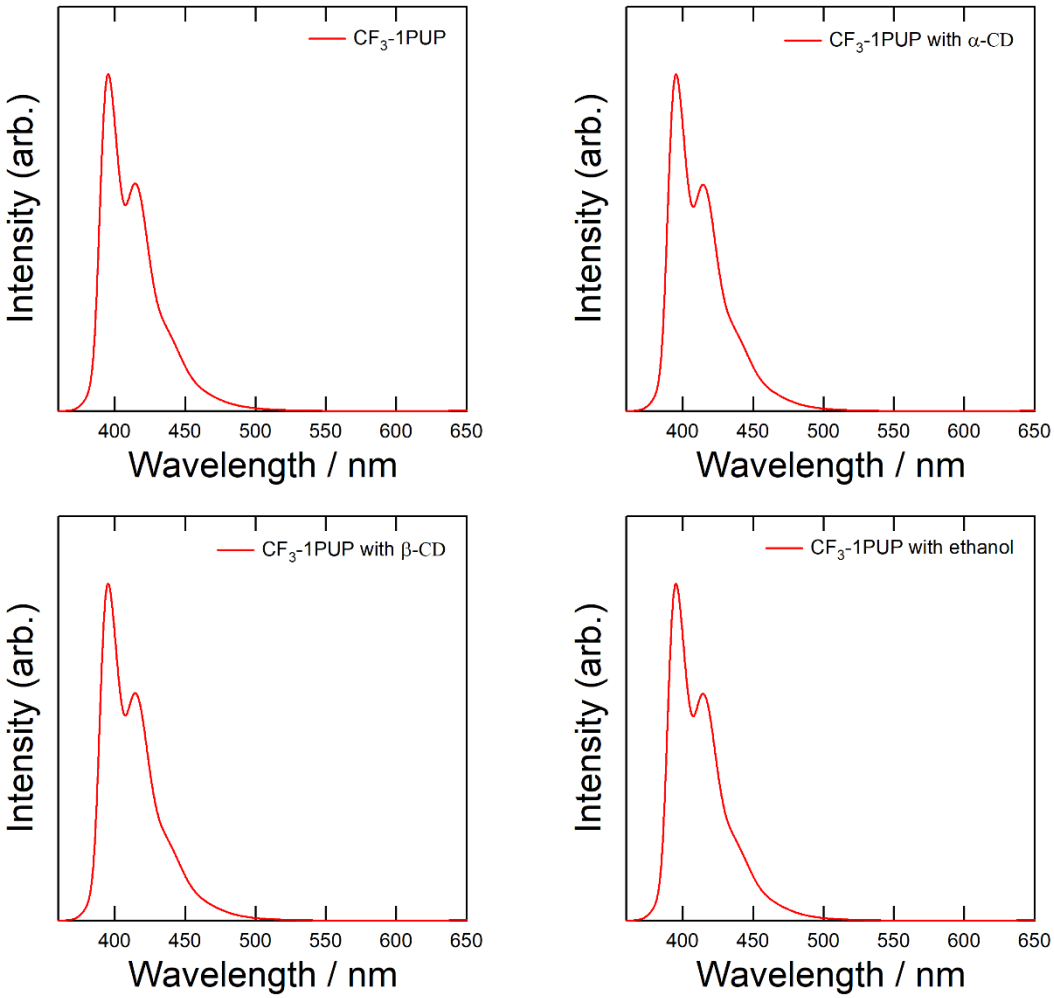

Fig. S4-1. Fluorescence spectra of *m*-CF_3-1PUP in DMF in the presence of α-CD, β-CD and ethanol without TBAAc.

