Supplementary Information

A dynamic solvent-modulated single component emissive system for information encryption

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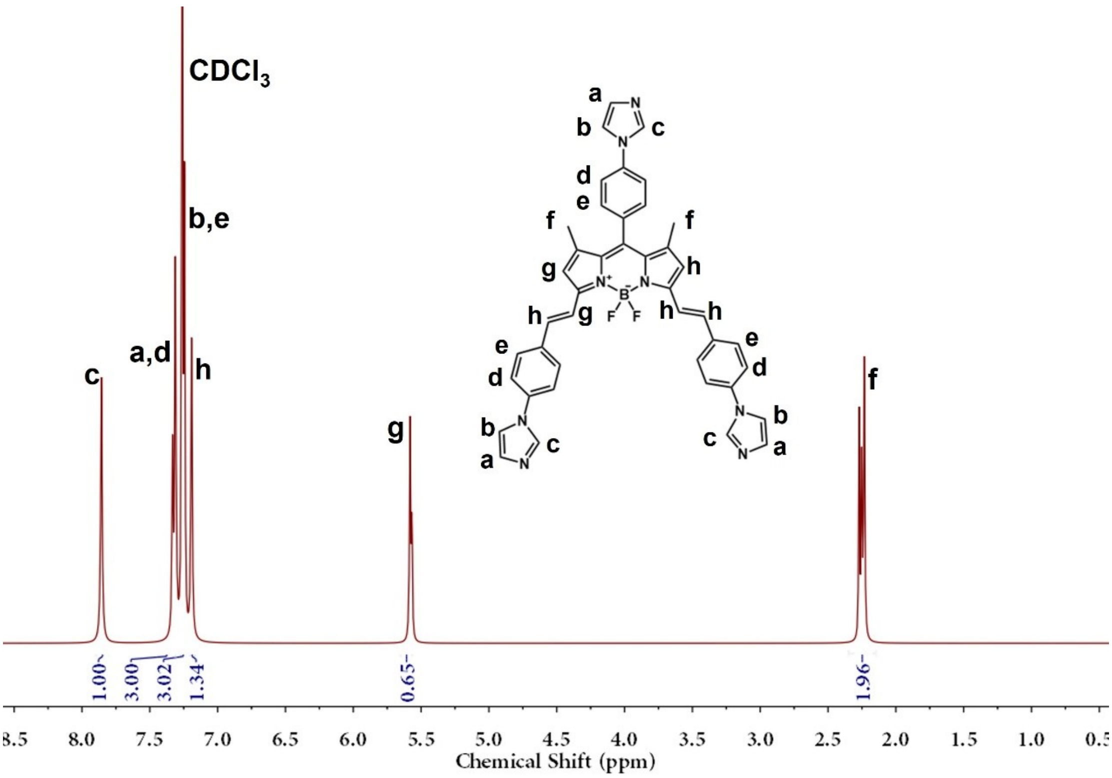

Fig. S1. The ^{1}H NMR spectrum of compound BODIPY-3Im in $CDCl_3$.

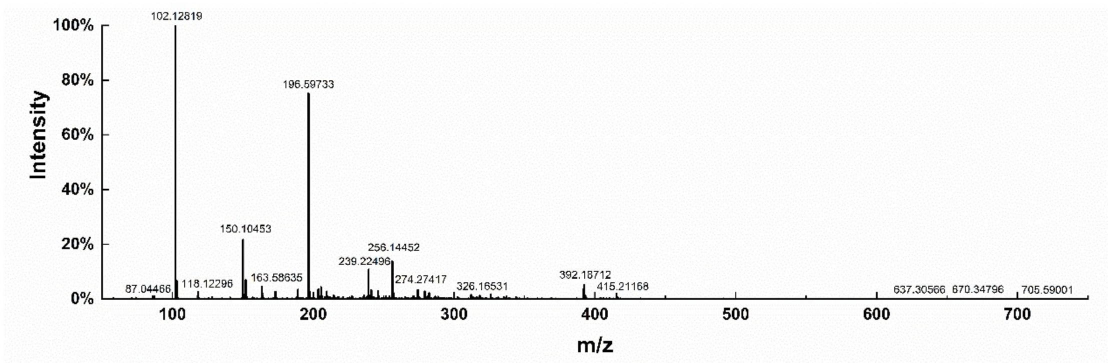

Fig. S2. High-resolution mass spectroscopy (HRMS) of BODIPY-3Im.

