ELECTRONIC SUPPLEMENTARY INFORMATION (ESI)

Ionic liquid-controlled J- versus H-aggregation of cyanine dyes

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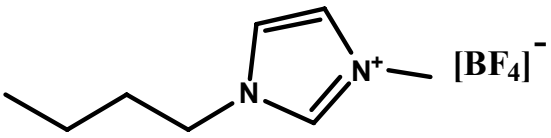
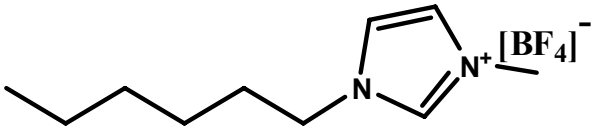


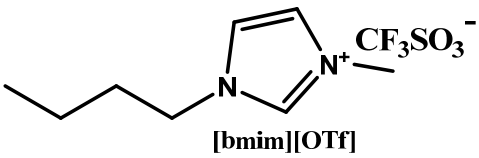
[bmim][BF_4]

1-butyl-3-methylimidazolium tetrafluoroborate



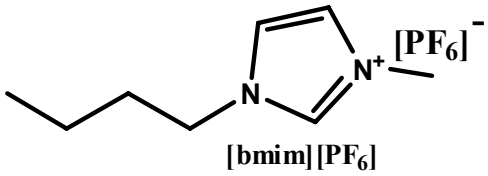
[hmim][BF_4]

1-hexyl-3-methyl imidazolium tetrafluoroborate



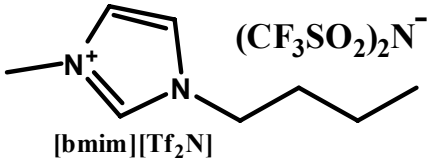
[bmim][OTf]

1-butyl-3-methylimidazolium trifluoromethanesulfonate



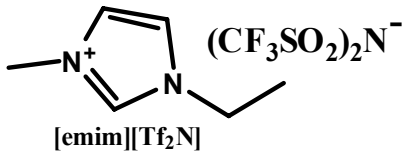
[bmim][PF_6]

1-butyl -3-methylimidazolium hexafluorophosphate



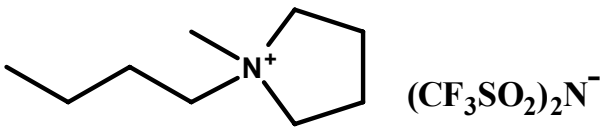
[bmim][Tf_2N]

1-butyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide



[emim][Tf_2N]

1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide



[bmpyrr][Tf_2N]

1-butyl -1-methylpyrrolidinium bis(trifluoromethylsulfonyl) imide

Scheme S1. Structures of ionic liquids used in this study and the abbreviations used in the manuscript text.

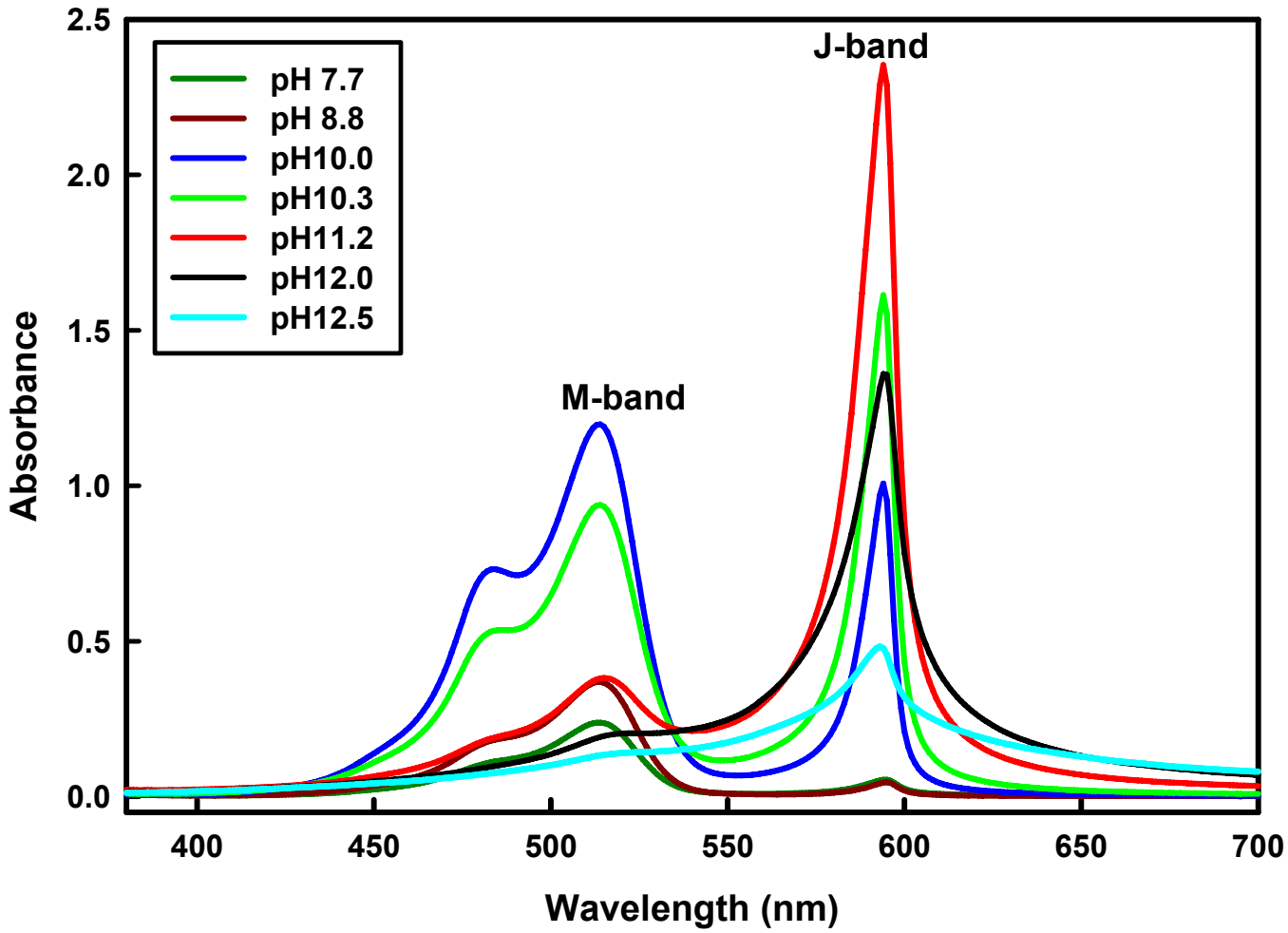


Figure S1. Absorbance spectra of TDBC (15 μM) dissolved in aqueous solutions of different pH at ambient conditions (data collected 5 minutes after sample preparation).

