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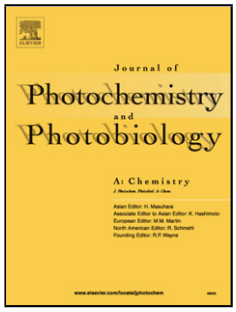

Title: Excited State Intramolecular Proton Transfer in 1,8-Dihydroxy-9,10-anthraquinone Dye: Revealing Microstructures in [C_nmIm][NTf_2] and [C_nmIm][BF_4] Series of Ionic Liquid Solvents

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Excited State Intramolecular Proton Transfer in 1,8-Dihydroxy-9,10-anthraquinone Dye: Revealing Microstructures in $[C_nmIm][NTf_2]$ and $[C_nmIm][BF_4]$ Series of Ionic Liquid Solvents

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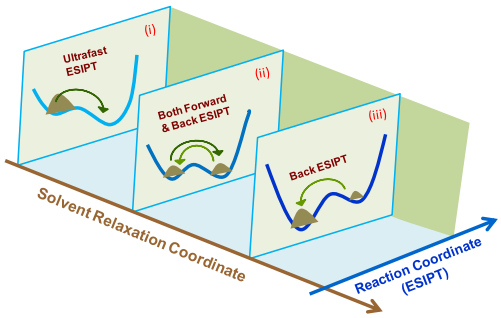
Graphical Abstract



Highlights

- The ESIPT process of 18DHAQ dye in 1-alkyl-3-methylimidazolium ($[C_nmIm]^+$) based ionic liquid (IL) solvents, $[C_nmIm][NTf_2]$ and $[C_nmIm][BF4]$, with n = 2, 4, 6, 8 and 10, display noteworthy modulations in the relative emission intensities for normal (N*) and tautomeric (T*) forms.
- Observed results reveal the microstructure formations in the $[C_nmIm][NTf_2]$ and $[C_nmIm][BF4]$ series of the IL solvents.
- More extensive microstructures are inferred as the alkyl chain length of the $[C_nmIm]^+$ cations of IL solvents is gradually increased.
- The small differences between the results in $[C_nmIm][NTf_2]$ and $[C_nmIm][BF4]$ series of ILs are understandably due to the dissimilar size, shape and basicity of the $[NTf_2]^-$ and $[BF4]^-$ anions of the two series of IL solvents.
- To the best of our knowledge, this is the only study involving ESIPT process to realize microstructure formations in neat IL solvents based on the $[C_nmIm]^+$ cations.

Abstract:

Excited state intramolecular proton transfer (ESIPT) in 18-dihydroxy-9,10-anthraquinone (18DHAQ) dye has been investigated in two series of 1-alkyl-3-methylimidazolium ($[C_nmIm]^+$) based ionic liquid (IL) solvents, $[C_nmIm][NTf_2]$ and $[C_nmIm][BF_4]$, with n = 2, 4, 6, 8 and 10, using steady-state (SS) and time-resolved (TR) fluorescence studies. In both the IL series, fluorescence intensity for tautomer (T*) form gradually decreases relative to normal (N*) form with increasing n value for $[C_nmIm]^+$ cations. Observed results suggest microstructure formation and its consequent