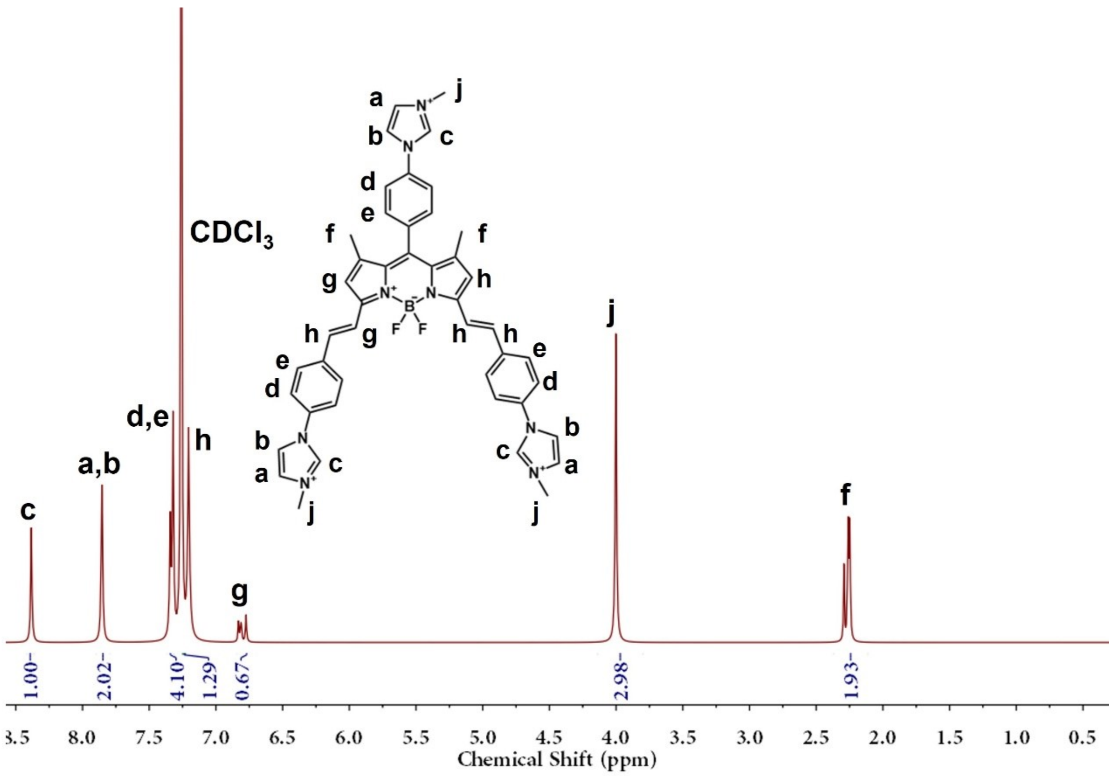

Fig. S3. The ^{1}H NMR spectrum of compound BODIPY-3ImMe in $CDCl_3$.

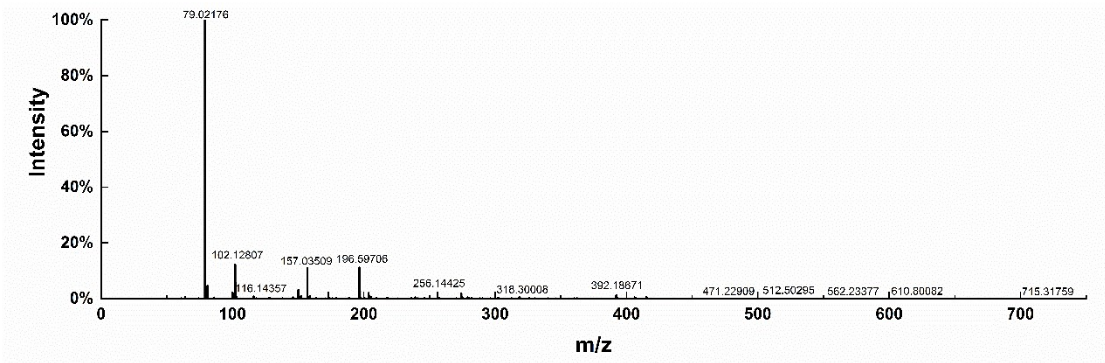

Fig. S4. HRMS result of BODIPY-3ImMe.

