Electronic Supplementary Material (ESI) for Soft Matter.

ELECTRONIC SUPPLEMENTARY INFORMATION

Interfacial properties modulated by the water confinement in Reverse Micelles created by the Ionic liquid-like surfactant bmim-AOT

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EXPERIMENTAL SECTION

Methods

RMs preparation: The stock solutions of bmim-AOT in the organic solvent (benzene and chlorobenzene) were prepared by mass and volumetric dilution. To obtain optically clear solutions, they were shaken in a sonicating bath. The amount of water present in the system is expressed as the molar ratio between water and surfactant (W_0 = [H_2O]/[surfactant]). The W_0 was varied between 0-6 for bmim-AOT RMs. It was not possible to obtain higher values of W_0 due to turbidity problems. The lowest value for W_0 ($W_0 = 0$), corresponds to a system without water addition. The appropriate amounts of H_2O (D_2O for ^2H NMR experiments) were incorporated into RMs solutions by means of microsyringes.

Similar procedures were performed by the Na-AOT RMs experiments.

For the absorption experiments, a $1x10^{-2}$ M solution of QB in methanol (Sintorgan HPLC quality) was prepared. The appropriate amount of this solution to obtain a concentration of $2x10^{-4}$ M for QB in the RMs was transferred into a volumetric flask, and the methanol was evaporated by bubbling dry N_2; then, the surfactant RMs stock solution was added to the residue and agitated in a sonicating bath until the RMs was optically clear. For the experiments varying the surfactant concentration at W_0 constant, a stock solution of surfactant 0.2 M was used. Thus, to the cell baring 2 mL of QB of the same concentration in the nonpolar solvent, was added the appropriate amount of surfactant and molecular probe stock solution to obtain a given concentration of surfactant in the micellar media. Therefore, the absorbance values of the molecular probe were not affected by dilution. For the experiments varying the water content, an RMs solution prepared at [surfactant] = 0.06 M was employed. Similar procedure was employed for the experiments using [Cu(acac)(tmen)][$B(C_6H_5)_4$].

General

The absorption spectra were measured by using Shimadzu 2401 equipment at 25 (0.1 °C unless otherwise indicated. The path length used in the absorption experiments was 1 cm. λ_{max} was measured by taking the midpoint between the two positions of the spectrum where the absorbance is equal to 0.9 × Abs_{max}.

The ^2H NMR spin-lattice relaxation times, T_1, were obtained on a Bruker Avance II 300 spectrometer operating at a deuterium Larmor frequency of 46.05 MHz. The measurements were performed using the inversion-recovery pulse sequence, $(\pi)_x - \tau - (\pi)_{x,-x} - \mathrm{Acq}$, as reported previously[1], where τ indicates the magnetization recovery period. The dependence of the normalized measured signal intensity with τ is $I(\tau) = 1 - 2\exp\left({}^{-\tau}/_{T_1}\right)$.[2,3] All NMR data were processed using MestReC 4.8.6 for window and plotted and fitted using Microcal OriginPro 7.

