Electronic Supplementaty Information Insights about the Ability of Folate based Supramolecular Gels to Act as Targeted Therapeutic Agents

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Figure S1. UV spectra of $[C_1C_{12}Im]_2[Folate]$ in solution at 10^{-4} M.



Figure S2. UV spectra of organic salts (0.0001 M), in PBS solution, in the presence of increasing amount of BSA (2 and 40 μ m).



Figure S3. Fluorescence spectra of organic salts (0.0001 M), in PBS solution, in the presence of increasing amount of BSA (2 and 40 μ m).



Figure S4. Fluorescence spectra of a) [Ch]₂[Folate] and c) [C₂₂₂C₁₂N]₂[Folate] in PBS at variable concentrations; fluorescence intensity as function of solution concentration for c) [Ch]₂[Folate] and d) [C₂₂₂C₁₂]₂[Folate].



Figure S5. a) Wavelength of fluorescence maxima of organic salts in PBS; **b)** critical aggregation concentration obtained from fluorescence intensity as function of salt concentration.



Figure S6. Emission spectra of [Folate]-based salt and 9,10-diphenylanthracene, in ethanol solution, at 2 · 10⁻⁵ M.





[C ₁ C ₁₂ Im] ₂ [Folate]	in PB/DMSO		Size (d.nm):	% Intensity:	St Dev (d.nm):	
Z-Average (d.nm):	748,5	Peak 1:	413,7	100, <mark>0</mark>	66,82	
Pdl:	0,575	Peak 2:	0,000	0,0	0,000	
Intercept:	0,862	Peak 3:	0,000	0,0	0,000	
Result quality :	Refer to quality	report				



[C ₁ C ₁₂ Im] ₂ [Folate]	in PBS		Size (d.nm):	% Intensity:	St Dev (d.nm):	
Z-Average (d.nm):	741,0	Peak 1:	304,8	100,0	40,13	
Pdl:	0,618	Peak 2:	0,000	0,0	0,000	
Intercept:	0,881	Peak 3:	0,000	0,0	0,000	
Result quality :	Defer to que	lity roport				



[C ₁ C ₁₂ Im] ₂ [Folate]	in PBS/DMSO)				
			Size (d.nm):	% Intensity:	St Dev (d.nm):	
Z-Average (d.nm):	979,3	Peak 1:	661,5	100, <mark>0</mark>	123,6	
Pdl:	0,494	Peak 2:	0,000	0,0	<mark>0,00</mark> 0	
Intercept:	0,666	Peak 3:	0,000	0,0	0,000	
Result quality :	Refer to quality	report				





Figure S7. Apparent hydrodynamic diameter distribution functions obtained in buffer and buffer/DMSO for $[C_1C_{12}Im]_2[Folate]$ from DLS experiments.

Size (d.nm)



Figure S8. Superimposed fluorescence spectra, in PBS solution $(3 \cdot 10^{-5} \text{ M})$ and solid phase, for a) [Ch]2[Folate] and b) [C222C12N]2[Folate].



Figure S9. ATR-FTIR spectra of organic salts.



Figure S10. Superimposed ATR-FTIR spectra of $[C_1C_{12}Im]_2[Folate]$ and corresponding gel phases. IR spectra were plotted with Spectragryph.



Figure S11. Strain and frequency sweeps of hydrogels formed by [C1C12Im]2[folate], in PB and PB/DMSO at 6 wt %.



Figure S12. RLS Spectra of $[C_1C_{12}Im]_2[Folate]$ solution (2.6 \cdot 10⁻⁴ M) in **a**) PB and PB/DMSO and **b**) TBS and TBS/DMSO. I_{RLS} at 450 nm, for different solutions at 450 nm, are displayed in Table 5.



Figure S13. RLS Spectra of $[C_1C_{12}Im]_2[Folate]$ gel at 6 wt % in a) PB and PB/DMSO and b) TBS and TBS/DMSO. I_{RLS} at 470 nm are displayed in Table S5.





