

Water-Stable, Adaptive and Electroactive Supramolecular Ionic Material and Its Application in Biosensing

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S1 Stoichiometry of SIM

Table S1. Elemental analysis and XPS data of SIM

Sample	Elemental analysis				Calculated formula
SIM	C (wt%)	H (wt%)	N (wt%)		C ₁₀ (mim) ₂ ·ABTS
	50.45	5.70	13.08		
	50.46	5.92	13.11		
	XPS analysis				
	C (at%)	O (at%)	N (at%)	S (at%)	
	65.44	13.28	13.33	7.95	

S2 TGA curves of precursors of the formed SIM

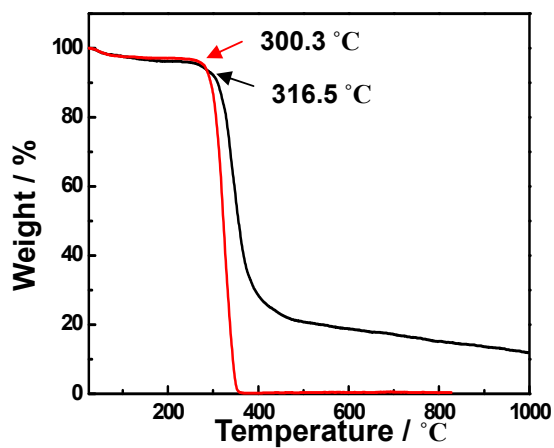


Figure S1. TGA curves of the precursors: bromide salt of $C_{10}(\text{mim})_2$ (red line), and amino salt of ABTS (black line).

S3 Salt stability of the as-prepared SIM

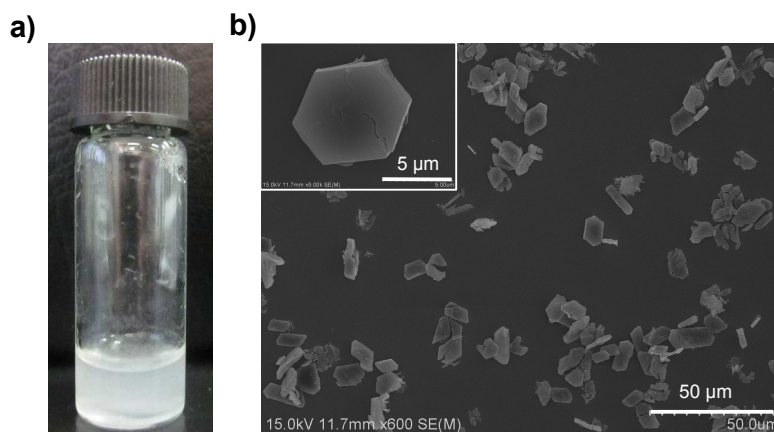


Figure S2. a) Photograph of the as-prepared SIM dispersion (0.8 mg) in an aqueous solution of KCl (500 mM, 1 mL); b) SEM images of the as-prepared SIM after being dispersed into 500 mM KCl solution.

S4 Investigation on adaptive encapsulation property

The adaptive encapsulation property of the as-prepared SIM in the self-assembling process was investigated as follows. Typically, each kind of the aqueous solutions of the dyes (i.e., MG, MB, AO, Rh6G, RhB and ST, 2 mL, 200 μM) was first mixed with the aqueous solution of $C_{10}(\text{mim})_2$ dication (2 mL, 2 mM). Each kind of resulting solutions was then mixed with an aqueous solution of ABTS (2 mL, 2 mM) under constantly stirring for 1 h at room temperature. The resulting dispersions were centrifuged, washed with water for three times and then dried in vacuum drying oven.

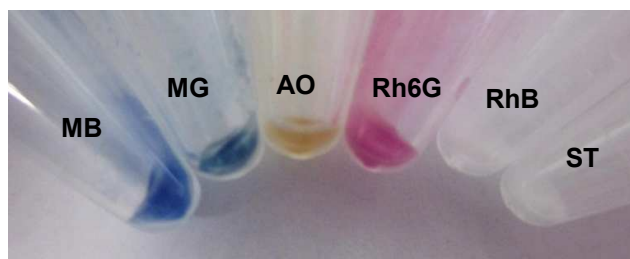


Figure S3. The photograph of each kind of dye-encapsulated SIMs formed by the method demonstrated above before dried in vacuum oven.