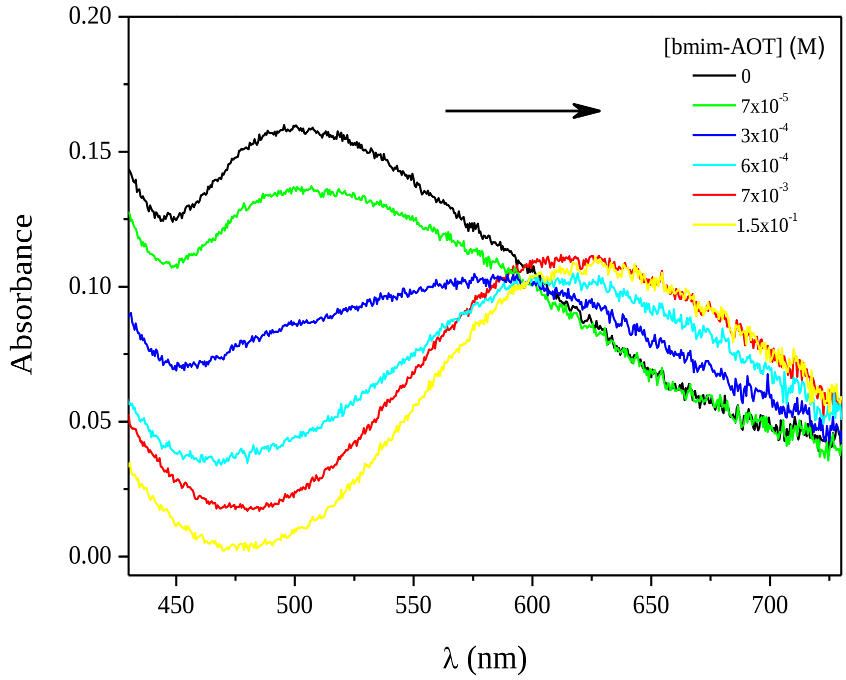


Figure S1. Absorption spectra of $[Cu(acac)(tmen)][B(C_6H_5)_4]$ complex in chlorobenzene/bmim-AOT RMs varying [bmim-AOT] at $W_0 = 0$. $[[Cu(acac)(tmen)][B(C_6H_5)_4]] = 1 \times 10^{-3}$ M.

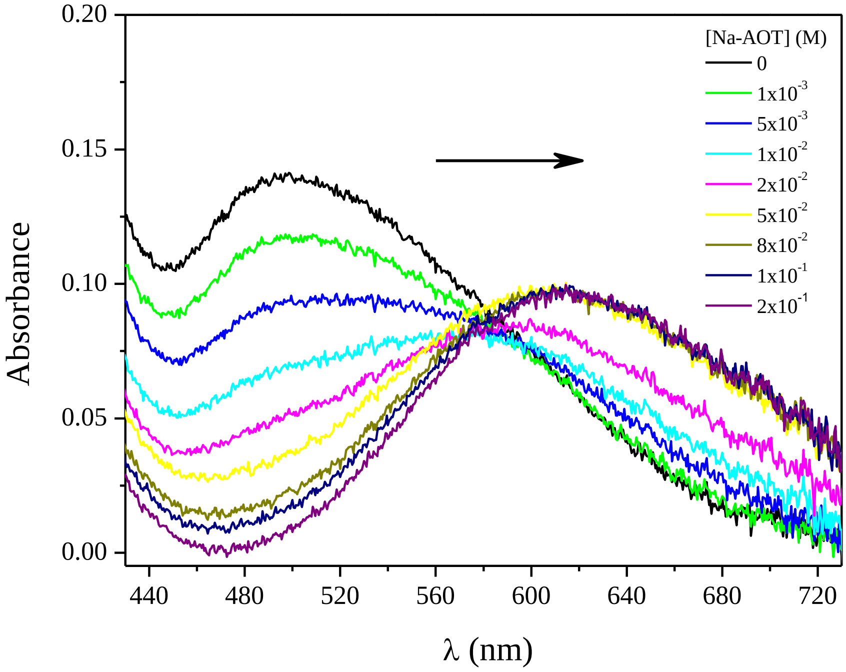


Figure S2. Absorption spectra of $[Cu(acac)(tmen)][B(C_6H_5)_4]$ complex in chlorobenzene/Na-AOT RMs varying [Na-AOT] at $W_0 = 0$. $[[Cu(acac)(tmen)][B(C_6H_5)_4]] = 1 \times 10^{-3}$ M.

