Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information for:

Direct Observation of Adsorption Kinetics on Clays by Cation−π Interaction−Triggered Aggregation Luminescence

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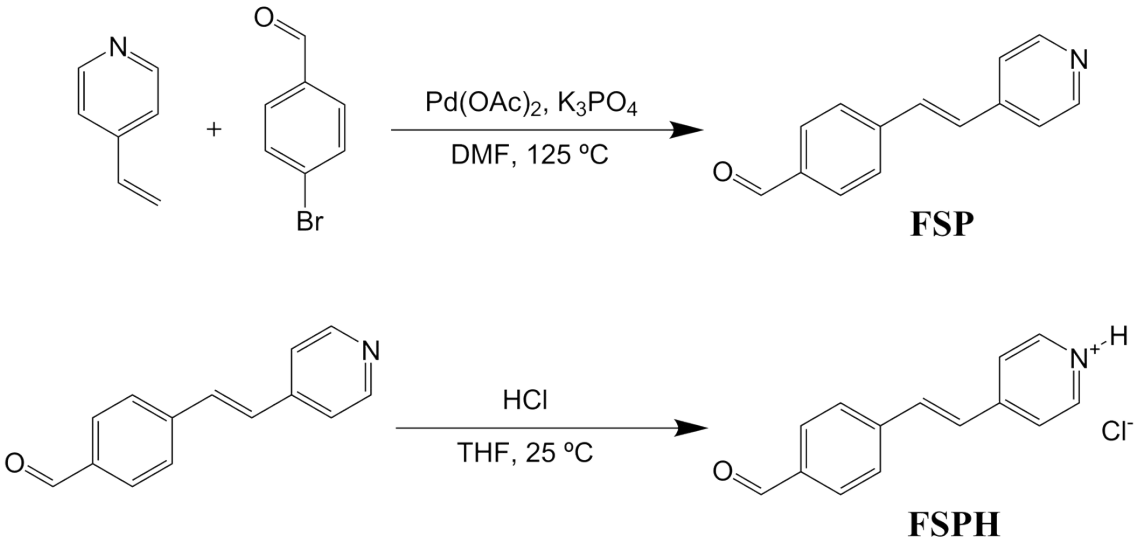

Fig. S1. Synthetic routes of FSP and FSPH. DMF = N, N-dimethylformamide, THF = Tetrahydrofuran.

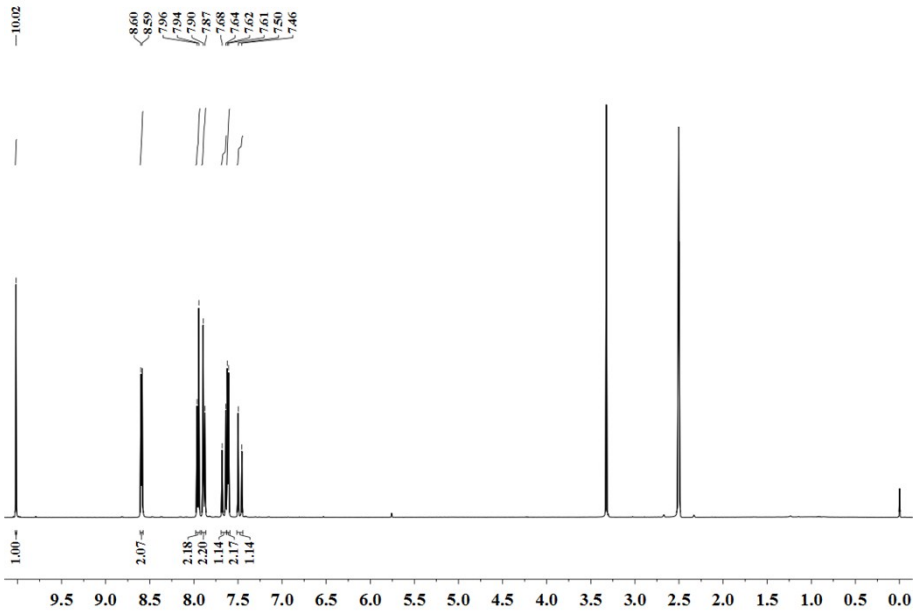

Fig. S2. ^{1}H-NMR spectrum of FSP in DMSO-d_6.