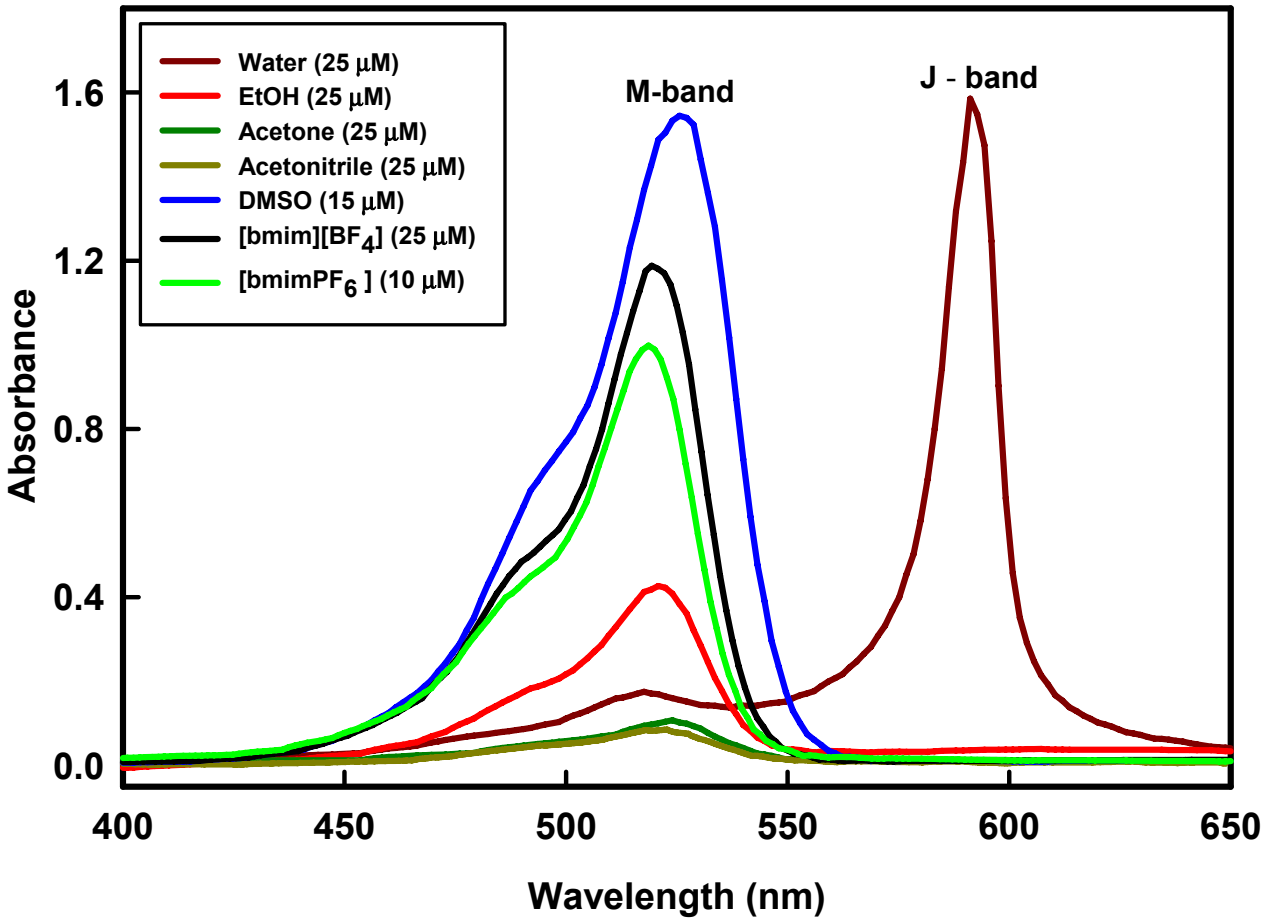


Figure S2. Absorbance spectra of TDBC dissolved in different solvents at ambient conditions (data collected immediately after sample preparation).