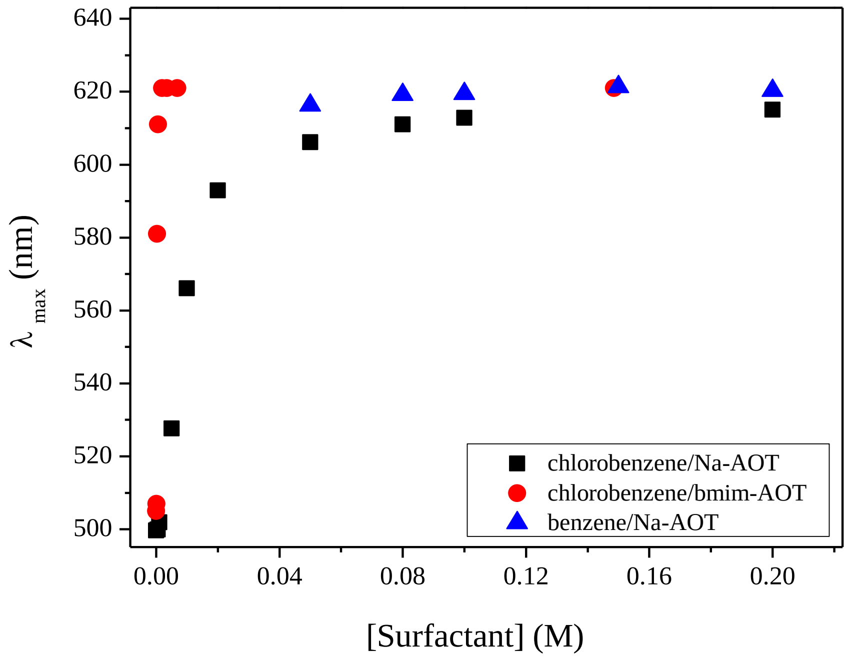


Figure S3. Absorption maxima shifts (λ_{max}) values of [Cu(acac)(tmen)][B(C_6H_5)$_4$] in different RMs as a function of [surfactant] at $W_0 = 0$. [[Cu(acac)(tmen)][B(C_6H_5)$_4$]] = 1 x 10^{-3} M.

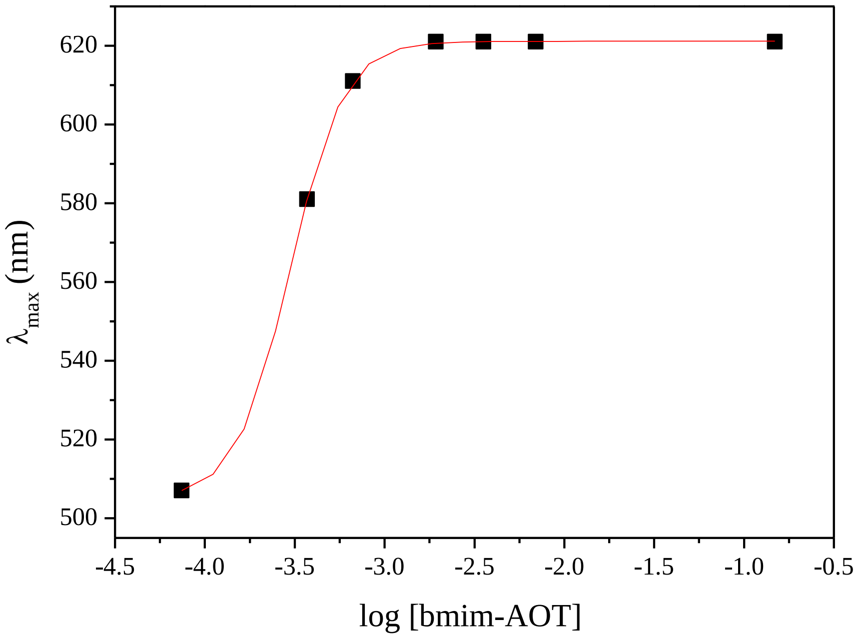


Figure S4. Variation of the λ_{max} of $Cu(acac)(tmen)B(C_6H_5)_4$ as a function of log[bmim-AOT] in chlorobenzene/bmim-AOT RMs at $W_0 = 0$. $[Cu(acac)(tmen)B(C_6H_5)_4] = 1 \times 10^{-3}$ M. The solid lines represent the sigmoidal fit using Sigmoidal–Boltzmann equation.

