Ionic liquid mediated micelle to vesicle transition of a cationic gemini surfactant in solution: a spectroscopic investigation

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Supporting Information

Synthesis and characterization:

The cationic gemini surfactant pentamethylene-1,5-bis(tetradecyldi-methylammonium bromide) (14-5-14) is synthesized by refluxing 1,5-dibromo butane with N,N-dimethyltetradecylamine in dry ethanol for 48 h. Then the solvent is evaporated and the product is recrystallized for several times in ethanol- acetone mixture.

The structure of the Gemini surfactant is confirmed by ¹H-NMR spectroscopy: Yield 13.8g, 20 mmol, 90%. ¹H-NMR (CDCl₃, 300 MH_Z), δ (ppm): 0.85-0.88 (terminal CH₃, 6H), 1.20-1.25 (CH₃-CH₂-(*CH*₂)₁₀, 40H and 2H from middle *CH*₂ of spacer), 1.36 (CH₃-*CH*₂, 4H), 1.76 (CH₃-CH₂-(CH₂)₁₀-*CH*₂-CH₂-N⁺Me₂-CH₂-RH), 3.26-3.33 (-*CH*₂-N⁺Me₂-*CH*₂-, 8H), 3.78 (CH3 gr attached to the N atom, 12H).



Figure S1: (a) Tensiometric profile of Gemini (14-5-14) surfactant (b) at two mole fractions of IL (X_{IL} = 0.1 and 0.2) in aqueous medium



Figure S2: Variation of turbidity at different mole fractions of IL and the inset shows the optical micrograph of different solution



Figure S3: Optical micrographs of $X_{IL} = 0.7$ and 0.9. The formation of two phase system can be ascribed to the coexistence of different aggregates and the different amphiphiles compositions, as well as the triggered difference of solution density between the upper and the lower phase.

Systems	Density(gm/cc)	Viscosity (mP.s)
Water	0.998208	1.0019
IL	0.999815	1.0484
GS	1.000062	1.2729
0.1	0.999990	1.5729
0.2	0.999951	5.9839
0.3	0.999895	205.6930
0.4	0.999475	32.9519
0.45	0.999763	7.8568
0.5	0.999744	2.6572

Table S1: Different parameters (density and viscosity) for pure and mixed system at 298 K



Figure S4: Time resolved emission spectra (TRES) of C153 at different mole fraction of IL in

mixed system.



Figure S5: Plot of turbidity vs. aging time (days) and the inset shows the size distribution profile at 0 day and at 30 days.



Figure S6: Representative plot of steady state anisotropy (r_{ss}) and micropolarity (I_1/I_3) at various temperature.