Figure S14. Fluorescence emission spectra of the hot solution and corresponding gel of [C₁C₁₂Im]₂[Folate] at 6 wt %;
b) Picture of [C₁C₁₂Im]₂[Folate] gels irradiated at 365 nm.



Figure S15. Sigmoidal cytotoxicity curves of treated MDA MB-231, MCF 7 and hTERT-RPE-1 cells for 24 h, obtained by plotting the cell percentage inhibition versus the logarithmic of salts concentration.





Figure S16. Inverted-phase contrast micrographs of MDA-MB-231 (A) and MCF-7 (B) cells treated for 24h with 6 and 25 μ M) of Folic Acid, [C₂₂₂C₁₂N]₂[Folate] and [C₁C₁₂Im]₂[Folate]. Magnification 100X.



Spectra S1. NMR spectra of [Ch]2[folate] in DMSO-d₆.



Spectra S2. NMR spectra of [C222C12N]2[Br] in CDCl3.



Spectra S3. NMR spectra of [C222C12N]2[folate] in DMSO-d6.



Spectra S4. NMR spectra of [C1C12im][Br] in DMSO-d6.



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	λ (nm)	Abs
BSA (2µM)	277	0.0468
BSA (40μM)	277	0.3324
[Ch] ₂ [Folate]	364	0.2169
[Ch] ₂ [Folate] + BSA (2µM)	359 (max)	0.1317
	364	0.1284
[Ch]2 [Folate] + BSA (40µM)	351(max)	0.1417
	364	0.1352
[C222C12N]2 [Folate]	356	0.1445
[C ₂₂₂ C ₁₂ N] ₂ [Folate] + BSA (2µM)	351 (max)	0.1603
	356	0.1562
[C ₂₂₂ C ₁₂ N] ₂ [Folate] + BSA (40µM)	346 (max)	0.3429
	356	0.3234
[C ₁ C ₁₂ Im] ₂ [Folate]	366	0.1897
[C ₁ C ₁₂ Im] ₂ [Folate] + BSA (2µM)	366	0.2007
[C ₁ C ₁₂ Im] ₂ [Folate] + BSA (40µM)	365	0.1884

Table S1. UV-vis values of folate-salts (1·10 $^{\text{-4}}\text{M})$ solution in PBS in presence of BSA at 2 and 40 $\mu\text{M}.$

	λmax (nm)	Ι	λ (nm)	Ι
BSA (2µM)	338	548.194		
BSA (40μM)	338	1759.47		
[Ch] ₂ [Folate]	350	70.0875	443.2	203.249
[Ch] ₂ [Folate] + BSA (2µM)	342.2(max)	389.655	442	237.955
	350	376.037		
[Ch]2 [Folate] + BSA (40µM)	337.6(max)	1215.47	/	/
[C ₂₂₂ C ₁₂ N] ₂ [Folate]	350	39.4114	442.2	298.942
[C ₂₂₂ C ₁₂ N] ₂ [Folate] + BSA (2µM)	339.2(max)	274.123	442.2	253.605
	350	253.669		
[C ₂₂₂ C ₁₂ N] ₂ [Folate] + BSA (40µM)	339.2	1233.61	/	/
[C ₁ C ₁₂ Im] ₂ [Folate]	350	56.1259	442.2	341.233
[C ₁ C ₁₂ Im] ₂ [Folate] + BSA (2µM)	341.6(max)	307.155	442.2	322.754
	350	291.555		
[C1C12Im]2 [Folate] + BSA (40µM)	337.4	1213.36	/	/

Table S2. Fluorescence values of folate-salts ($1\cdot 10^{-5}$ M) solution in PBS in presence of BSA at 2 and 40 μ M.

Table S3. Apparent dynamic diameter ($d_{\rm H}$) and polydispersion index (PDI_{DLS}) obtained from DLS measurements of [C₁C₁₂Im]₂[Folate] in buffer and buffer/DMSO solution (0.0001 M).