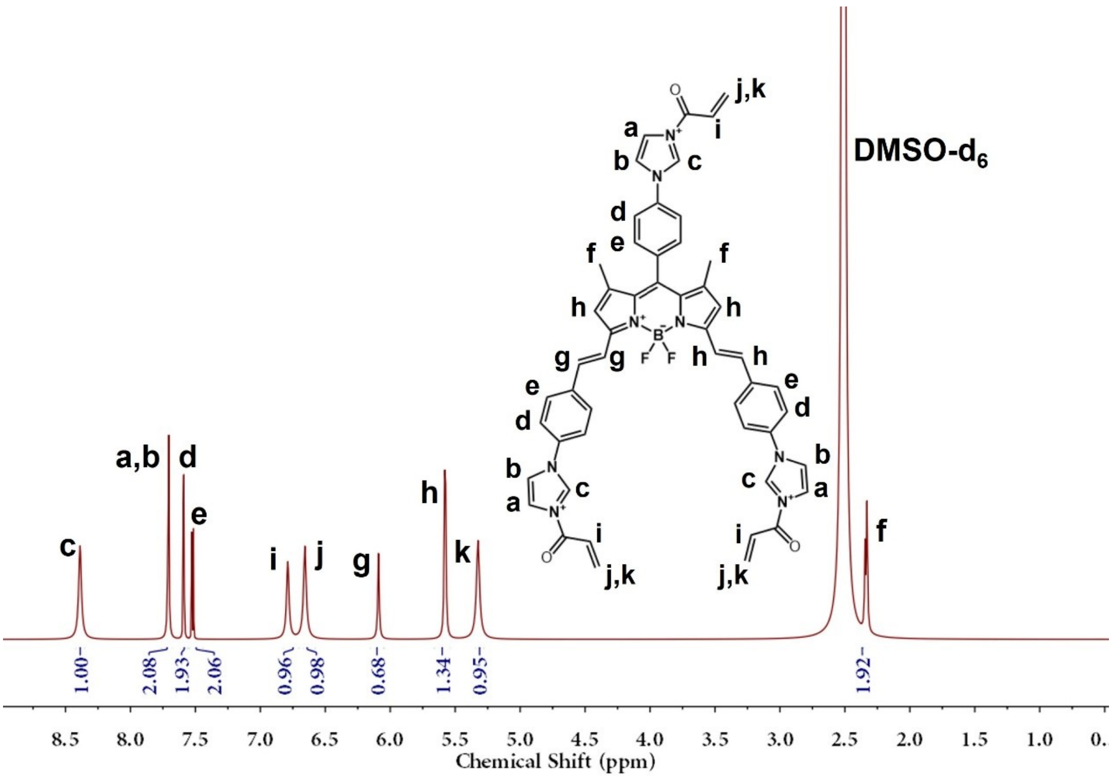

Fig. S5. The ^{1}H NMR spectrum of compound BODIPY-3ImV in DMSO-d_6.

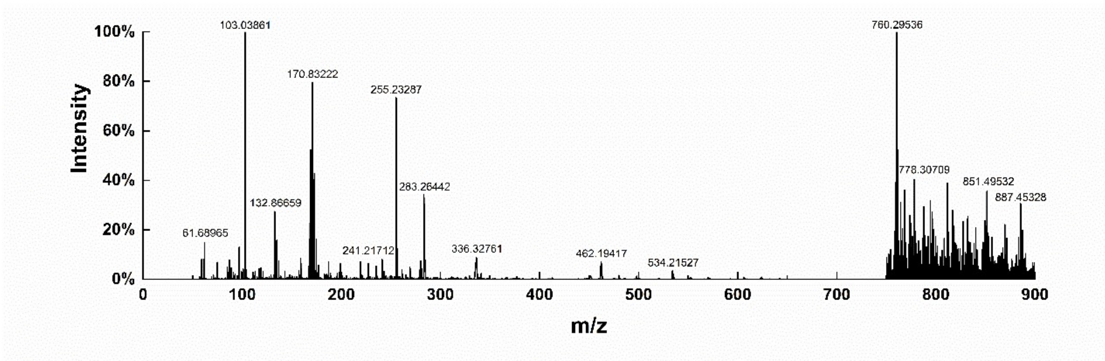

Fig. S6. HRMS result of BODIPY-3ImV.

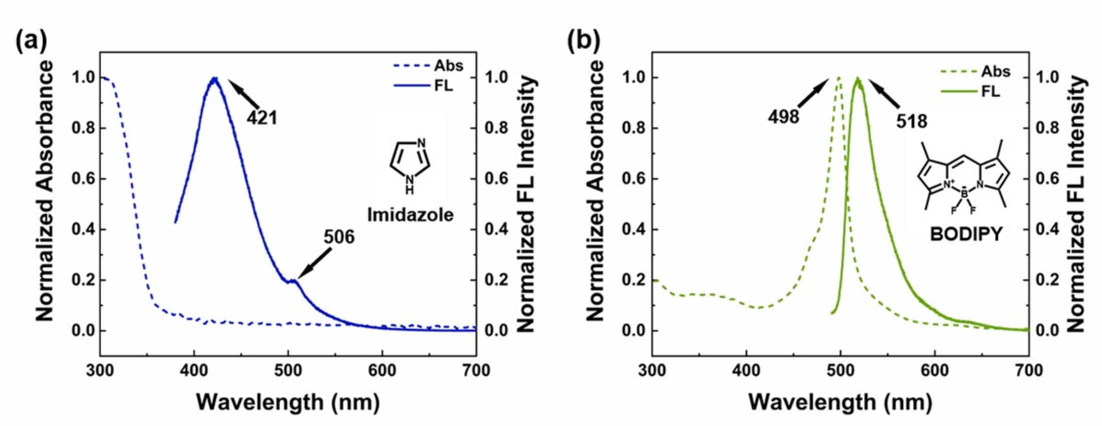

Fig. S7. Normalized UV-vis absorption and fluorescence emission spectra of (a) imidazole and (b) BODIPY core in methanol with a concentration of 25 μM. λ_{ex} = 365 nm.