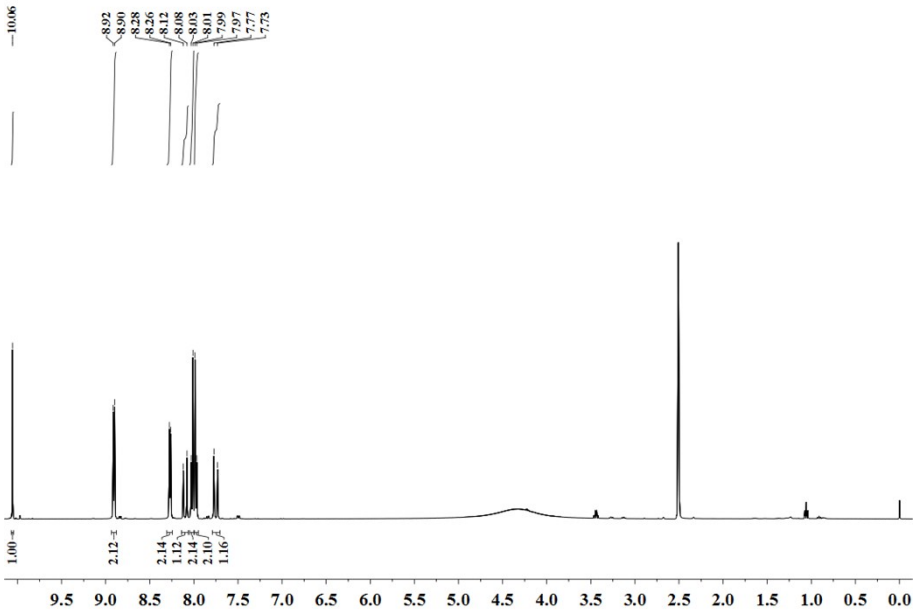

Fig. S3. ^{1}H-NMR spectrum of FSPH in DMSO-d_6.

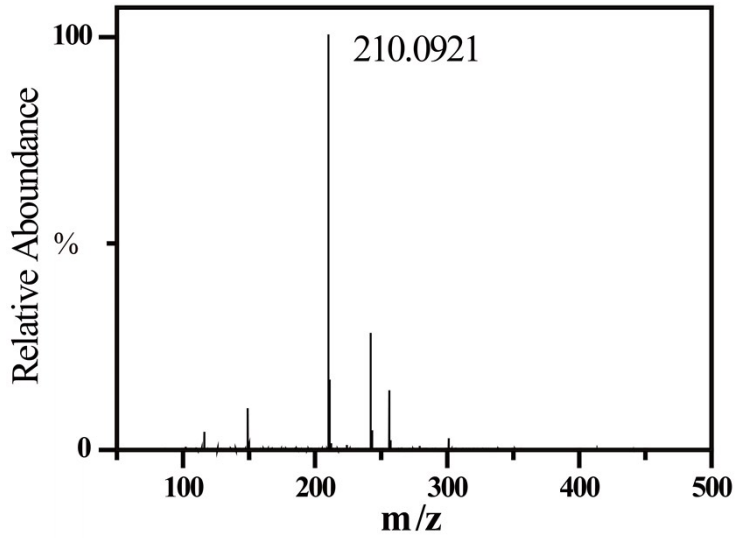

Fig. S4. Positive-ion mode ESI-MS spectrum of FSPH.