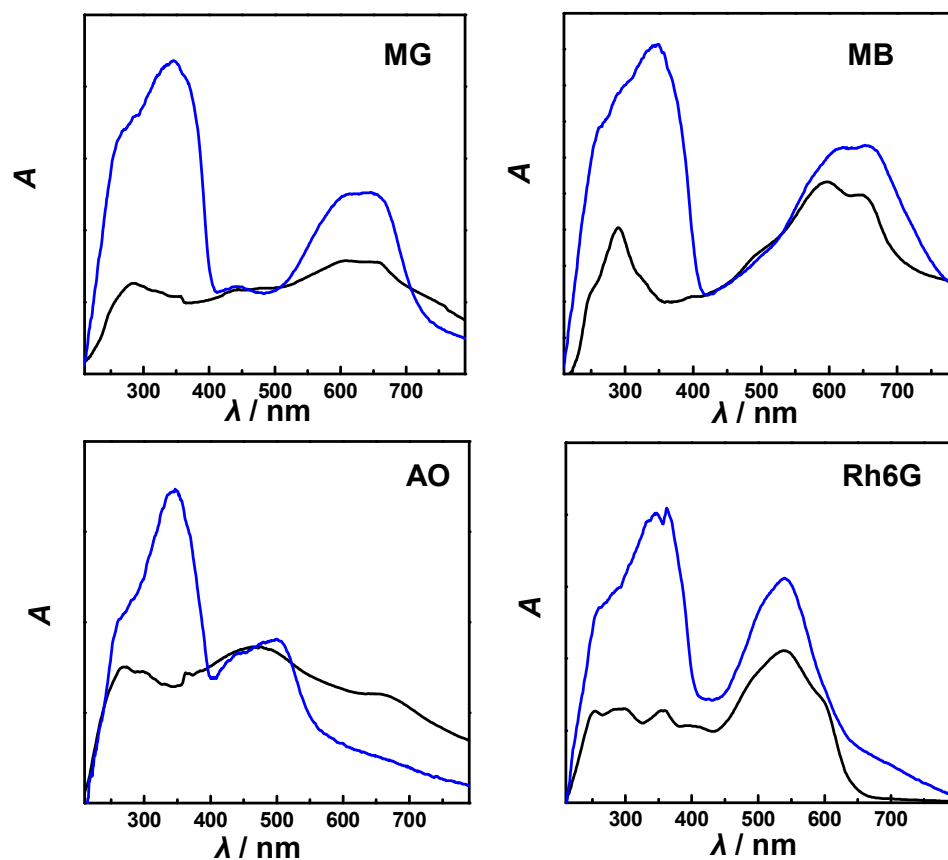


Figure S4. UV-Vis DRS spectra of each kind of pure dyes (black curves) and dye-encapsulated SIMs (blue curves) as indicated in the figure.

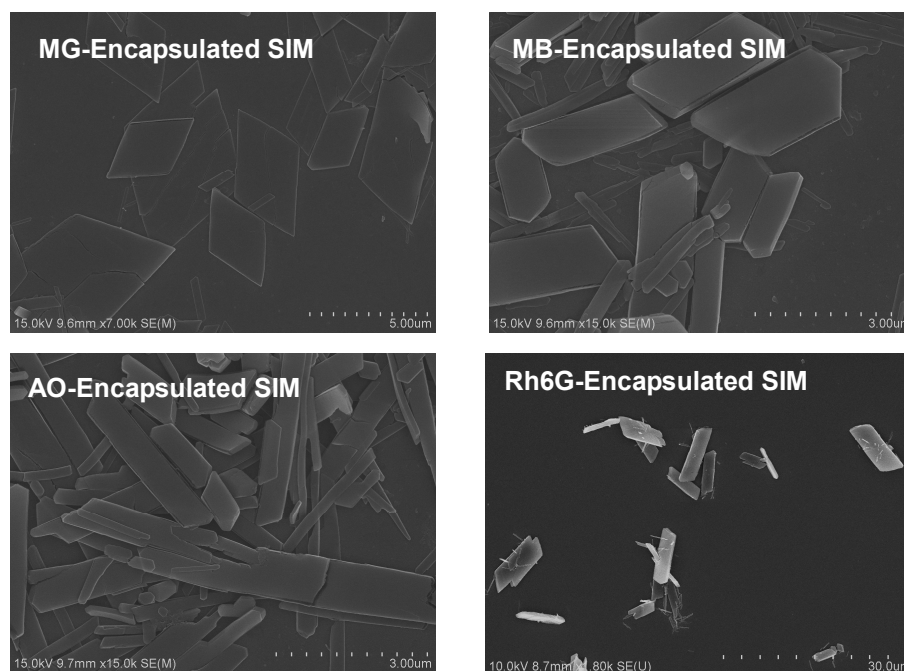


Figure S5. Typical SEM images of each kind of dye-encapsulated SIMs, as indicated in the figure.