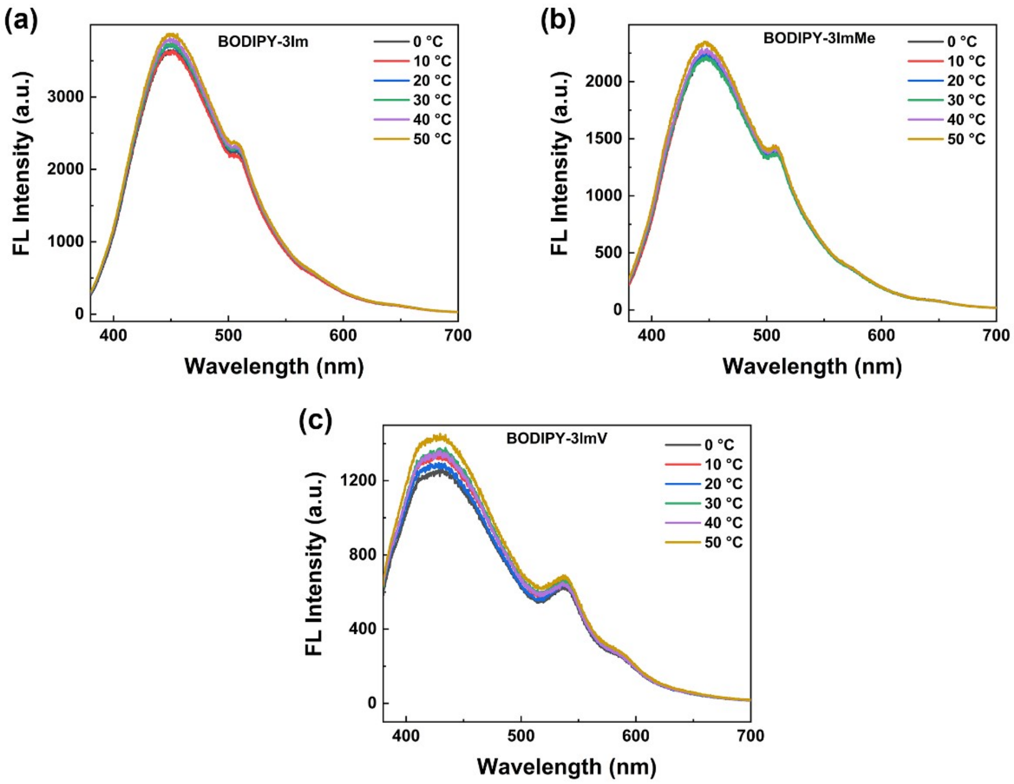

Fig. S8. Fluorescence spectra of (a) BODIPY-3Im, (b) BODIPY-3ImMe, and (c) BODIPY-3ImV solutions in MeOH at different temperature.

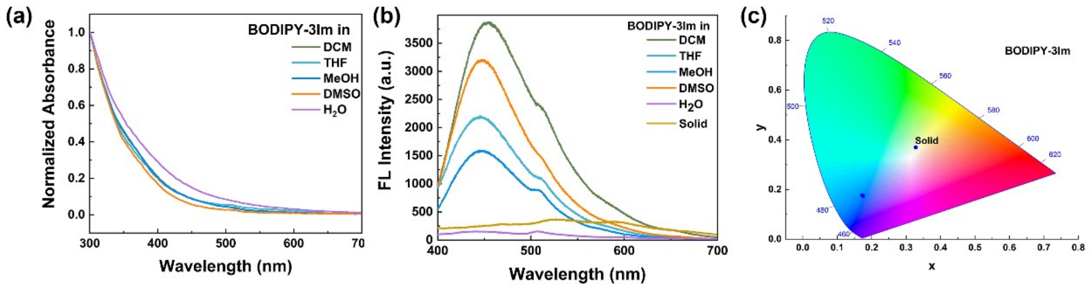

Fig. S9. (a) Normalized absorption spectra of BODIPY-3Im in dichloromethane (DCM), tetrahydrofuran (THF), methanol (MeOH), dimethyl sulfoxide (DMSO), and H_2O. (b) FL intensity of BODIPY-3Im in in DCM, THF, MeOH, DMSO H_2O and solid state. (c) The CIE 1931 chromaticity diagram of BODIPY-3Im in different solvents and solid state.

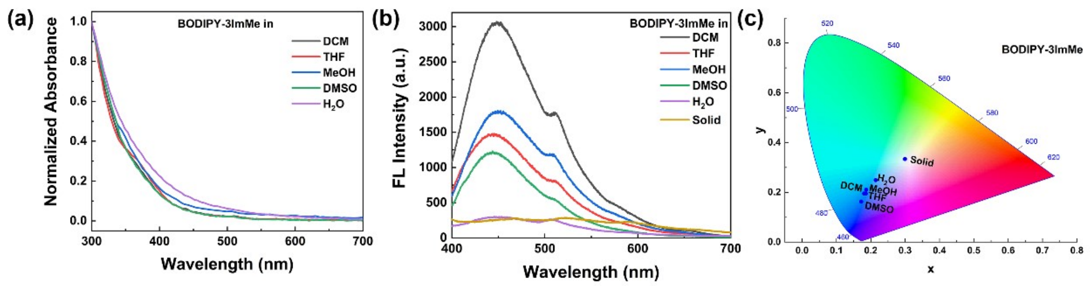

Fig. S10. (a) Normalized absorption spectra of BODIPY-3ImMe in DCM, THF, MeOH, DMSO, and H_2O. (b) FL intensity of BODIPY-3ImMe in in DCM, THF, MeOH, DMSO H_2O and solid state. (c) The CIE 1931 chromaticity diagram of BODIPY-3ImMe in different solvents and solid state.