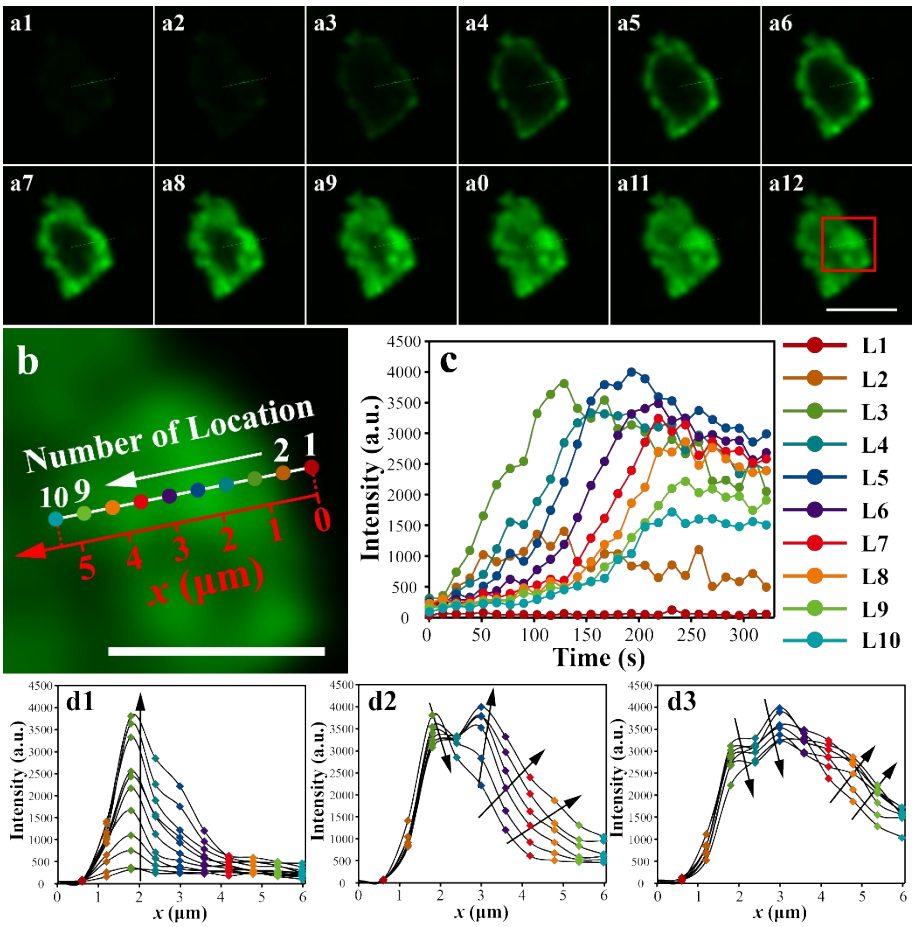

Fig. S5. (a1-a12) Time-varying fluorescence distribution of FSPH within MMT, scale bar: 10 μm. (b) Selected locations along the straight line from the edge to the center for quantification of fluorescence intensity, enlarged image of the red square in (a12), scale bar: 4 μm. (c) Time-varying fluorescence intensity of the numbered locations in (b), time interval between two dots: 12.875 seconds. (d1-d3) Three stages of time-varying fluorescence intensity of fourteen locations along the *x*-axis in (b), time interval between two curves: 12.875 seconds.