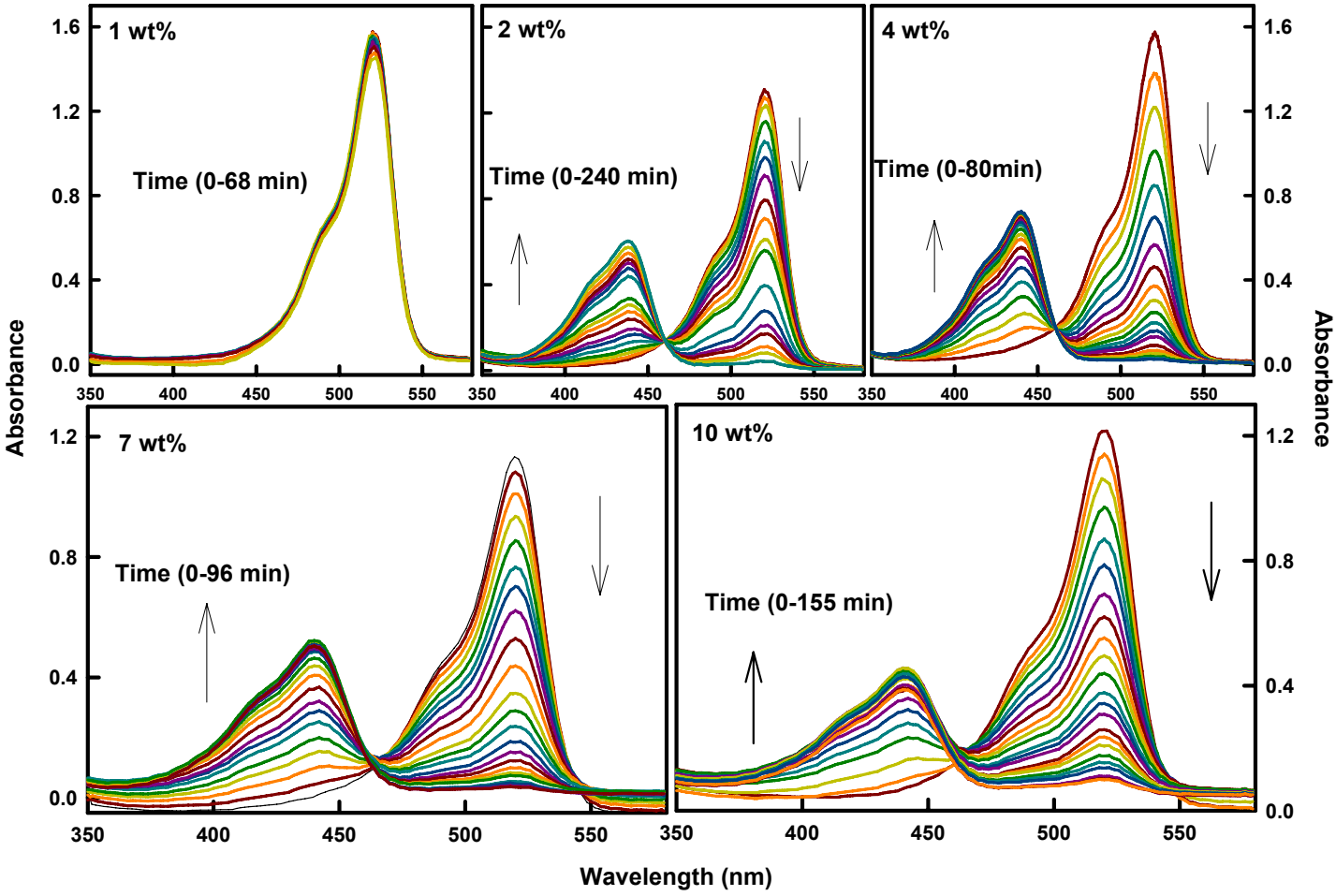


Figure S3. Absorbance spectra of TDBC (10 μM) with time in different wt% 1 M aqueous NaOH added [bmim][BF_4] at ambient conditions.

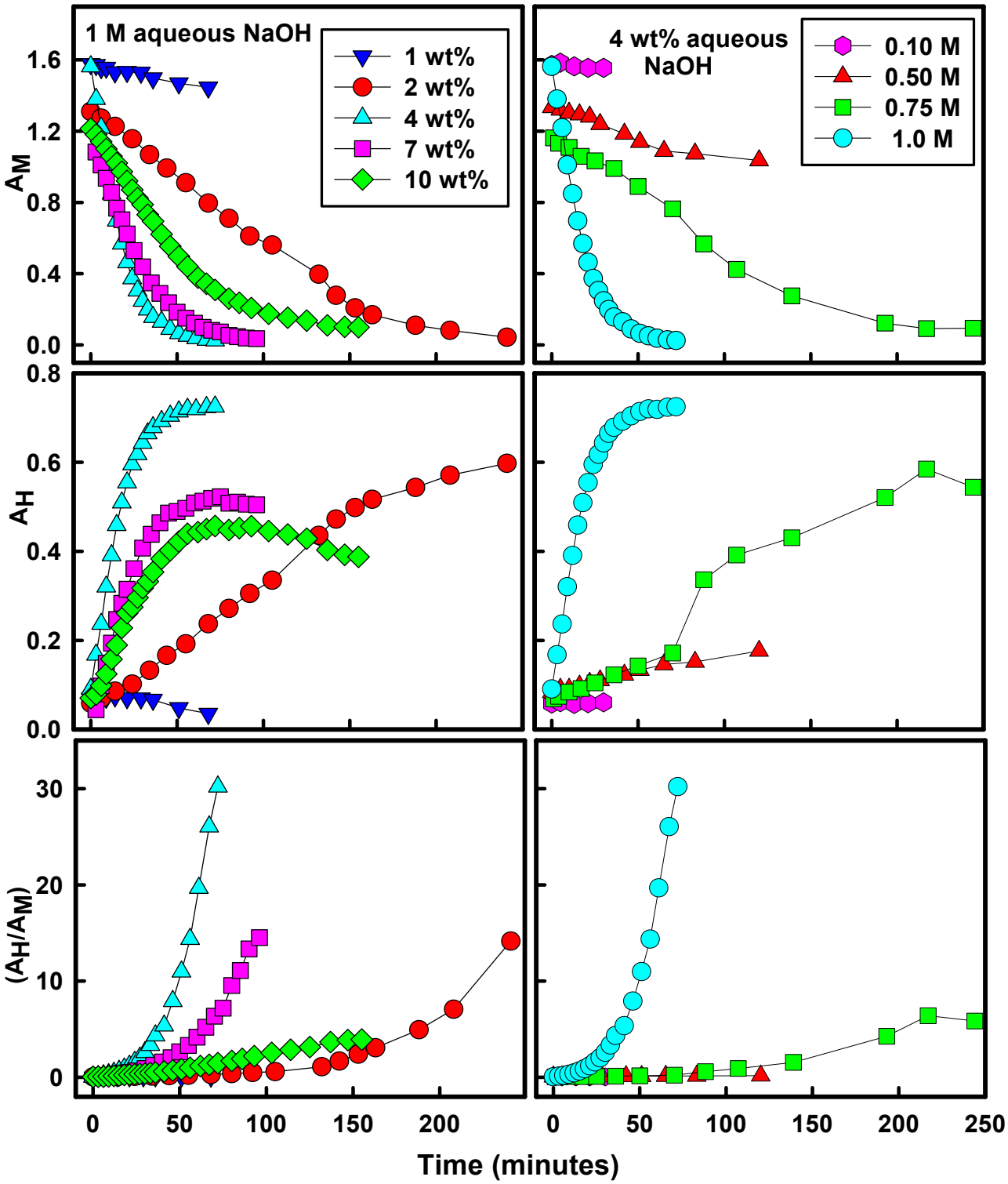


Figure S4. Variation in the absorbance of M-band (A_M) and H-band (A_H) as well as (A_H/A_M) with time for TDBC (10 μM) in [bmim][BF_4] containing different wt% 1 M aqueous NaOH (left panels), and different molarity 4 wt% aqueous NaOH (right panels) at ambient conditions.