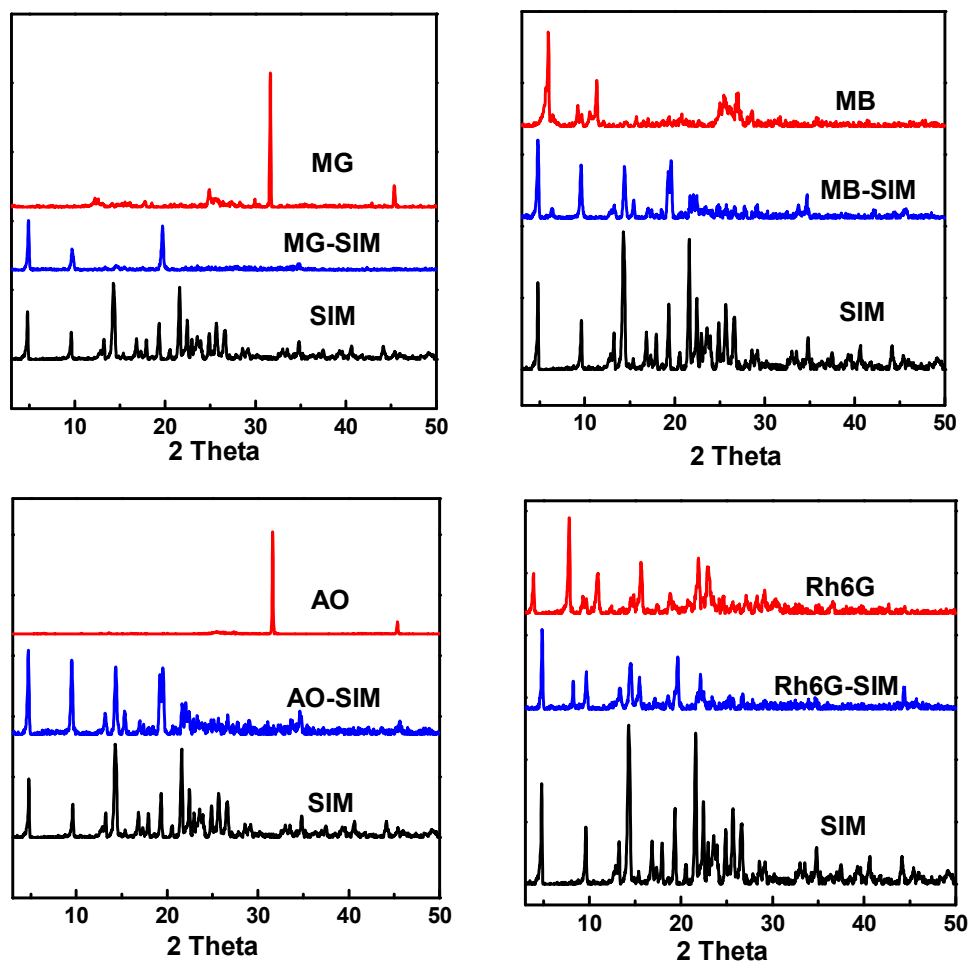


Figure S6. Powder X-ray diffraction (PXRD) patterns of each kind of pure dye (red curves), dye-encapsulated SIMs (blue curves), and pure SIM (black curves), as indicated in the figure.

S5 Confocal Fluorescence of AO-Encapsulated SIM

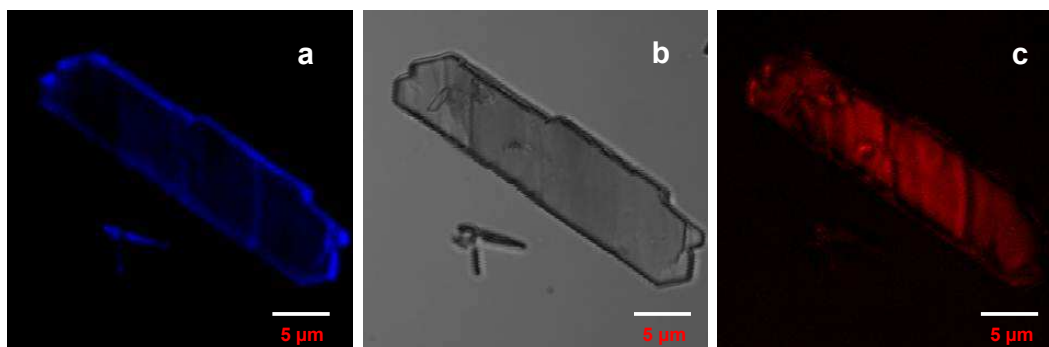


Figure S7. Confocal fluorescence (a: $\lambda_{\text{ex}} = 405 \text{ nm}$ and c: $\lambda_{\text{ex}} = 559 \text{ nm}$) and bright-field (b) images of AO-encapsulated SIM.