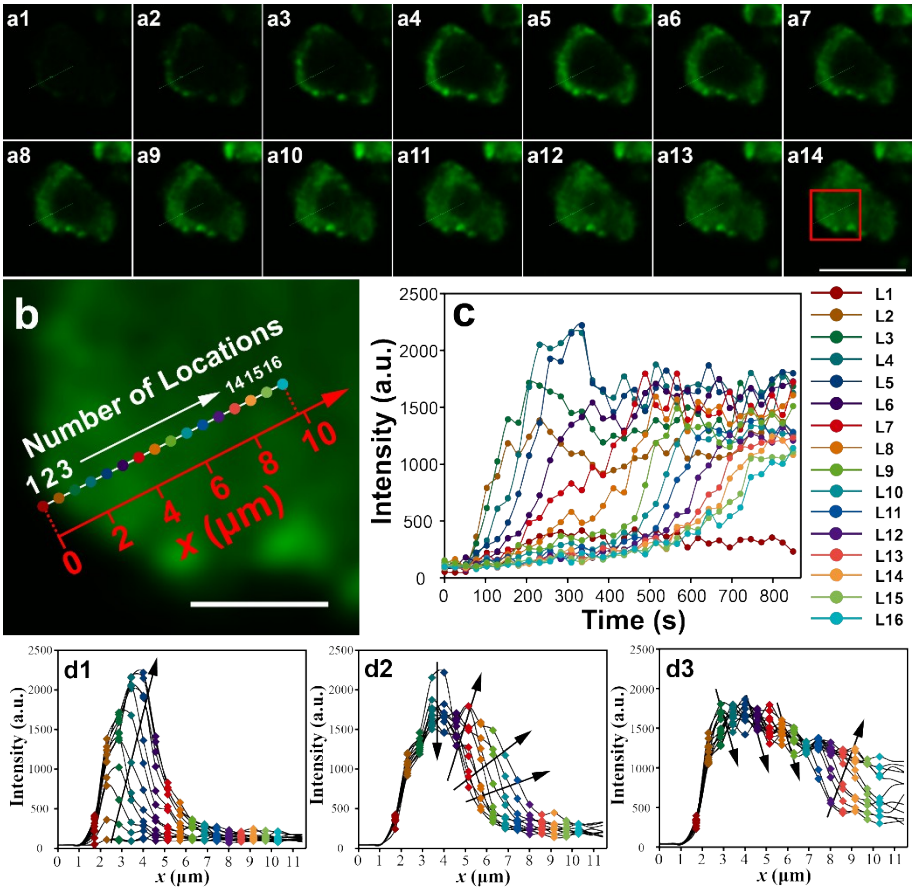

Fig. S6. (a1-a12) Time-varying fluorescence distribution of FSPH within MMT, scale bar: 20 μm. (b) Selected locations along the straight line from the edge to the center for quantification of fluorescence intensity, enlarged image of the red square in (a12), scale bar: 5 μm. (c) Time-varying fluorescence intensity of the numbered locations in (b), time interval between two dots: 12.875 seconds. (d1-d3) Three stages of time-varying fluorescence intensity of fourteen locations along the *x*-axis in (b), time interval between two curves: 12.875 seconds.

Table S1. Crystal data and structure refinement of FSPH.

Empirical formula	$C_{16}H_{12}F_3NO_3$
Formula weight	323.27
Temperature / K	106.4
Crystal system	triclinic
Space group	P-1
a / Å, b / Å, c / Å	7.0611(9), 9.8351(13), 11.0237(13)
α/°, β/°, γ/°	98.033(11), 106.241(11), 100.184(11)
Volume / $Å^3$	708.78(16)
Z	2
ρ_{calc} / mg mm^{-3}	1.515
μ / mm^{-1}	1.136
F(000)	332
Crystal size / mm^3	0.40 × 0.30 × 0.25
2Θ range for data collection	8.52 to 142.1°
Index ranges	$-5 \leq h \leq 8$, $-12 \leq k \leq 11$, $-13 \leq l \leq 13$
Reflections collected	4401
Independent reflections	2666[R(int) = 0.0235 (inf-0.9Å)]
Data/restraints/parameters	2666/0/208
Goodness-of-fit on F^2	1.078
Final R indexes [$I>2\sigma(I)$ i.e. $F_o>4\sigma(F_o)$]	$R_1 = 0.0390$, $wR_2 = 0.1079$
Final R indexes [all data]	$R_1 = 0.0424$, $wR_2 = 0.1117$
Largest diff. peak/hole / e $Å^{-3}$	0.355/-0.198
Flack Parameters	N
Completeness	0.973

Table S2. Fractional atomic coordinates ($\times 10^4$) and equivalent isotropic displacement parameters ($Å^2 \times 10^3$) for FSPH. U_{eq} is defined as 1/3 of the trace of the orthogonalised U_{IJ} tensor.