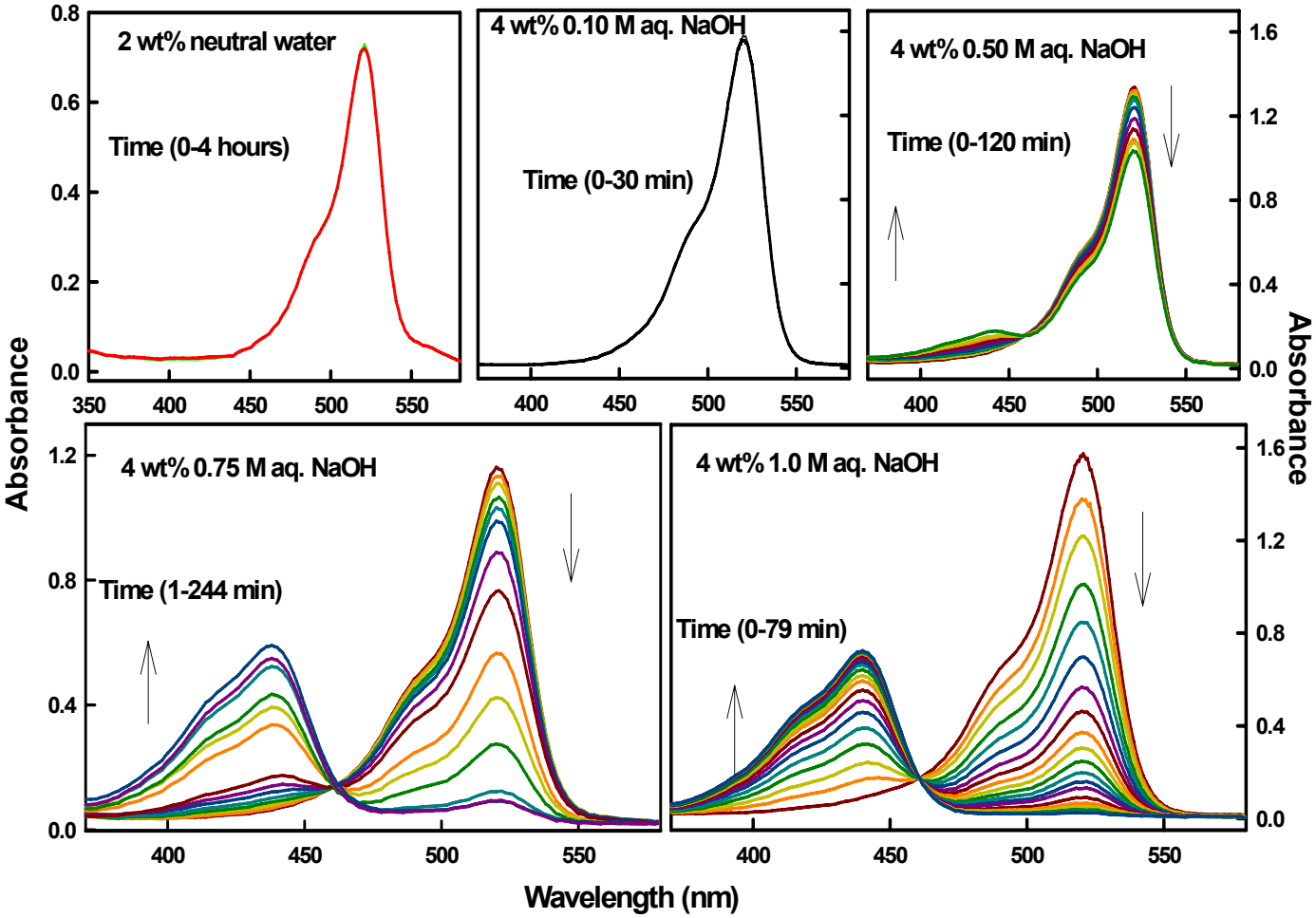


Figure S5. Absorbance spectra of TDBC (10 μM) with time in different molarity aqueous NaOH added [bmim][BF_4] at ambient conditions.