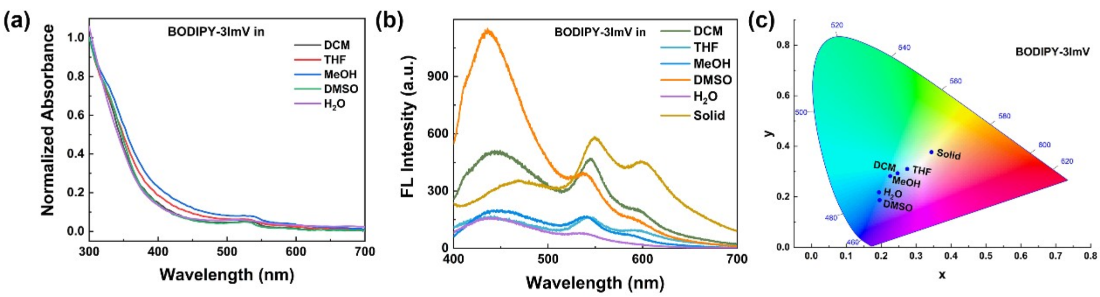

Fig. S11. (a) Normalized absorption spectra of BODIPY-3ImV in DCM, THF, MeOH, DMSO, and H_2O. (b) FL intensity of BODIPY-3ImV in in DCM, THF, MeOH, DMSO H_2O and solid state. (c) The CIE 1931 chromaticity diagram of BODIPY-3ImV in different solvents and solid state.

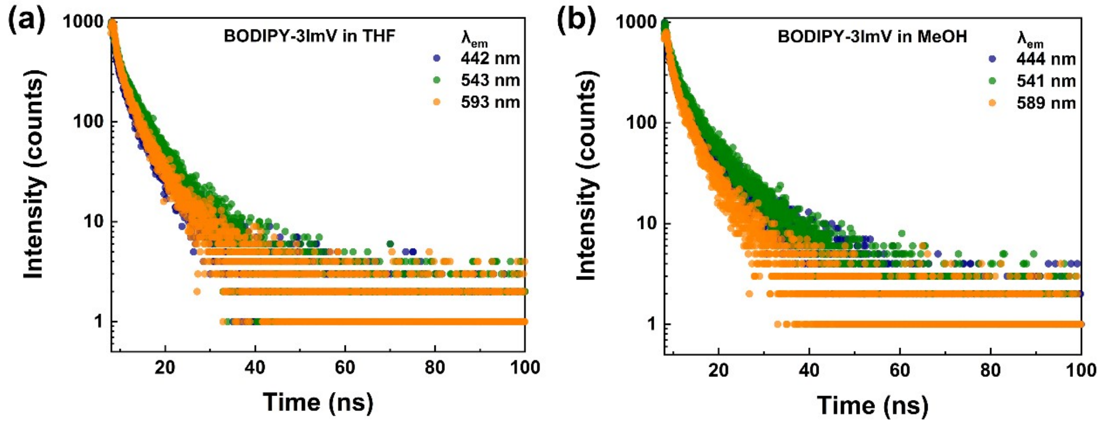

Fig. S12. Fluorescence decay curves and average lifetimes of BODIPY-3ImV in THF (a) and in MeOH (b) at three emission wavelengths.