Atom	***x***	***y***	***z***	**U(eq)**
F1	1165.8(14)	-13548.2(10)	306.5(9)	33.1(3)
F2	4030.7(15)	-14095.1(10)	506.0(9)	34.7(3)
O3	4466.2(16)	-11787.2(11)	3094.6(9)	26.6(3)
F4	2544.4(17)	-14422.5(10)	1921.3(9)	38.9(3)
O2	4331.3(17)	-11196.6(11)	1178.7(10)	26.5(3)
N1	5620.3(17)	-8591.8(12)	2525.8(11)	20.0(3)
C3	9285(2)	93.3(15)	6432.5(14)	21.3(3)
C8	8020(2)	-3885.8(15)	5788.5(14)	19.8(3)
C5	8694(2)	-2402.5(15)	6448.0(13)	18.6(3)
C9	7465(2)	-4350.9(15)	4514.3(14)	20.4(3)
O1	11368.8(18)	2866.7(12)	7872.8(12)	34.3(3)
C4	8494(2)	-1287.4(15)	5784.2(13)	20.7(3)
C14	6428(2)	-6161.3(15)	2523.5(14)	21.3(3)
C7	10423(2)	-686.1(16)	8435.4(13)	21.9(3)
C10	6847(2)	-5834.9(15)	3863.9(13)	18.5(3)
C11	6636(2)	-6962.5(15)	4505.3(14)	19.9(3)
C13	5818(2)	-7546.3(15)	1877.3(14)	21.6(3)
C2	10295(2)	405.1(15)	7760.8(14)	19.9(3)
C6	9613(2)	-2077.3(15)	7787.2(14)	21.5(3)
C12	6019(2)	-8324.1(15)	3814.3(14)	20.1(3)
C16	4027(2)	-12021.5(15)	1916.6(13)	19.2(3)
C15	2929(2)	-13538.4(15)	1165.2(14)	22.2(3)
C1	11266(2)	1881.2(16)	8419.7(15)	25.7(3)

Table S3. Anisotropic displacement parameters ($Å^2 \times 10^3$) for FSPH. The anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+...+2hka \times b \times U_{12}]$.

Atom	$\mathbf{U_{11}}$	$\mathbf{U_{22}}$	$\mathbf{U_{33}}$	$\mathbf{U_{23}}$	$\mathbf{U_{13}}$	$\mathbf{U_{12}}$
F1	30.1(5)	27.5(5)	30.3(5)	5.3(4)	-3.4(4)	-1.5(4)
F2	48.1(6)	23.6(5)	34.8(5)	-0.6(4)	17.6(4)	11.8(4)
O3	34.2(6)	26.4(6)	15.1(5)	3.3(4)	4.1(4)	3.0(4)
F4	65.2(7)	21.9(5)	24.7(5)	11.1(4)	11.5(5)	-3.5(4)
O2	41.3(6)	16.6(5)	18.4(5)	3.7(4)	8.0(5)	0.3(4)
N1	21.7(6)	15.6(6)	20.4(6)	1.6(5)	5.0(5)	2.4(5)
C3	22.8(7)	19.8(7)	21.7(7)	6.6(6)	6.1(6)	5.1(5)
C8	21.8(7)	17.9(7)	20.1(7)	6.1(5)	7.1(6)	3.3(5)
C5	16.6(6)	19.9(7)	19.2(7)	3.8(5)	6.5(5)	2.6(5)
C9	24.4(7)	16.2(7)	20.4(7)	6.1(5)	6.3(6)	3.4(5)
O1	44.1(7)	20.1(6)	35.2(7)	4.1(5)	12.2(5)	-0.2(5)
C4	22.0(7)	22.3(7)	14.7(6)	3.3(5)	2.0(5)	3.8(5)
C14	25.4(7)	18.7(7)	20.7(7)	7.0(5)	6.7(6)	5.2(6)
C7	23.8(7)	25.5(8)	14.4(6)	1.2(5)	5.4(5)	3.8(6)
C10	16.6(6)	19.2(7)	19.6(7)	4.2(5)	4.9(5)	4.5(5)
C11	21.0(7)	21.0(7)	17.2(7)	3.7(5)	6.1(5)	3.5(5)
C13	26.2(7)	20.4(7)	16.6(7)	2.8(5)	5.1(6)	4.6(6)
C2	17.8(6)	20.3(7)	20.8(7)	0.7(5)	6.7(5)	3.6(5)
C6	26.1(7)	20.7(7)	19.2(7)	6.8(6)	8.0(6)	5.5(6)
C12	19.7(7)	19.2(7)	21.6(7)	6.7(5)	6.1(5)	3.2(5)
C16	21.3(7)	17.5(7)	18.5(7)	3.8(5)	5.0(5)	5.2(5)
C15	30.3(7)	18.1(7)	16.9(7)	5.4(5)	5.6(6)	3.5(6)
C1	26.2(7)	23.8(8)	23.8(8)	-1.1(6)	7.0(6)	3.5(6)

Table S4. Bond lengths for FSPH.