Solvent	$d_{\rm H}({\rm nm})$	PDI _{DL} S
PB	650	0.54
PB/DMSO	750	0.58
PBS	740	0.88
PBS/DMSO	980	0.67
Tris	930	0.67
Tris/DMSO	646	0.72

Folic acid		cid	[C222C12N]2 [folate]		[Ch]2 [folate]		[C1C12Im]2 [folate]	
Solvent	C(wt%) ^b	App. ^c	C(wt%) ^b	App. ^c	C(wt%) ^b	App. ^c	C(wt%) ^b	App. ^c
H ₂ O	0.2-2.0%	Ι	2.0-3.8%	S	2.6-7.2%	S	0.5-5.4%	Ι
DMSO	0.9-2.0%	S	2.0%	SC	2.3-4.0%	S	2.0%	SC
H ₂ O/DMSO (50/50) ^a	0.1-0.4%	G	/	/	0.2-0.7%	SC	/	/
H ₂ O/DMSO (90/10) ^a	0.3-2.3%	PS	2.0-4.1%	S	2.2-4.8%	SC	1.8-4.0%	Р
TBS $(1x)$	0.3-1.1%	S	2.1-2.9%	PG	2.6%	SC	0.5-6.4%	G
TBS (1x)/DMSO (50/50) ^a	0.2-0.5%	S	1.9%	S	2.5-4.2%	S	2.4%	Р
TBS (1x)/DMSO (90/10) ^a	/	/	1.9-3.9%	S	/	/	2.2-6.1%	G
PB	1.0 - 2.0%	Р	2.0-7.3%	S	3.5-7.1%	S	2.2-6.0%	G
PB/DMSO (50/50) ^a	0.3-0.5%	S	1.9%	SF	2.0-4.0%	S	2.0%	S
PB/DMSO (90/10) ^a	/	/	2.0-3.9%	S	/	/	2.3-6.1%	G
PBS (1x)	/	/	4.0%	S	3.9%	S	4.1-5.9%	G
PBS (1x)/DMSO (90/10) ^a	/	/	3.7%	S	3.8%	SC	5.0-6.0%	G
PBS (10x)	0.2-0.3%	Р	2.1-6.9%	PG	1.9-9.5%	SC	0.5-4.9%	Ι
PBS (10x)/DMSO (50/50) ^a	0.2-0.7%	Р	1.9-4.8%	Р	1.8-4.4%	S	2.0%	Р
PBS (10x)/DMSO (90/10) ^a	0.2%	S	2.0-4.0%	S	/	/	2.2-4.0%	Ι
Ethanol	0.1-2.2%	Ι	2.0%	S	0.2-2.5%	Ι	2.0%	S
H ₂ O/Ethanol (50/50) ^a	0.2%	S	2.3-4.8%	S	0.2%	SC	2.1-4.0%	Р
Glycerol	0.2 -2.0%	Р	2.0-6.6%	S	2.9-6.7%	PG	2.0-4.0%	PG
Dioxolane	0.4%	Р	/	/	2.3%	Ι	/	/
1,3-Propanediol	0.2%	Ι	/	/	2.0-8.4%	S	/	/

^{*a*} volume ratio (v/v); ^{*b*}C=concentration range analized (g gelator/g solution); ^{*c*}App. = appearance: I (insoluble), G (gel), PG (partial gel), PS (partially soluble), P (precipitate), SC (soluble at room temperature), S (soluble after heating and cooling of solution).

 $Table \ S5. \ I_{\rm RLS} \ at \ 470 \ nm \ for \ [C_1C_{12}Im]_2 [Folate] \ gel \ phases \ formed \ in \ buffer \ and \ buffer/DMSO \ binary \ mixtures.$

gels	I 470 nm
[C1C12Im]2 [folate] in PB	2160
[C1C12Im]2 [folato] in PB/DMSO 90/10	890
[C ₁ C ₁₂ Im] ₂ [folate] in PBS	9370
C1C12Im]2 [folate] in PBS	5680
[C ₁ C ₁₂ Im] ₂ [folato] in TBS	840
[C1C12Im]2 [folato] in TBS/DMSO	75

References

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