ELECTRONIC SUPPLEMENTARY INFORMATION

Ionic Hydrogel with Stimuli-Responsive, Self-healable and Injectable Characteristics for the Targeted and Sustained Delivery of Doxorubicin in the Treatment of Breast Cancer

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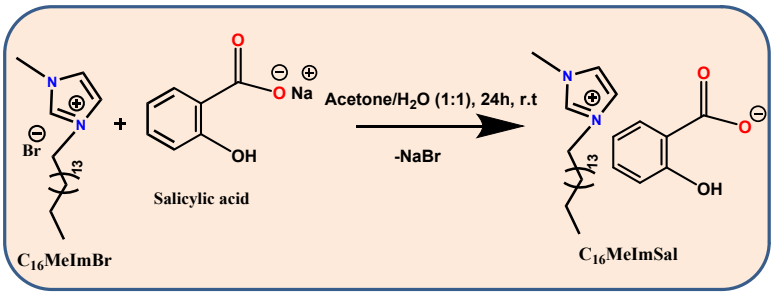
Synthesis of the C_{16}MeImSal. 1-methyl-3-hexadecylimidazolium salicylate (C_{16}MeImSal) was synthesized in two steps procedure. Briefly, in the first step, 1-methyl-3-hexadecylimidazolium Bromide (C_{16}MeImBr) was synthesized by reacting 1-methyl imidazole (0.10 mol) and hexadecyl bromides (0.13 mol) in toluene solvent media. Their reaction was preceded for 24 h at 80^0C by continuously observing the progress of reaction through Thin Layer Chromatography (TLC). Product was washed three times by ethyl acetate and white crystalline solids were dried in vacuum for 48 h before the preparation of the respective solution.

In the second step, an equimolar ratio of C_{16}MeImBr and sodium salicylate (NaSal) were dissolved in the 50 ml of acetone/water (1:1) and the solution was stirred for 15 h at room temperature. The remaining suspension was diluted with 50 ml of water and extracted with DCM. The combined organic layer washed successively with water until no more chloride ion could be detected in the washings (checked by addition of $AgNO_3$), the solvent was evaporated and dried in vacuum-oven to yield a colourless waxy solid product with 76.44% yield.^{1}H NMR (D_2O;δ/ppm): 0.84 (11.06H, N-$(CH_2)_{11}$- **$(CH_2)_4$ -CH_3**), 1.24 (20.92H, N- CH_2 - **$(CH_2)_{10}$**-$(CH_2)_4$-CH_3), 3.66 (5H, N-**CH_3** and N- **CH_2** - $(CH_2)_{14}$-CH_3), 6.45 (1H, b), 6.47 (1H, c), 6.86 (1H, G), 6.88 (1H, H), 6.96 (1H, F), 7.16 (1H, I), 7.54 (1H, a).



Scheme S1 Synthesis of C_{16}MeImSal

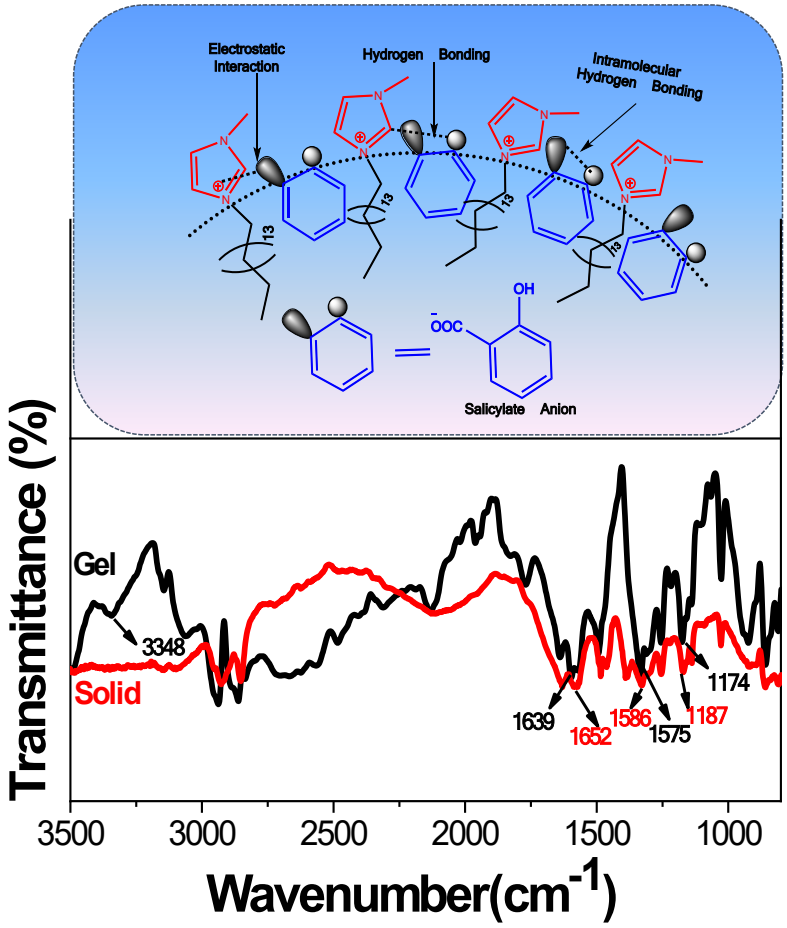


Figure S1 Schematic diagram showing the molecular interactions to form the ionic hydrogel and FTIR spectra of solid C_{16}MeImSal and ionic hydrogel.