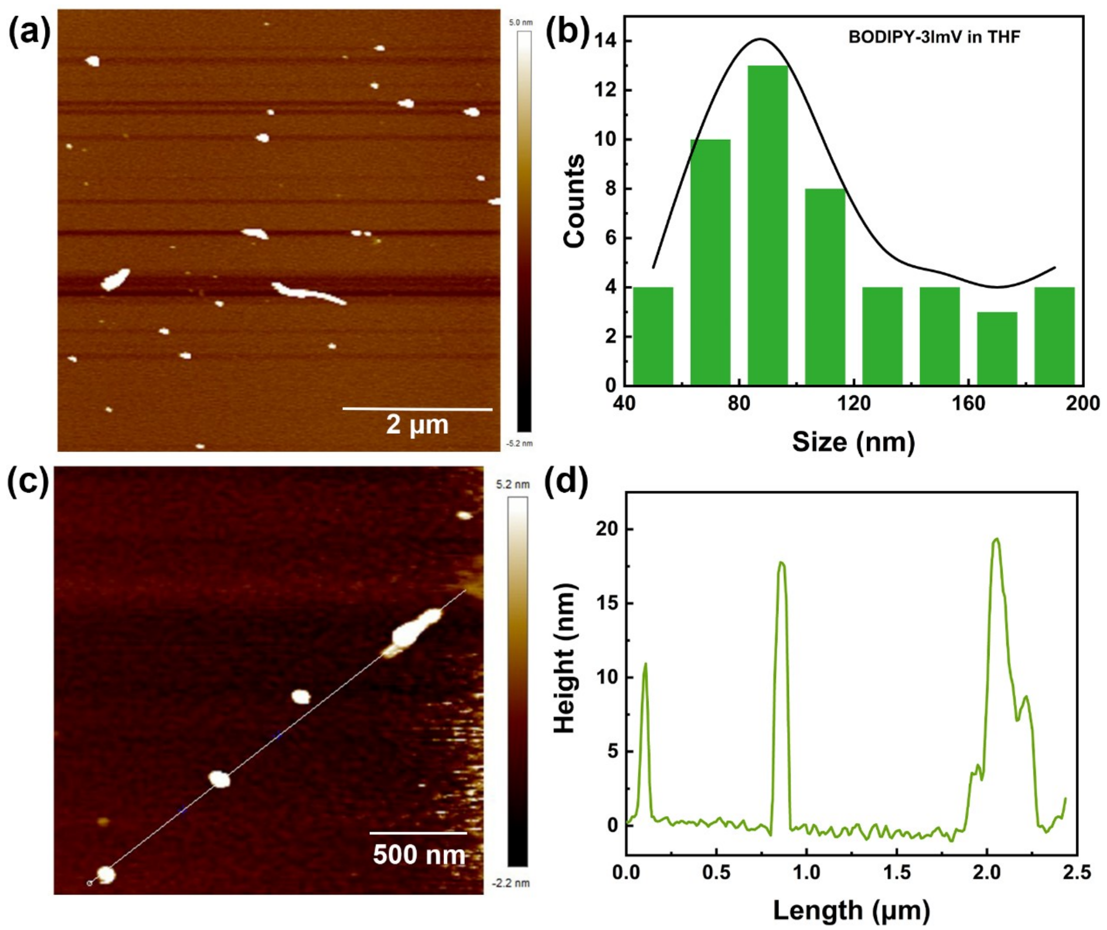

Fig. S13. (a) (c) AFM height-contrast images of BODIPY-3ImV nanoparticles formed in THF. (b) Counted size distribution of BODIPY-3ImV nanoparticles based on image (a). (d) Sectional analysis of BODIPY-3ImV nanoparticles along the line in (c).

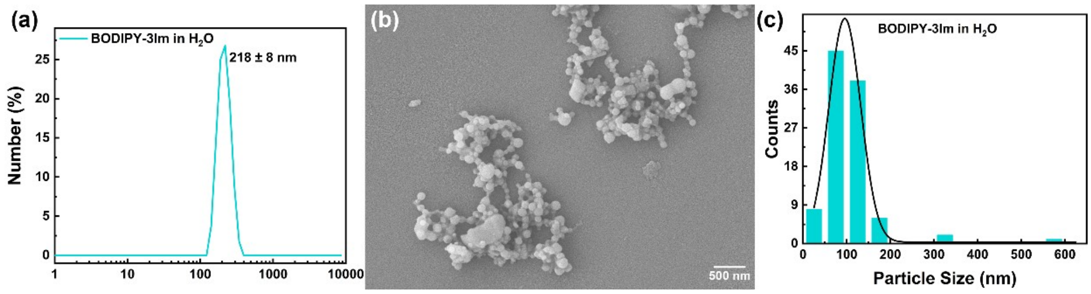

Fig. S14. (a) Size distribution of BODIPY-3Im in H_2O (25 °C, 200 μM) determined by DLS. (b) SEM image of BODIPY-3Im nanoparticles in H_2O. (c) Counted size distribution of BODIPY-3Im nanoparticles.

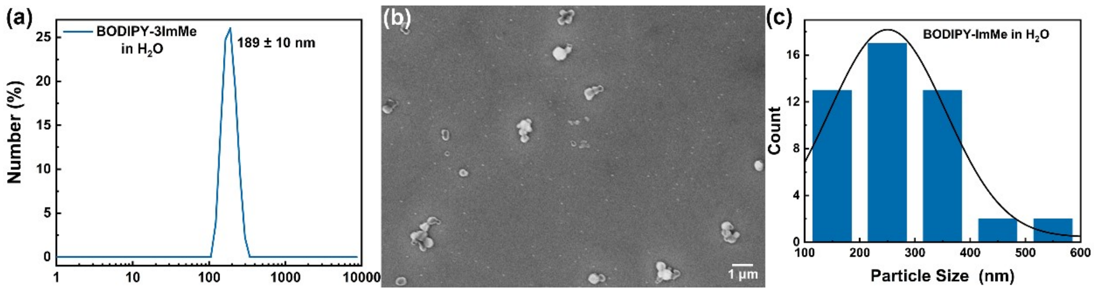

Fig. S15. (a) Size distribution of BODIPY-3ImMe in H_2O (25 °C, 200 μM) determined by DLS. (b) SEM image of BODIPY-3ImMe nanoparticles in H_2O. (c) Counted size distribution of BODIPY-3ImMe nanoparticles.

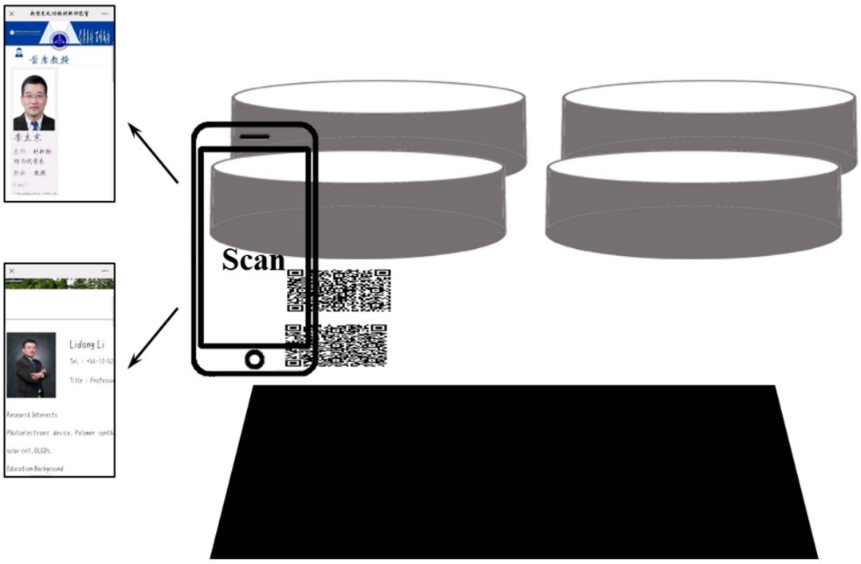

Fig. S16. A schematic illustration for the information orthogonal encryption in "sandwich" structure.