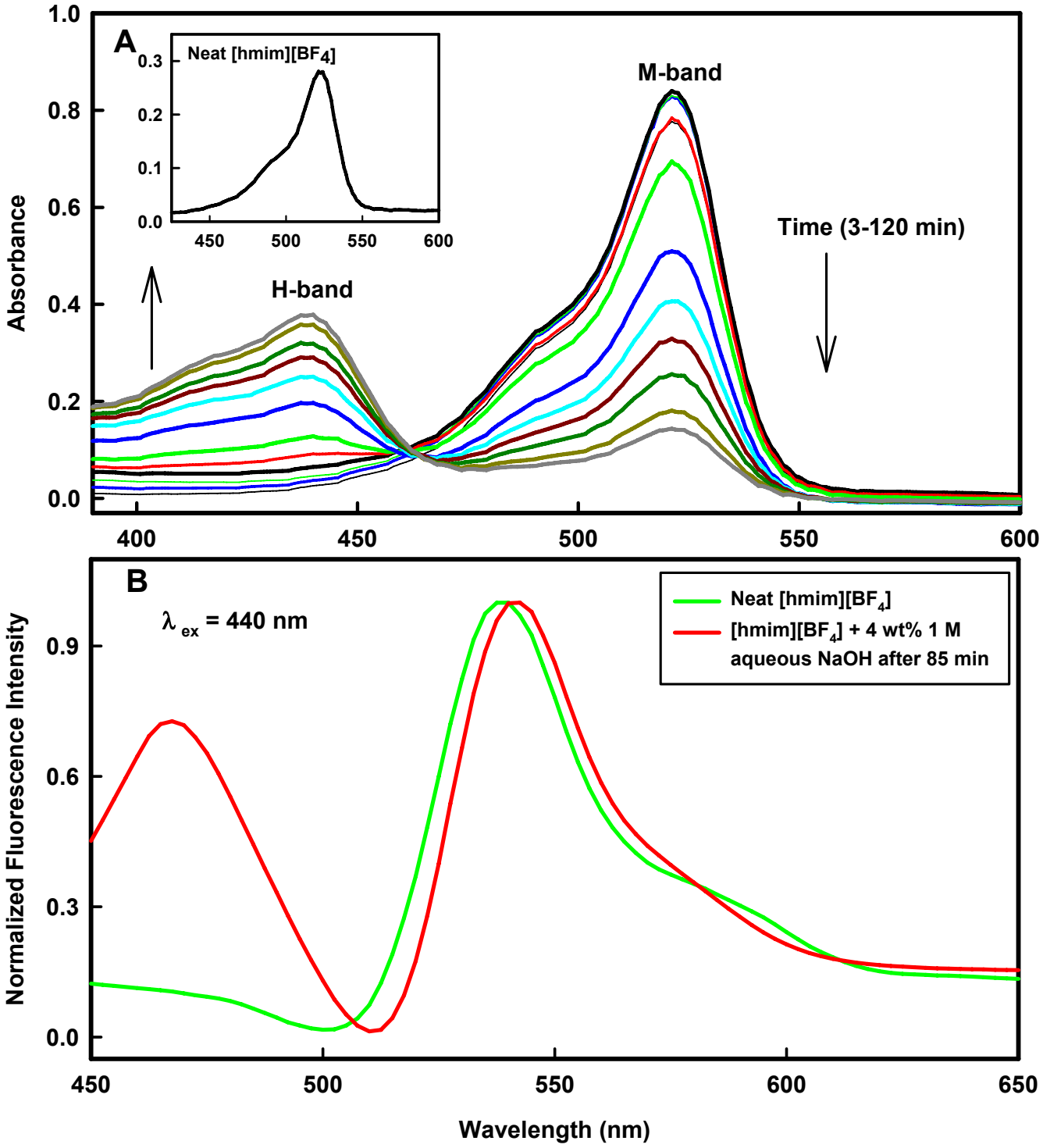


Figure S6. Absorbance (panel A) and fluorescence emission (panel B) spectra of TDBC (10 μM) with time in 4 wt% 1 M aqueous NaOH added [hmim][BF_4] at ambient conditions.

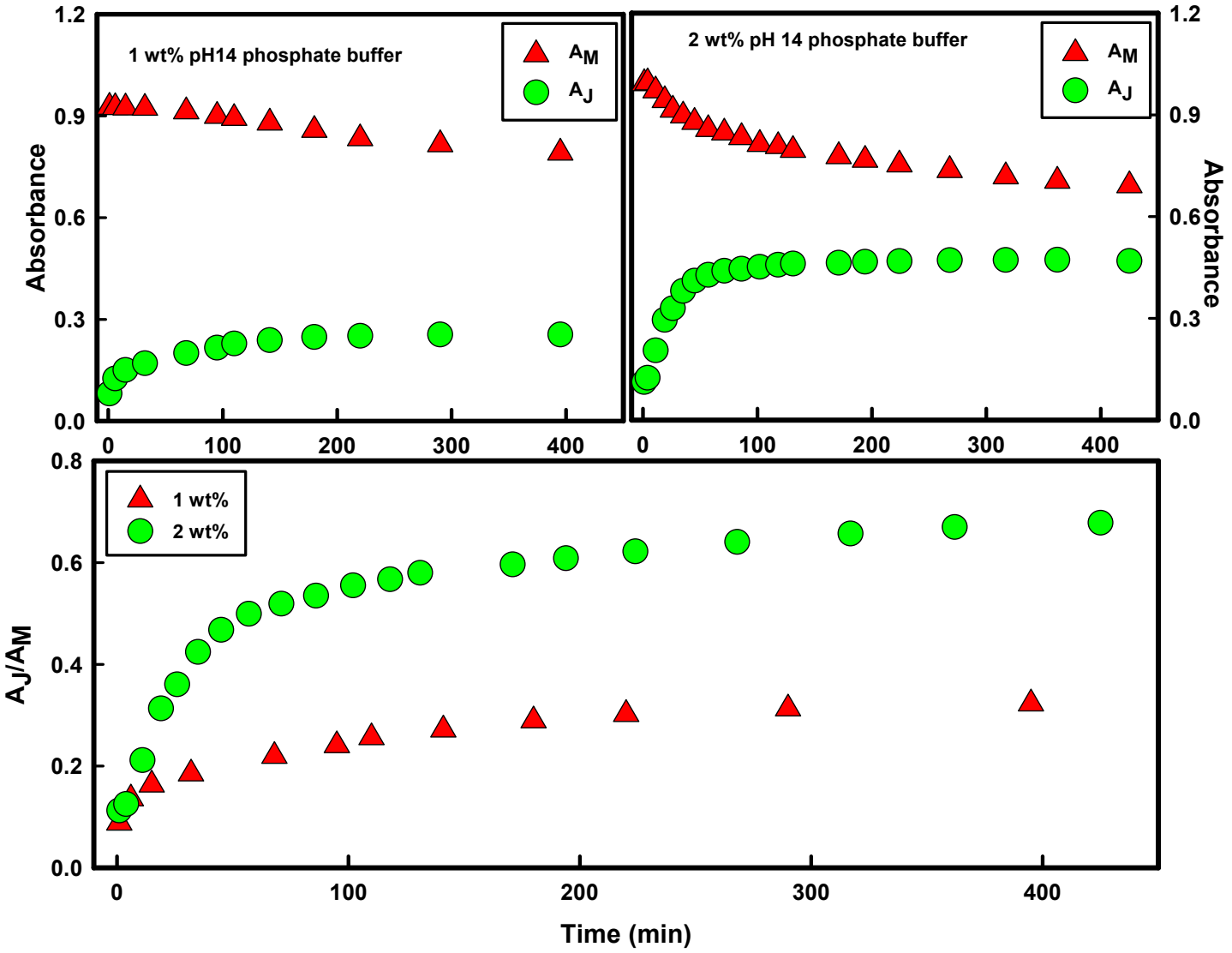


Figure S7. Variation in the absorbance of M-band (A_M) and J- band (A_J) and their absorbance ratio (A_J/ A_M) with time for TDBC (10 μM) in different wt% pH 14 phosphate buffer (10 mM) added [bmim][PF_6] at ambient conditions.