Atom	Atom	Length/Å	Atom	Atom	Length/Å
F1	C15	1.3343(18)	C5	C6	1.401(2)
F2	C15	1.3375(18)	C9	C10	1.4635(19)
O3	C16	1.2254(17)	O1	C1	1.2129(19)
F4	C15	1.3304(16)	C14	C10	1.401(2)
O2	C16	1.2596(17)	C14	C13	1.378(2)
N1	C13	1.3411(18)	C7	C2	1.390(2)
N1	C12	1.3460(18)	C7	C6	1.390(2)
C3	C4	1.380(2)	C10	C11	1.4042(19)
C3	C2	1.400(2)	C11	C12	1.373(2)
C8	C5	1.4655(19)	C2	C1	1.477(2)
C8	C9	1.336(2)	C16	C15	1.549(2)
C5	C4	1.407(2)			

Table S5. Bond angles for FSPH.

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C13	N1	C12	121.38(12)	C3	C2	C1	119.68(13)
C4	C3	C2	120.48(13)	C7	C2	C3	119.46(13)
C9	C8	C5	125.47(13)	C7	C2	C1	120.83(13)
C4	C5	C8	122.53(13)	C7	C6	C5	120.73(13)
C6	C5	C8	118.92(13)	N1	C12	C11	120.69(13)
C6	C5	C4	118.53(13)	O3	C16	O2	129.64(13)
C8	C9	C10	125.20(13)	O3	C16	C15	118.15(12)
C3	C4	C5	120.49(13)	O2	C16	C15	112.21(12)
C13	C14	C10	120.21(13)	F1	C15	F2	106.77(12)
C6	C7	C2	120.15(13)	F1	C15	C16	111.04(12)
C14	C10	C9	118.64(12)	F2	C15	C16	111.32(12)
C14	C10	C11	117.60(13)	F4	C15	F1	107.37(12)
C11	C10	C9	123.76(13)	F4	C15	F2	106.61(12)
C12	C11	C10	119.83(13)	F4	C15	C16	113.37(12)
N1	C13	C14	120.28(13)	O1	C1	C2	124.24(14)

Table S6. Torsion angles for FSPH.

A	B	C	D	Angle/°
O3	C16	C15	F1	122.49(14)
O3	C16	C15	F2	-118.69(14)
O3	C16	C15	F4	1.51(19)
O2	C16	C15	F1	-57.42(16)
O2	C16	C15	F2	61.40(16)
O2	C16	C15	F4	-178.40(13)
C3	C2	C1	O1	-4.8(2)
C8	C5	C4	C3	-175.18(13)
C8	C5	C6	C7	174.66(13)
C8	C9	C10	C14	-175.99(14)
C8	C9	C10	C11	4.3(2)
C5	C8	C9	C10	178.21(12)
C9	C8	C5	C4	11.4(2)
C9	C8	C5	C6	-167.18(14)
C9	C10	C11	C12	179.04(13)
C4	C3	C2	C7	-2.7(2)
C4	C3	C2	C1	175.34(13)
C4	C5	C6	C7	-3.9(2)
C14	C10	C11	C12	-0.7(2)
C7	C2	C1	O1	173.17(14)
C10	C14	C13	N1	0.0(2)
C10	C11	C12	N1	0.3(2)
C13	N1	C12	C11	0.3(2)
C13	C14	C10	C9	-179.19(13)
C13	C14	C10	C11	0.5(2)
C2	C3	C4	C5	-0.1(2)

C2	C7	C6	C5	1.2(2)
C6	C5	C4	C3	3.4(2)
C6	C7	C2	C3	2.1(2)
C6	C7	C2	C1	-175.89(13)
C12	N1	C13	C14	-0.4(2)

Table S7. Hydrogen atom coordinates (Å×10^4) and isotropic displacement parameters (Å^2×10^3) for FSPH.

Atom	***x***	***y***	***z***	**U(eq)**
H1	5231	-9451	2110	24
H3	9146	822	5984	26
H8	7975	-4560	6300	24
H9	7471	-3678	4000	24
H4	7825	-1482	4902	25
H14	6563	-5441	2069	26
H7	11053	-485	9323	26
H11	6913	-6788	5396	24
H13	5543	-7757	988	26
H6	9682	-2800	8248	26
H12	5874	-9069	4241	24
H1A	11836	2067	9312	31