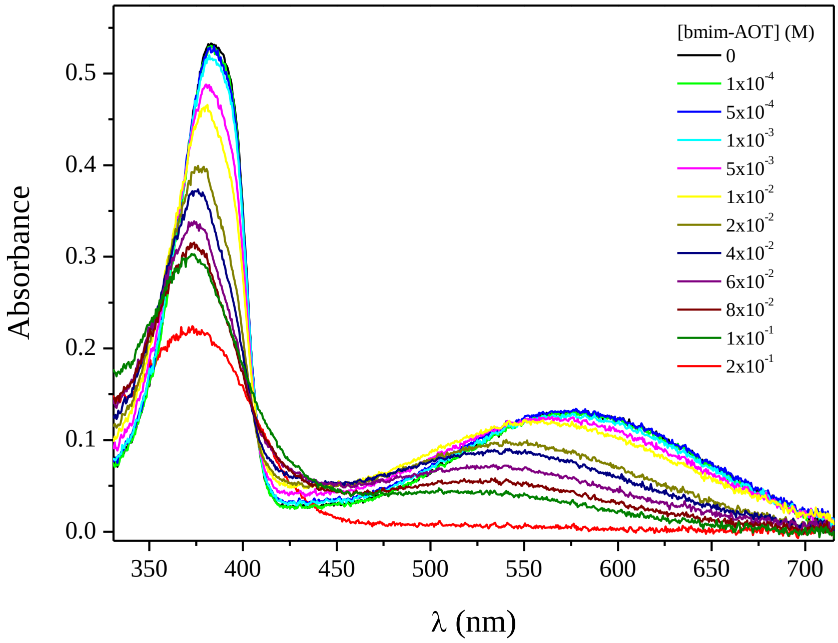


Figure S5. Absorption spectra of QB in benzene/bmim-AOT RMs varying [bmim-AOT] at W_0 = 0. [QB] = 2 x 10^{-4} M.

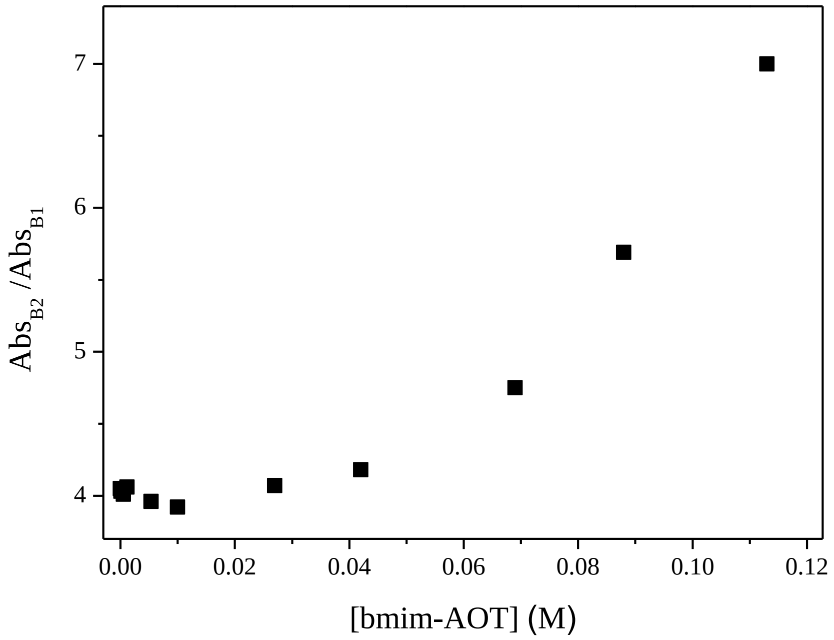


Figure S6. Variation of Abs_{B2}/Abs_{B1} ratio values in benzene/bmim-AOT as a function of [bmim-AOT] at $W_0 = 0$.