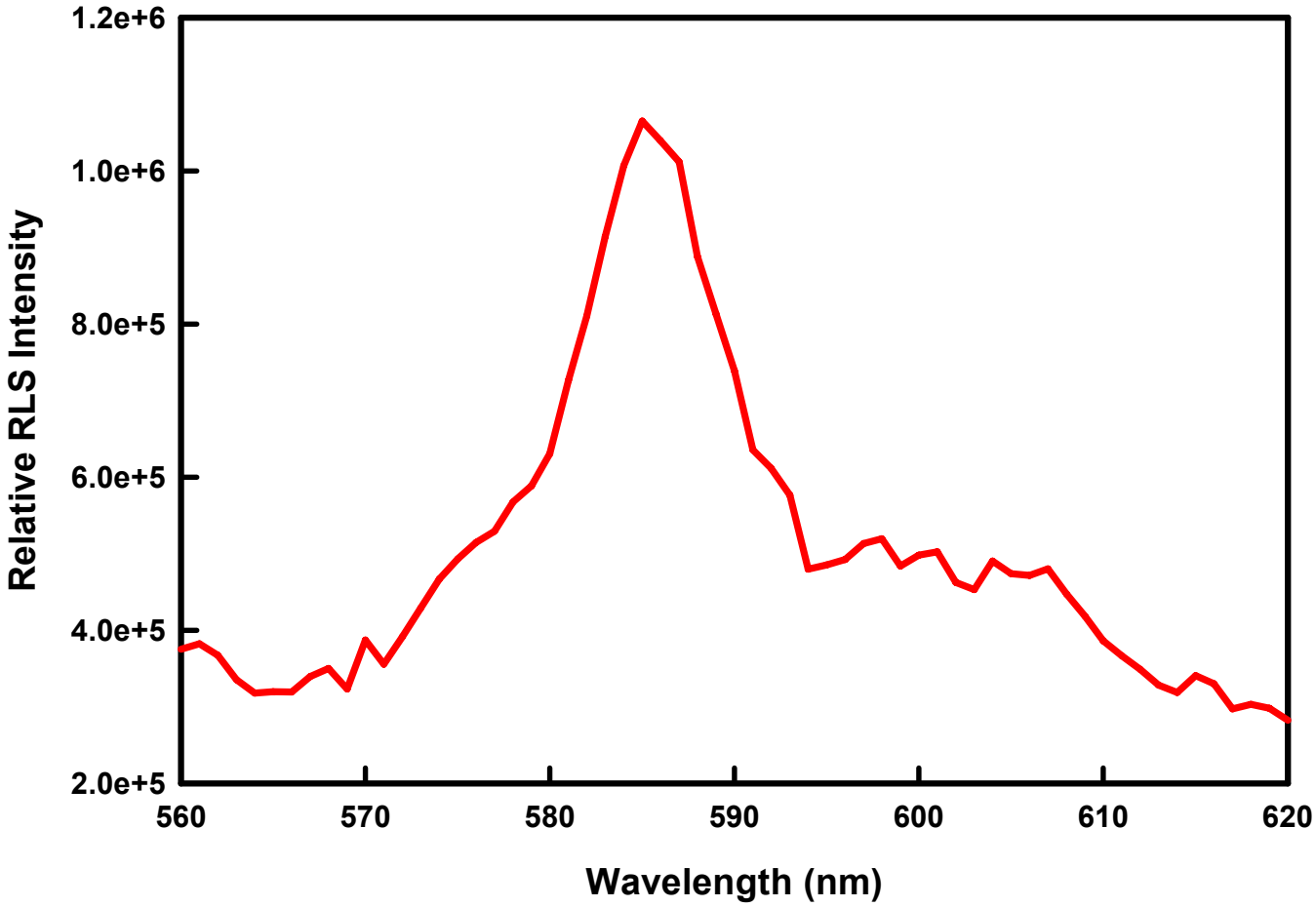


Figure S8. Resonance light scattering (RLS) spectrum of TDBC (10 μM) in 2 wt% 1 M aqueous NaOH added [bmim][PF_6] at ambient conditions.

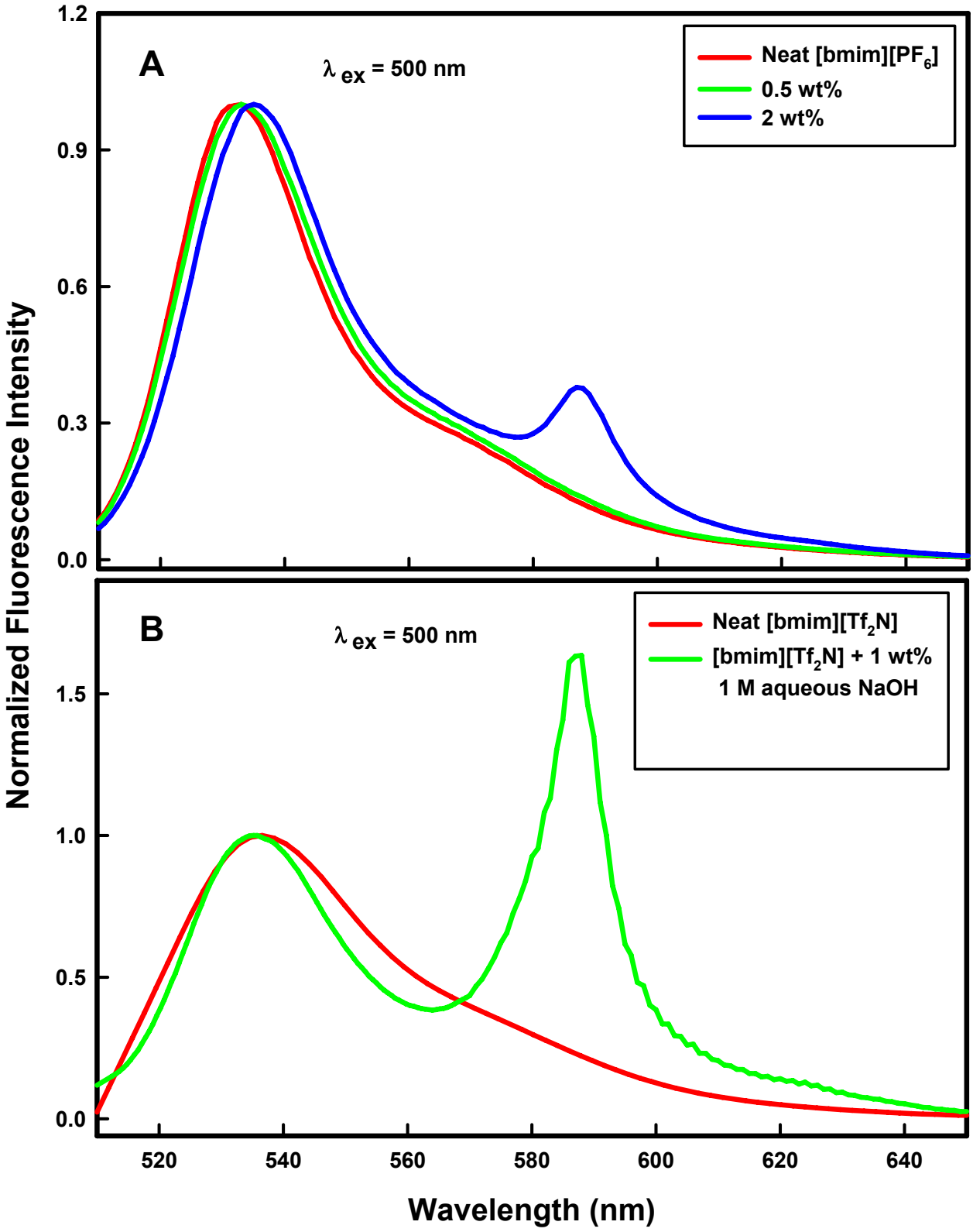


Figure S9. Fluorescence **e**mission spectra of TDBC (10 μM) in different wt% pH 14 phosphate buffer (10 mM) added [bmim][PF_6] after 5 minutes of sample preparation at ambient conditions (panel A) and in1 wt% 1 M aqueous NaOH added [bmim][Tf_2N] after 30 minutes of sample preparation at ambient conditions (panel B).