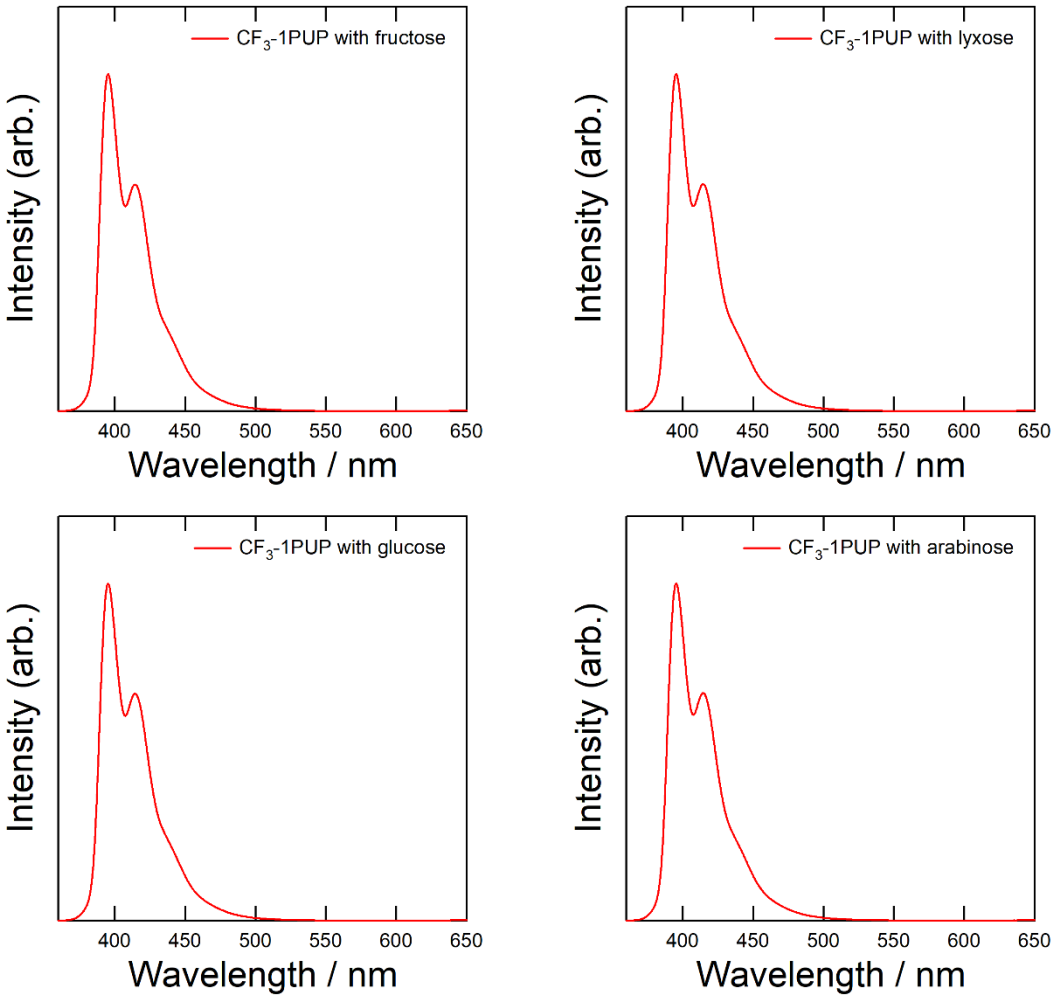

Fig. S4-2. Fluorescence spectra of *m*-CF_3-1PUP in DMF in the presence of fructose, glucose, lyxose and arabinose without TBAAc.