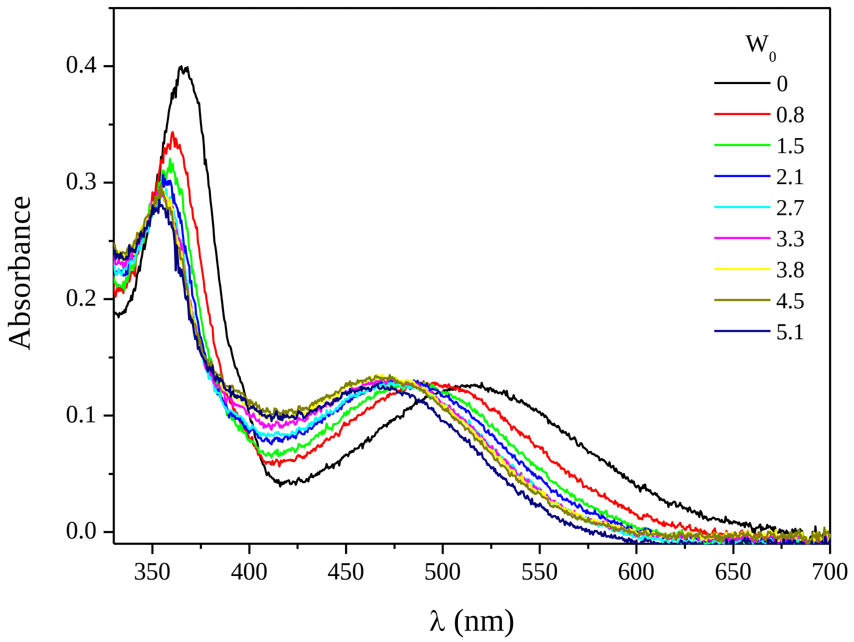
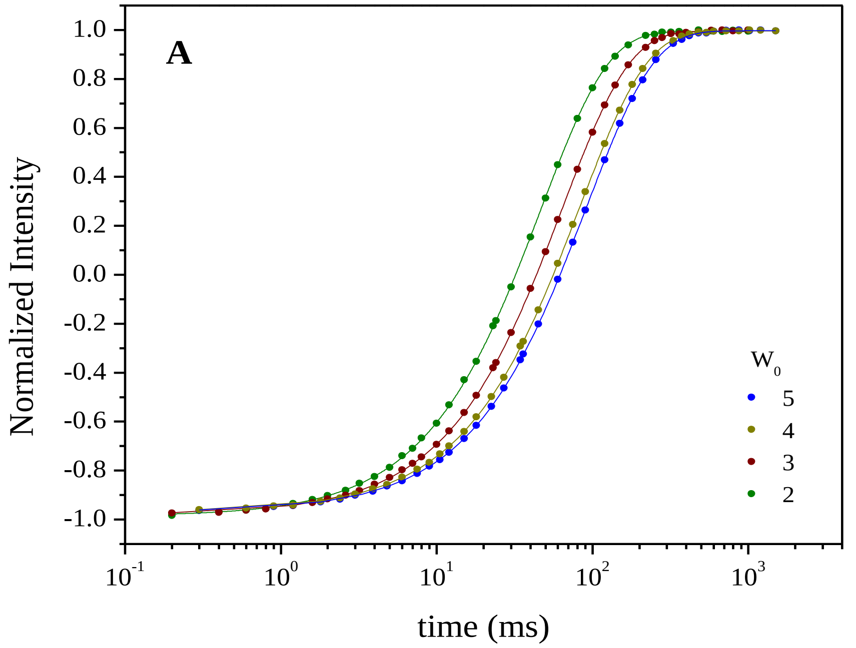


Figure S7. Absorption spectra of QB in benzene/Na-AOT/water RMs varying W_0. [Na-AOT] = 0.06 M, [QB] = 2 x 10^{-4} M. T = 25 ºC.



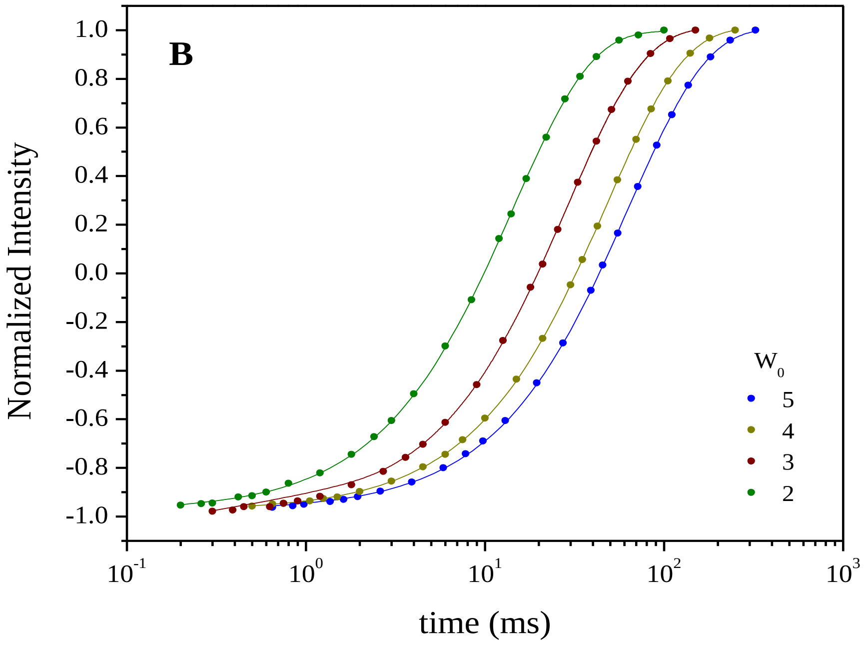


Figure S8. Monoexponential fit of the longitudinal relaxation decay for benzene/surfactant/D_2O RMs as a function of D_2O content. A) bmim-AOT and B) Na-AOT. [Surfactant] = 0.2 M.

References

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3 J. Keeler, *Understanding NMR spectroscopy*, John Wiley and Sons, 2010.