S6 Interaction between Dyes and ABTS

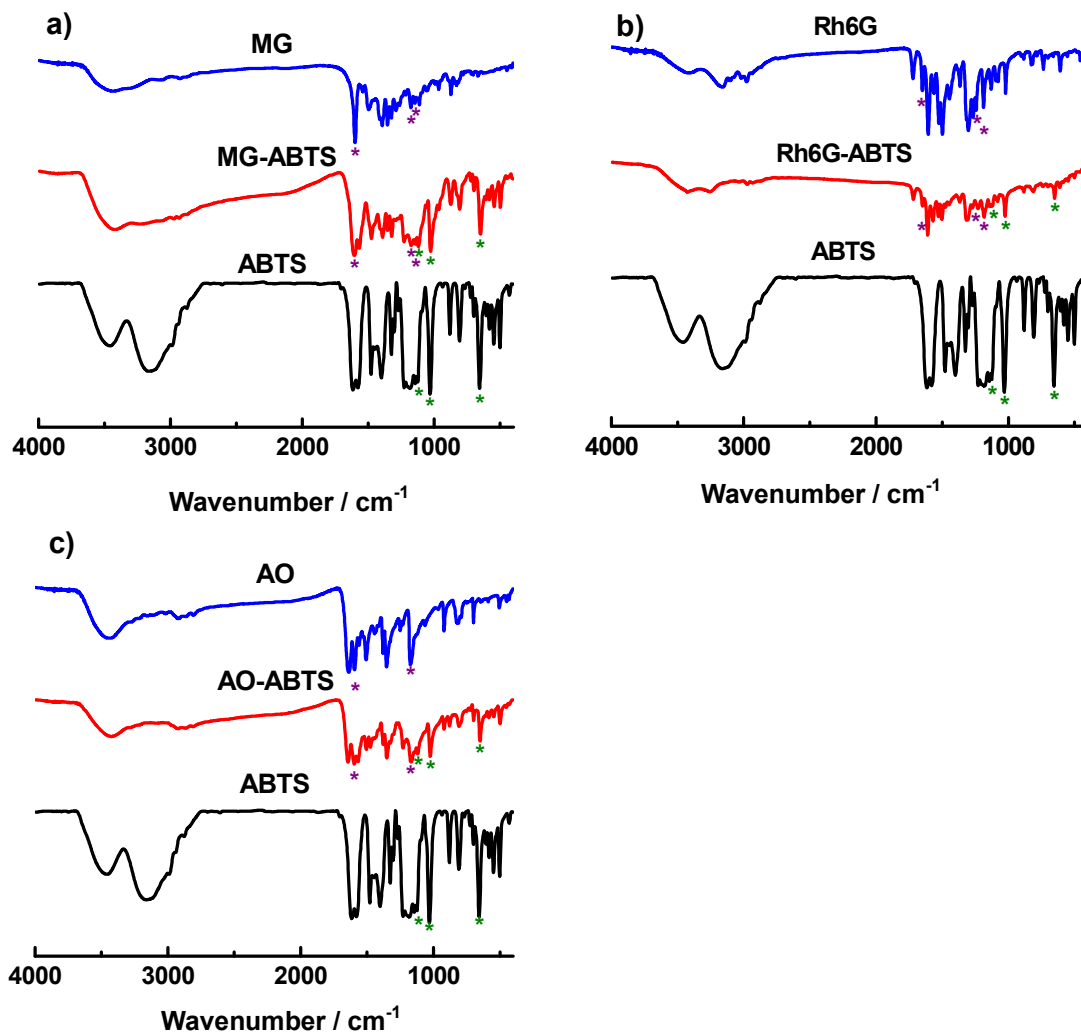


Figure S8. FT-IR spectra of chlorine salts of dyes (blue curves), precipitates formed by each kind of dyes and ABTS (red curves), and pure ABTS (ammonium salt, black curves), as indicated in the figure.

- The symmetric vibration bands of sulphonate in ABTS shift from 1124, 1032 and 656 cm^{-1} to 1120, 1027 and 649 cm^{-1} , respectively. The N-CH₃ stretching and C=N⁺ vibration of MG shift from 1177, 1147 and 1600 cm^{-1} to 1174, 1143 and 1605 cm^{-1} , respectively.
- The symmetric vibration bands of sulphonate in ABTS shift from 1124, 1032 and 656 cm^{-1} to 1122, 1025 and 650 cm^{-1} , respectively. The N-CH₂CH₃ stretching and C=N⁺ vibration of Rh6G shift from 1243, 1188 and 1650 cm^{-1} to 1240, 1184 and 1648 cm^{-1} , respectively.

- c) The symmetric vibration bands of sulphonate in ABTS shift from 1124, 1032 and 656 cm^{-1} to 1119, 1025 and 648 cm^{-1} , respectively. The N-CH₃ stretching and C=N⁺ vibration of AO shift from 1174 and 1594 cm^{-1} to 1168 and 1596 cm^{-1} , respectively.