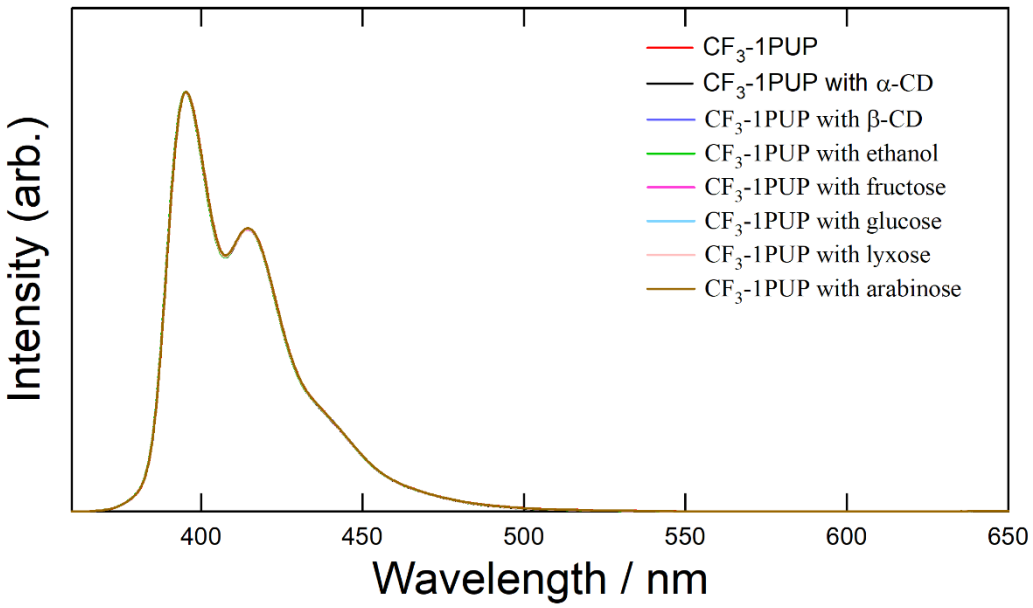

Fig. S4-3. Fluorescence spectra of *m*-CF_3-1PUP in DMF in the presence of all hydroxy compounds without TBAAc.

5. Fluorescence decay curves of *m*-CF_3-1PUP in DMF in the presence of TBAAc

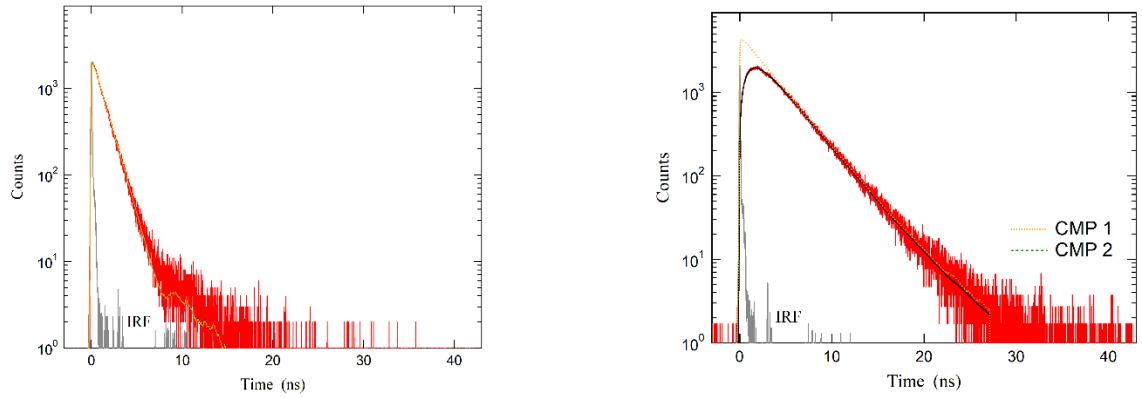

Fig. S5. Fluorescence decay curves of *m*-CF_3-1PUP observed at 410 nm (left) and 520 nm (right) excited at 375 nm in the presence of 10 mM TBAAc in DMF under Ar.

6. Fluorescence lifetimes of *m*-CF_3-1PUP in DMF in the presence of TBAAc

Table S1. Fluorescence lifetimes of *m*-CF_3-1PUP with TBAAc in DMF under Ar

λ_{obs}	τ / ns
410	1.16 (1.00)
520	1.19 (−1.00), 3.00 (1.00)

7. Absorption spectra of *m*-CF_3-1PUP in DMF in the presence of hydroxy compounds

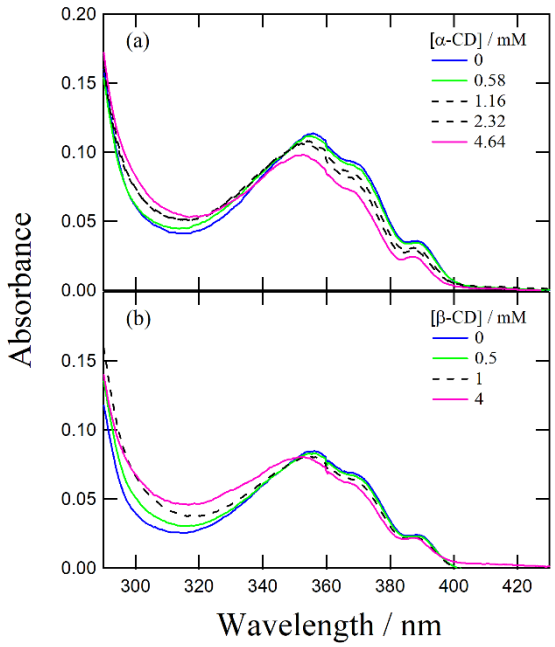

Fig. S6-1. Absorption spectra of *m*-CF_3-1PUP in the presence of 9 mM TBAAc in various concentrations of (a) α-CD and (b) β-CD in DMF.