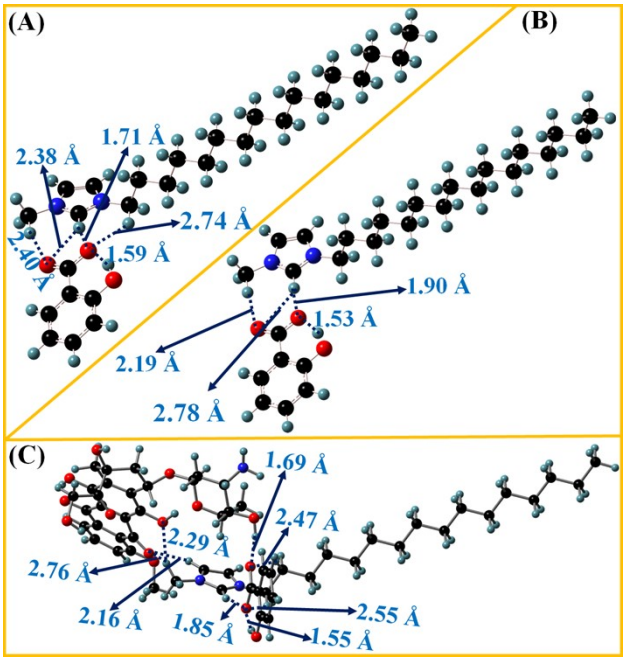


Figure S2: The optimized geometries of (A) C_{16}MeImSal in gas phase, (B) C_{16}MeImSal in solvent phase, and (C) C_{16}MeImSal-DOX complex in gas phase. The dotted lines show the distance between the bonds

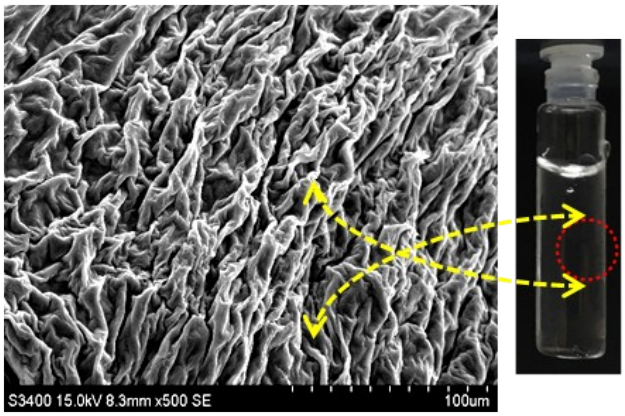


Figure S3 Morphology of ionic hydrogel SEM.

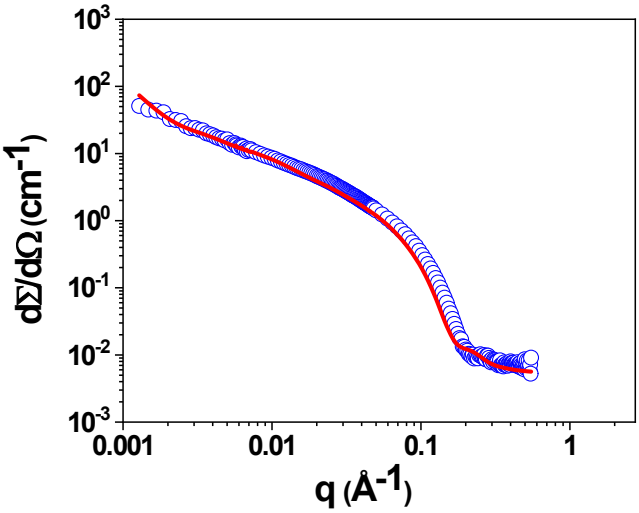


Figure S4 SAXS scattering intensity I(q) versus the scattering factor (q) for the ionogel at 25 ^{0}C.