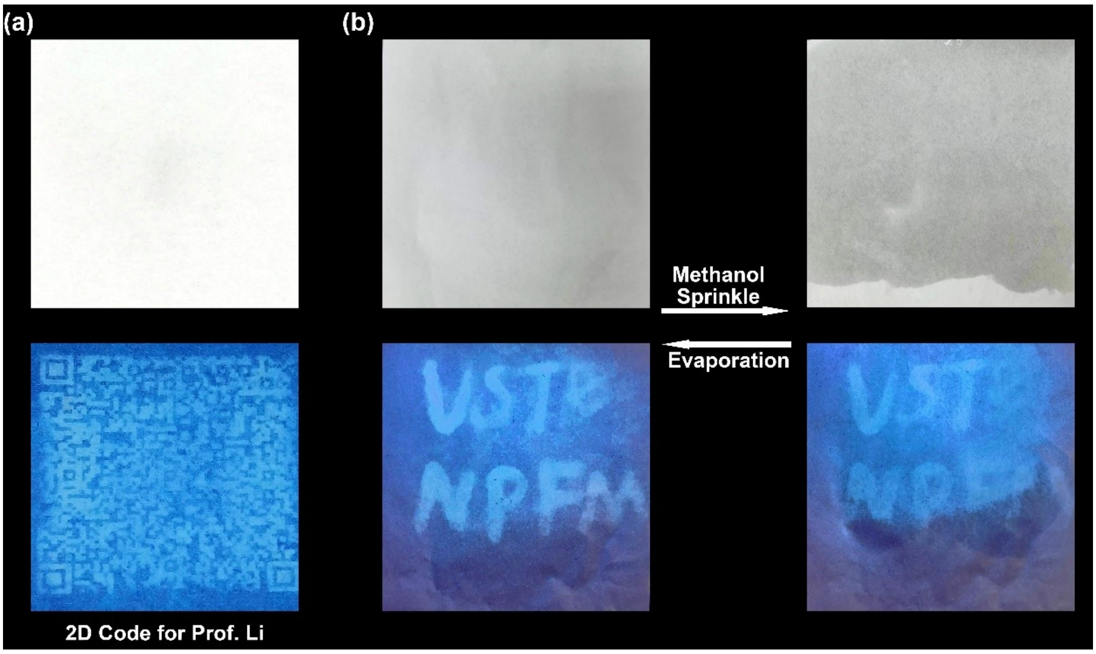

Fig. S17. (a) Photograph of the printing pattern 2D code under natural and UV light. (b) Fluorescence images of the printing pattern 'USTB-NPFM' before and after sprinkled by methanol under natural and UV light, indicating the stability and time dual encryption functions.

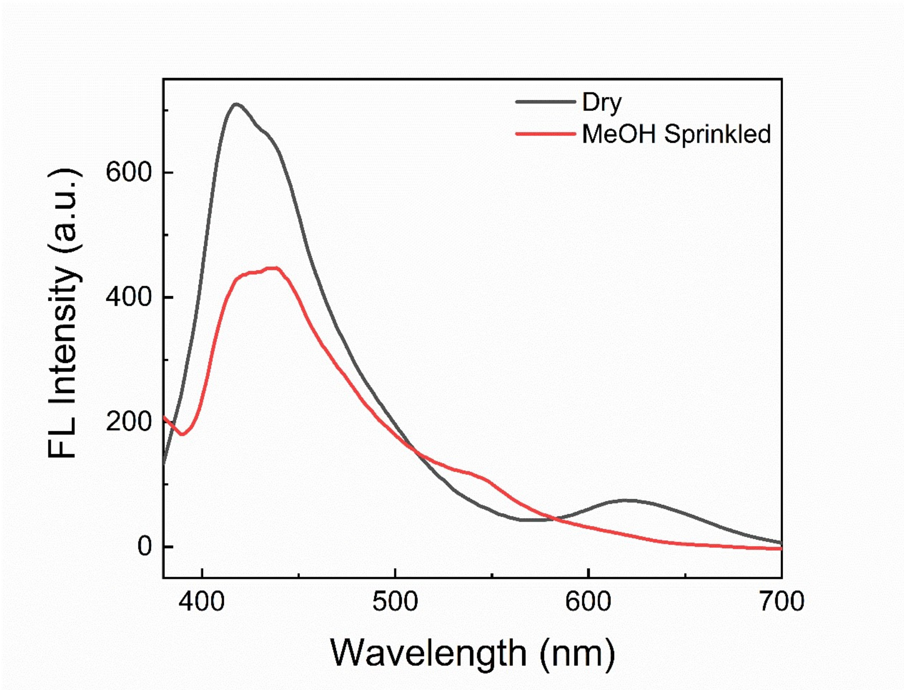

Fig. S18. The fluorescence of the printing 2D code at dry condition and after MeOH sprinkle.