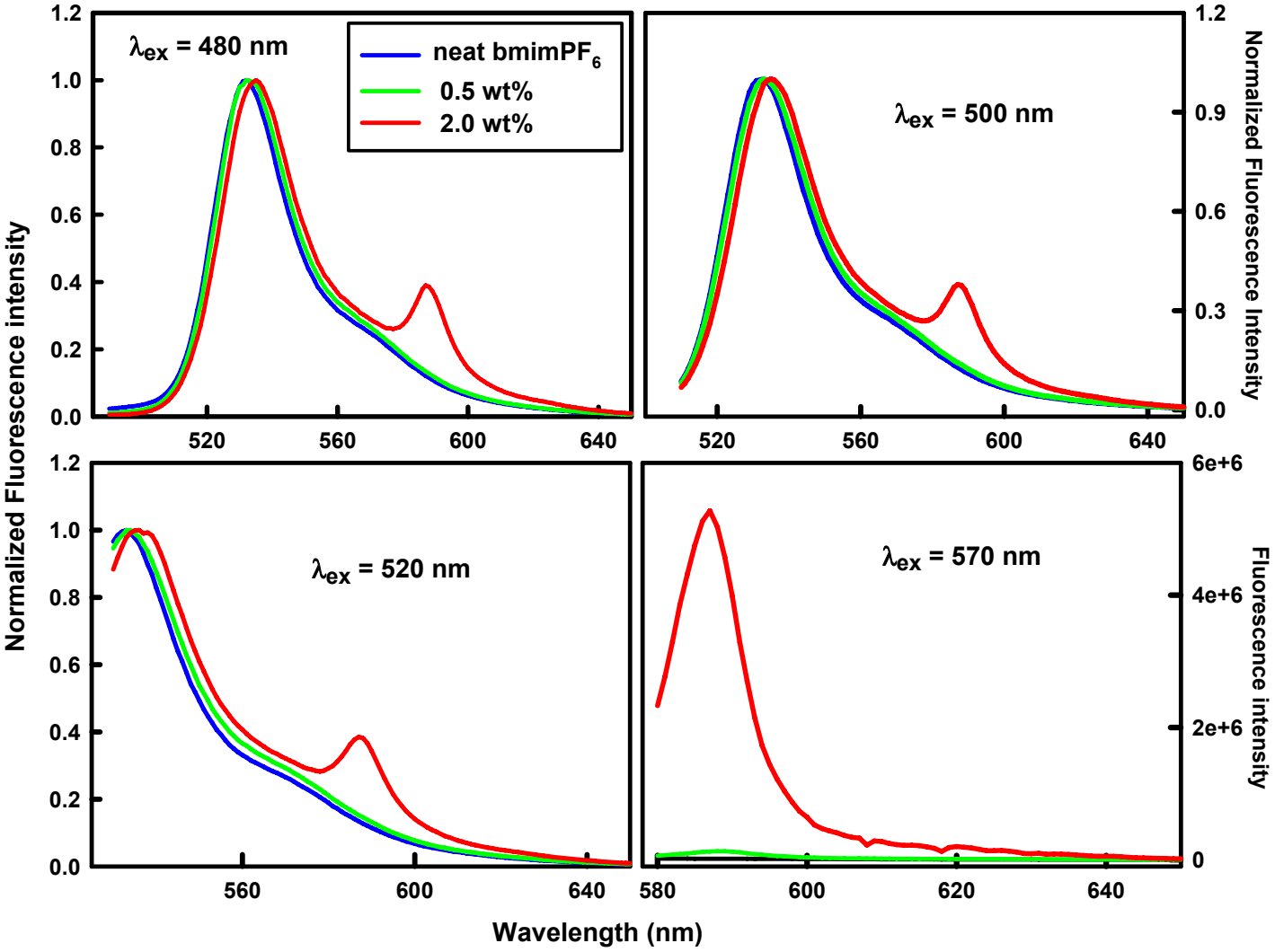


Figure S10. Fluorescence emission spectra when excited at different wavelengths of TDBC (10 μM) in different wt% pH 14 phosphate buffer (10 mM) added [bmim][PF_6] 5 minutes after sample preparation at ambient conditions. Fluorescence emission band characterizing J-aggregates appears at 588 nm irrespective of the excitation wavelength.