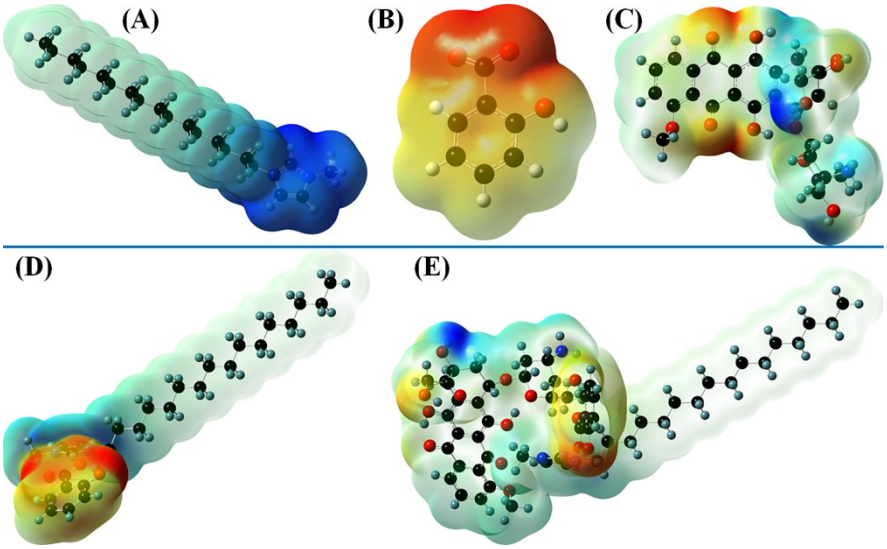


Figure S5 Calculated ESPs of (A) $C_{16}MeIm^{+}$ cation, (B) Sal anion, (C) DOX, (D) $C_{16}MeImSal$, and (E) $C_{16}MeImSal$-DOX complex.

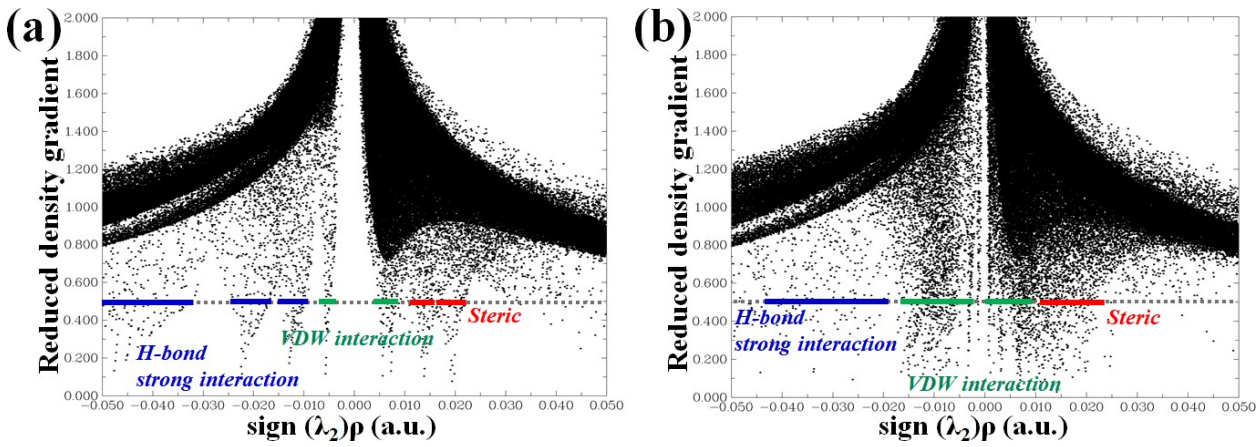


Figure S6 Scattered diagram presenting the plot of *sign* $(\lambda_2)\rho$ versus RDG for (A) C_{16}MeImSal and (B) C_{16}MeImSal-DOX complex.

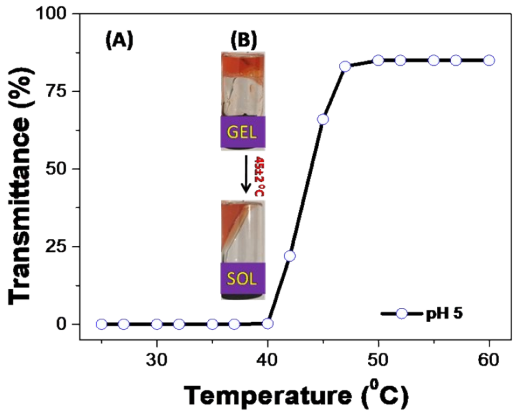


Figure S7 Ionic hydrogel-to-solution transition (pH=5.0) by (A) UV-vis absorbance spectroscopy, and (B) tube inversion method.

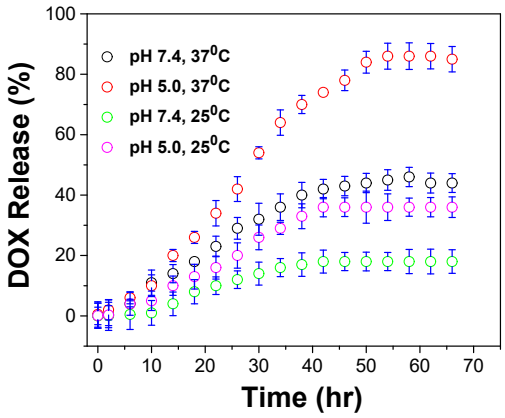


Figure S8 *In vitro* DOX releasing from ionic hydrogel.

Table S1 Summary of various models tried for DOX release data.

Condition	M_α	*Zero Order*	*First Order*	*Higuchi's*
		R^2	R^2	R^2
37 ^{0}C, pH 5.0	86.4	0.90	0.91	0.97
37 ^{0}C, pH 7.4	45.3	0.91	0.87	0.92
25 ^{0}C, pH 5.0	33.2	0.83	0.86	0.93
25 ^{0}C, pH 7.4	18.2	0.86	0.91	0.77