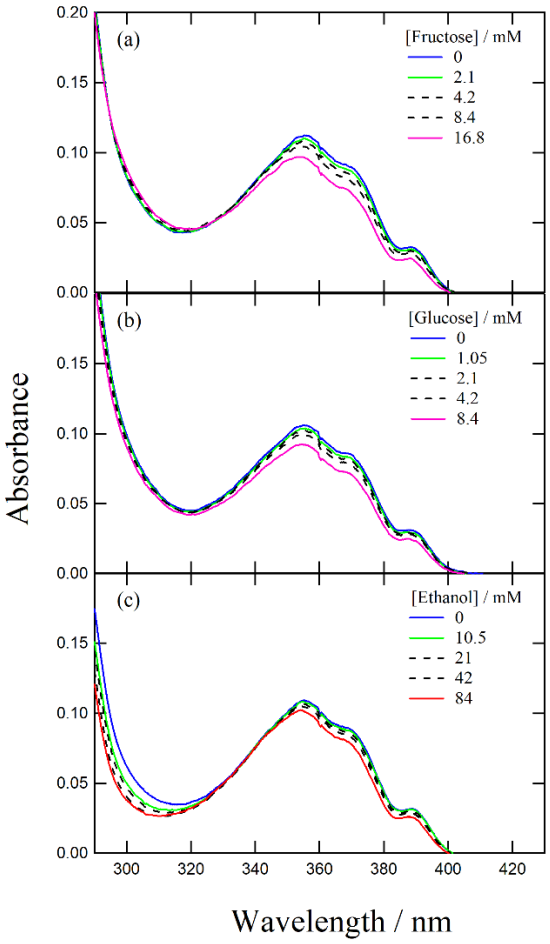

Fig. S6-2. Absorption spectra of *m*-CF_3-1PUP in the presence of 9 mM TBAAc in various concentrations of (a) fructose, (b) glucose and (c) ethanol in DMF.

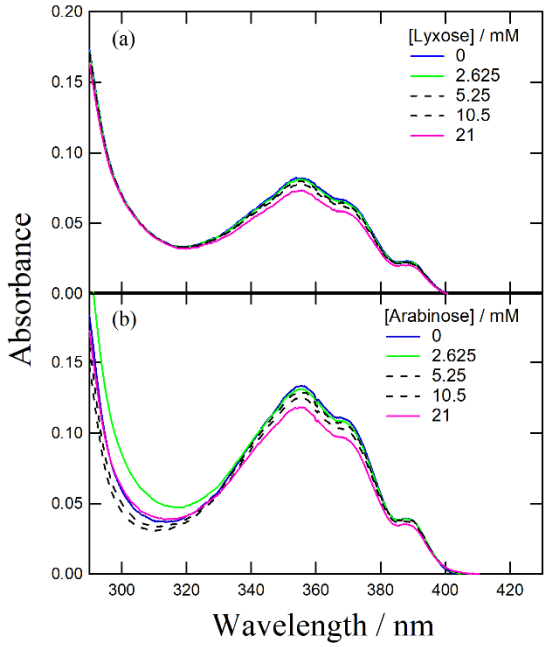

Fig. S6-3. Absorption spectra of *m*-CF_3-1PUP in the presence of 9 mM TBAAc in various concentrations of (a) lyxose and (b) arabinose in DMF.