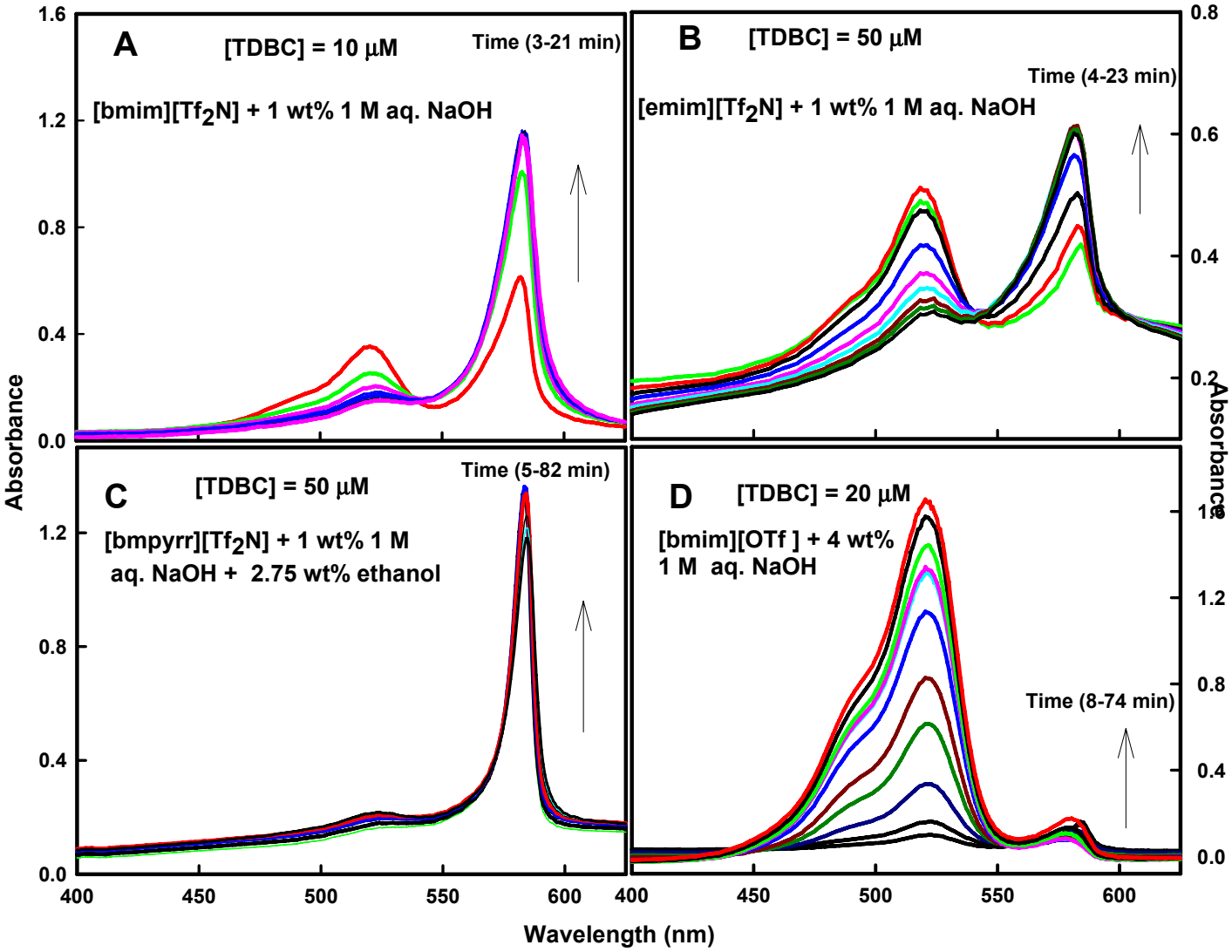


Figure S11. Absorbance spectra of TDBC with time in 1 wt% 1 M aqueous NaOH added [bmim][Tf_2N] (panel A), in 1 wt% 1 M aqueous NaOH added [emim][Tf_2N] (panel B), in 1 wt% 1 M aqueous NaOH + 2.75 wt % ethanol added [bmpyrr][Tf_2N] (panel C), and in 4 wt% 1 M aqueous NaOH added [bmim][OTf] at ambient conditions.

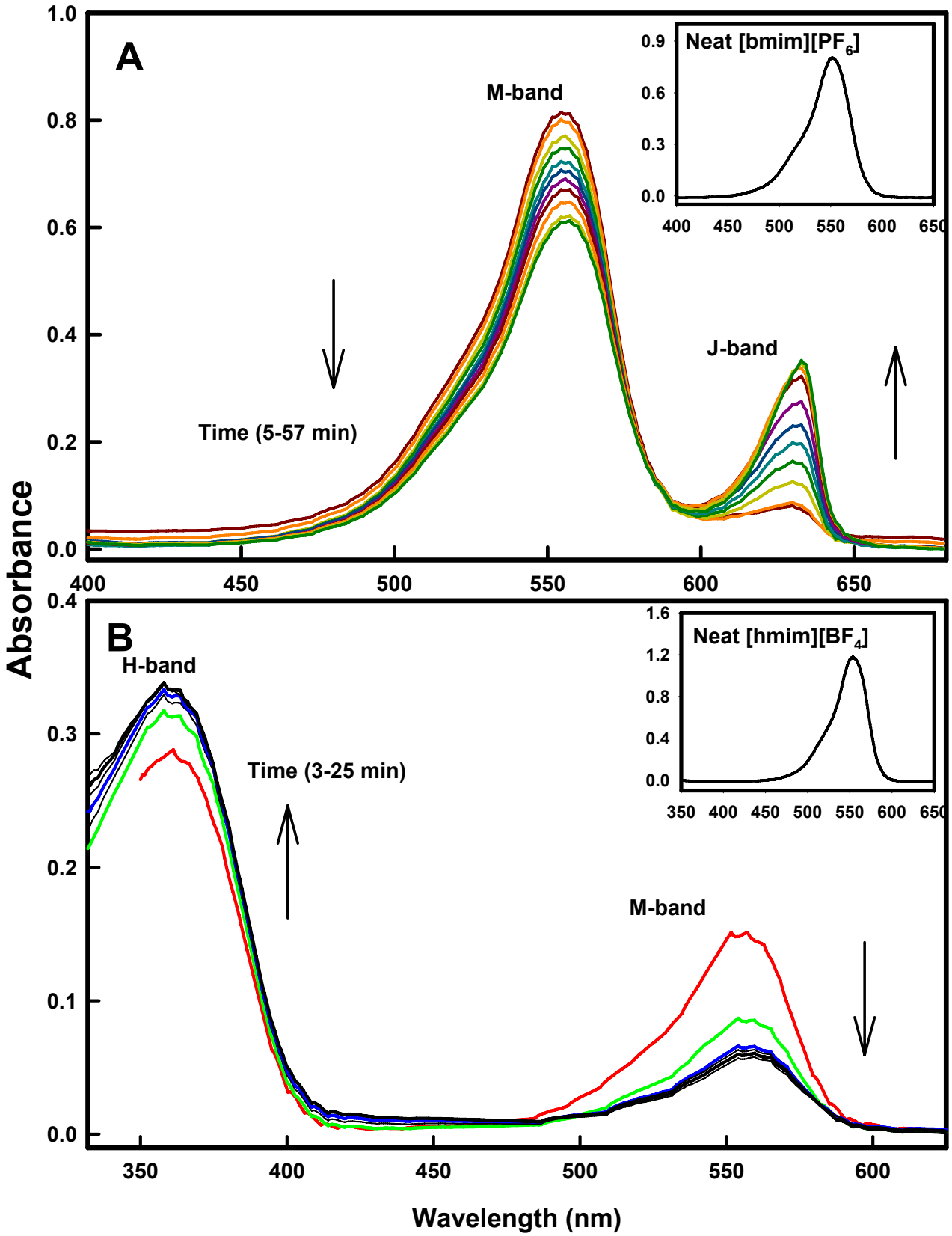


Figure S12. Absorbance spectra of TMDC (10 μM) with time in 2 wt% 1 M aqueous NaOH added [bmim][PF_6] (panel A) and in 2 wt% 1 M aqueous NaOH added [hmim][BF_4] (panel B) at ambient conditions.