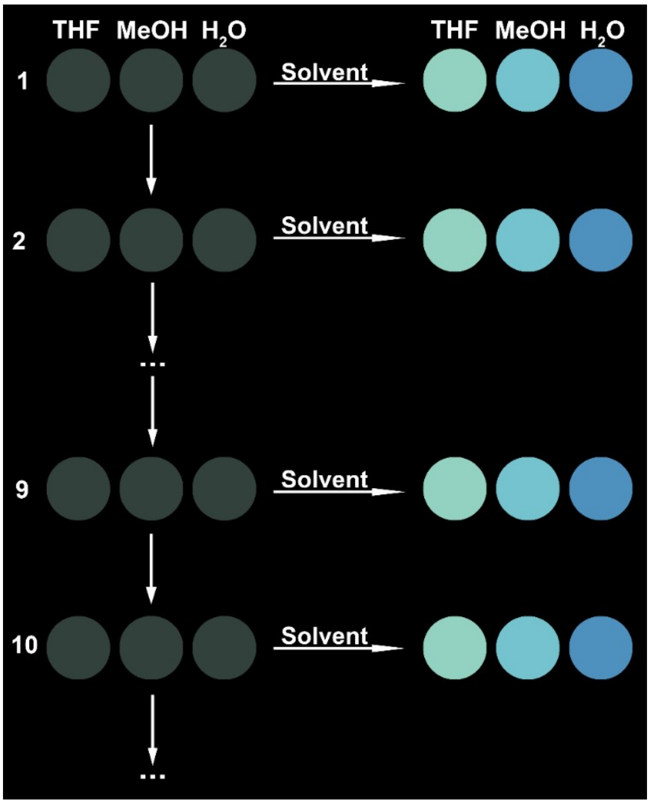

Fig. S19. Illustrations of 10 repeating cycles of time-dependent information encryption material.

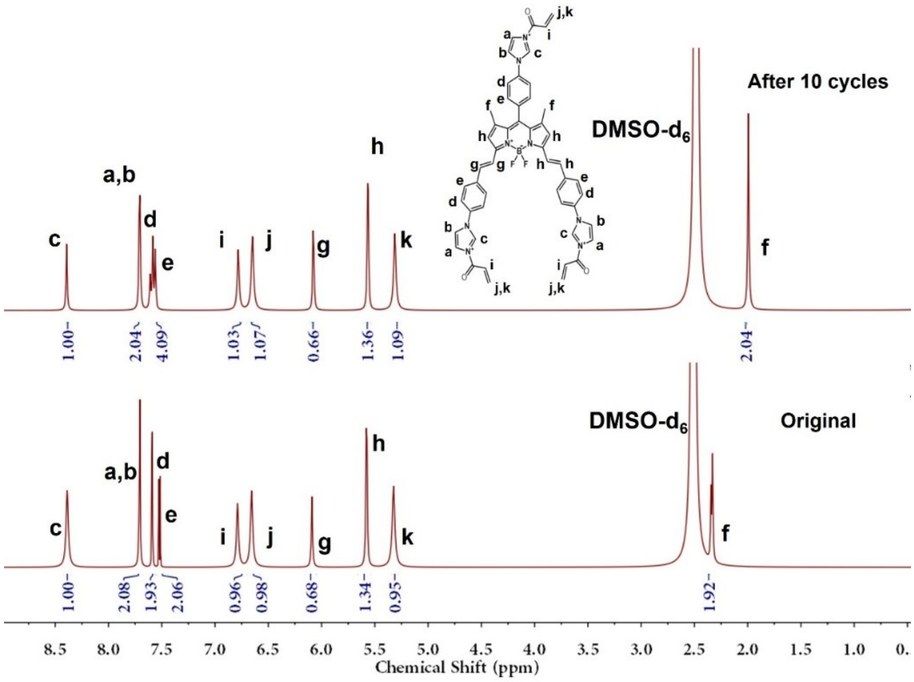

Fig. S20. ^{1}H NMR spectrum of BODIPY-3ImV in DMSO-d_6 after ten written-erased cycles.

Table S1. Fluorescence lifetime parameters of the three emission peaks of BODIPY-3ImV in THF or MeOH. λ_{ex} = 375 nm.

	λ_{em}	B_i	τ_i (ns)	f_i (%)	Adj.R^2	$\langle\tau\rangle$ (ns)
THF	442 nm	716 209	1.31 6.23	41.86 58.14	0.99591	4.17
	543 nm	569 369	1.17 5.98	23.18 76.82	0.99564	4.86
	593 nm	713 276	1.14 5.47	35.08 64.92	0.99962	3.95
MeOH	448 nm	649 189	1.45 8.12	38.06 61.94	0.99529	5.58
	540 nm	590 252	1.77 7.87	34.49 65.51	0.99415	5.76
	589 nm	542 229	1.18 5.28	34.65 65.35	0.99531	2.40

Supplementary Movie S1: The recognition of tow 2D codes through a smartphone, resulting in the information of NPFM Lab and Prof. Li, suggesting the achievement of the orthogonal encryption strategy.

Supplementary Movie S2: The recognition of 2D code by solid state of BODILY-3ImV through a smartphone, resulting in information of Prof. Li.

Supplementary Movie S3: The silica gel powder containing BODIPY-3ImV was loaded in a container. The addition of THF, MeOH and H_2O resulted in green, cyan and blue fluorescence that automatically faded with time. Movie speed up: 6200×.