8. Fluorescence lifetimes of *m*-CF_3-1PUP in DMF in the presence of hydroxy compounds

Table S2-1. Fluorescence lifetimes of *m*-CF_3-1PUP–TBAAc with different concentrations of α-CD and β-CD in DMF under Ar

Concentration	λ_{obs}	τ / ns
α-CD		
0.58 mM	410	1.04 (0.94), 4.96 (0.06)
	520	0.97 (−1.00), 3.11 (1.00)
1.16 mM	410	1.01 (0.93), 4.44 (0.07)
	520	0.98 (−1.00), 3.12 (1.00)
2.32 mM	410	1.04 (0.91), 5.00 (0.09)
	520	0.96 (−1.00), 3.19 (1.00)
4.64 mM	410	1.08 (0.85), 4.84 (0.15)
	520	0.99 (−1.00), 3.17 (1.00)
β-CD		
0.5 mM	410	1.21 (0.96), 5.14 (0.04)
	520	1.18 (−1.00), 3.26 (1.00)
1.0 mM	410	1.20 (0.88), 5.31 (0.12)
	520	1.16 (−1.00), 3.15 (1.00)
2.0 mM	410	1.26 (0.69), 5.82 (0.31)
	520	1.14 (−1.00), 3.31 (1.00)
4.0 mM	410	1.36 (0.46), 6.18 (0.54)
	520	1.09 (−1.00), 3.57 (1.00)

Table S2-2. Fluorescence lifetimes of *m*-CF_3-1PUP–TBAAc with different concentrations of fructose and glucose in DMF under Ar

Concentration	λ_{obs}	τ / ns
Fructose		
2.1 mM	410	1.21 (0.95), 5.28 (0.05)
	520	1.17 (−1.00), 3.30 (1.00)
4.2 mM	410	1.20 (0.91), 5.75 (0.09)
	520	1.20 (−1.00), 3.31 (1.00)
8.4 mM	410	1.25 (0.84), 5.46 (0.16)
	520	1.20 (−1.00), 3.25 (1.00)
16.8 mM	410	1.24 (0.71), 5.36 (0.29)
	520	1.17 (−1.00), 3.15 (1.00)
Glucose		
1.05 mM	410	1.18 (0.98), 4.85 (0.02)
	520	1.18 (−1.00), 3.26 (1.00)
2.1 mM	410	1.25 (0.96), 5.34 (0.04)
	520	1.22 (−1.00), 3.36 (1.00)
4.2 mM	410	1.19 (0.92), 5.67 (0.08)
	520	1.19 (−1.00), 3.35 (1.00)
8.4 mM	410	1.13 (0.86), 5.91 (0.14)
	520	1.21 (−1.00), 3.37 (1.00)

Table S2-3. Fluorescence lifetimes of *m*-CF_3-1PUP–TBAAc with different concentrations of ethanol in DMF under Ar

Ethanol		
10.5 mM	410	1.14 (0.97), 4.67 (0.03)
	520	1.19 (−1.00), 3.20 (1.00)
21 mM	410	1.19 (0.96), 4.86 (0.04)
	520	1.21 (−1.00), 3.24 (1.00)
42 mM	410	1.28 (0.92), 5.22 (0.08)
	520	1.30 (−1.00), 3.31 (1.00)
84 mM	410	1.47 (0.85), 5.78 (0.15)
	520	1.45 (−1.00), 3.32 (1.00)

Table S2-4. Fluorescence lifetimes of *m*-CF_3-1PUP–TBAAc with different concentrations of lyxose and arabinose in DMF under Ar

Lyxose		
2.625 mM	410	1.14 (0.99), 4.75 (0.01)
	520	1.20 (−1.00), 3.23 (1.00)
5.25 mM	410	1.17 (0.99), 5.31 (0.01)
	520	1.19 (−1.00), 3.23 (1.00)
10.5 mM	410	1.16 (0.98), 5.50 (0.02)
	520	1.20 (−1.00), 3.20 (1.00)
21 mM	410	1.17 (0.97), 5.79 (0.03)
	520	1.17 (−1.00), 3.36 (1.00)
Arabinose		
2.625 mM	410	1.14 (0.99), 3.76 (0.01)
	520	1.17 (−1.00), 3.06 (1.00)
5.25 mM	410	1.19 (0.98), 4.66 (0.02)
	520	1.21 (−1.00), 3.30 (1.00)
10.5 mM	410	1.19 (0.98), 4.95 (0.02)
	520	1.21 (−1.00), 3.34 (1.00)
21 mM	410	1.18 (0.96), 5.12 (0.04)
	520	1.18 (−1.00), 3.23 (1.00)

9. References

1. L. Huang, M. Yoshida and Y. Nishimura, *Journal of Molecular Liquids*, 2024, **398**, 124268.