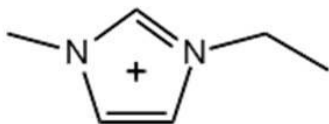


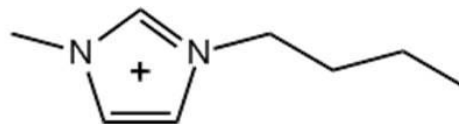
## Supporting Information

Structures and abbreviations of cations and anions used in this study.

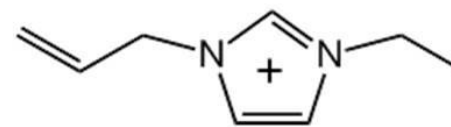
### Cation



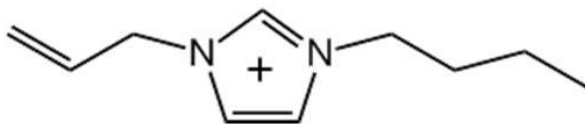
[EMIm]<sup>+</sup>: 1-ethyl-3-methylimidazolium



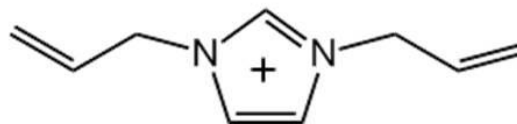
[BMIm]<sup>+</sup>: 1-butyl-3-methylimidazolium



[AEM]<sup>+</sup>: 1-allyl-3-ethylimidazolium



[ABIm]<sup>+</sup>: 1-allyl-3-butylimidazolium

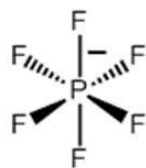


[AAIm]<sup>+</sup>: 1,3-diallylimidazolium

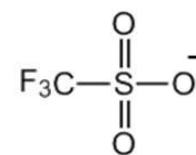
## Anion



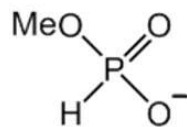
[BF<sub>4</sub>]<sup>-</sup>: tetrafluoroborate



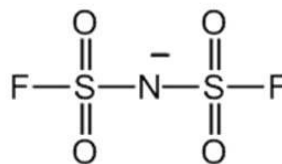
[PF<sub>6</sub>]<sup>-</sup>: hexafluorophosphate



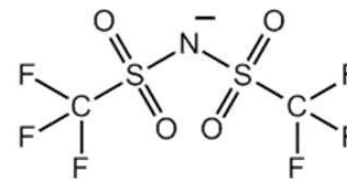
[TfO]<sup>-</sup>: trifluoromethanesulfonate



[(MeO)(H)PO<sub>2</sub>]<sup>-</sup>: methylphosphonate



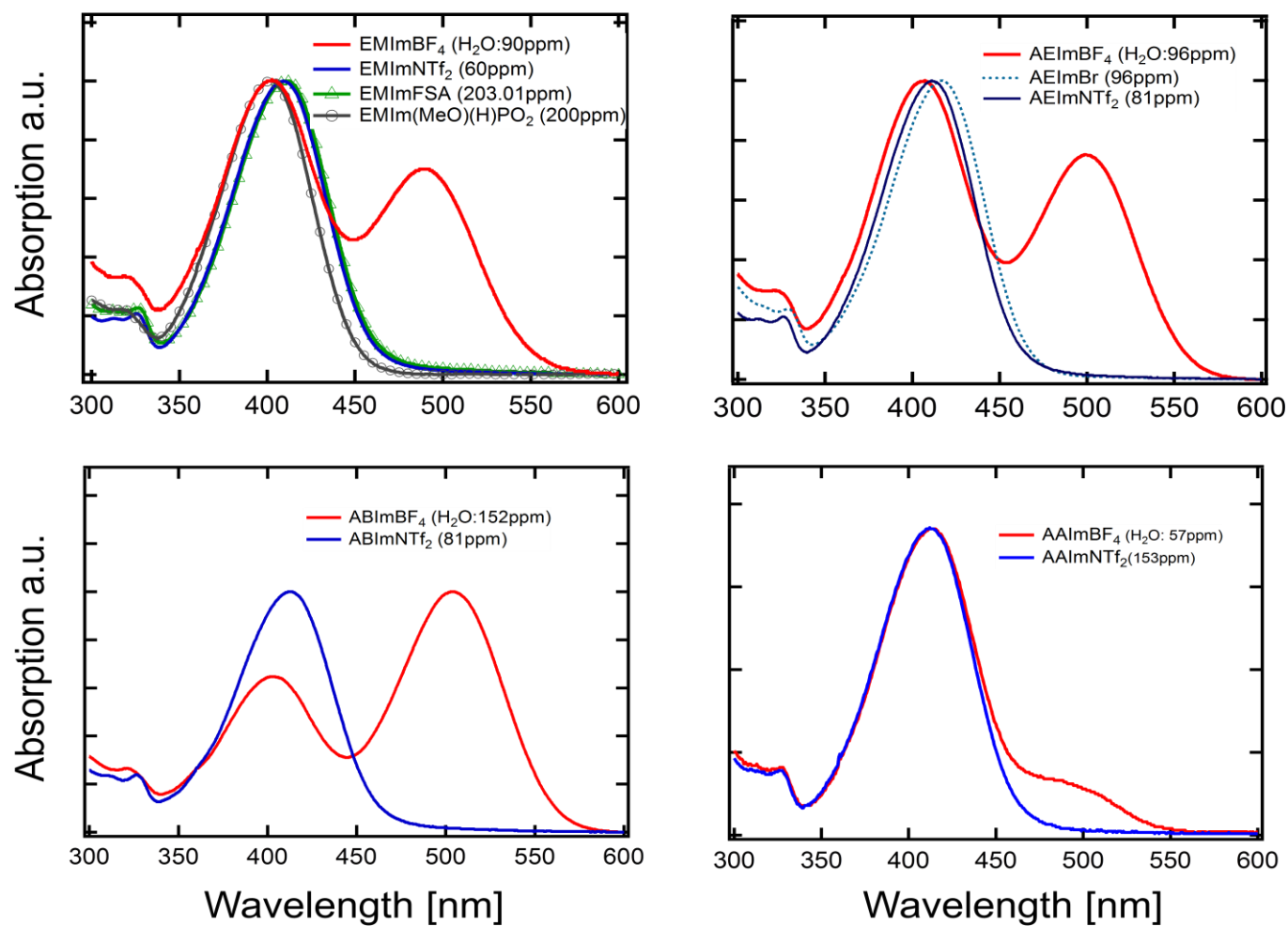
[FSA]<sup>-</sup>: bis(fluorosulfonyl)amide



[NTf<sub>2</sub>]<sup>-</sup>: bis(trifluoromethanesulfonyl)amide



bromide



**Fig. S1.** Absorption spectra of DEAHF in RTILs. The water contents of each solution are showed the inset of figures respectively.

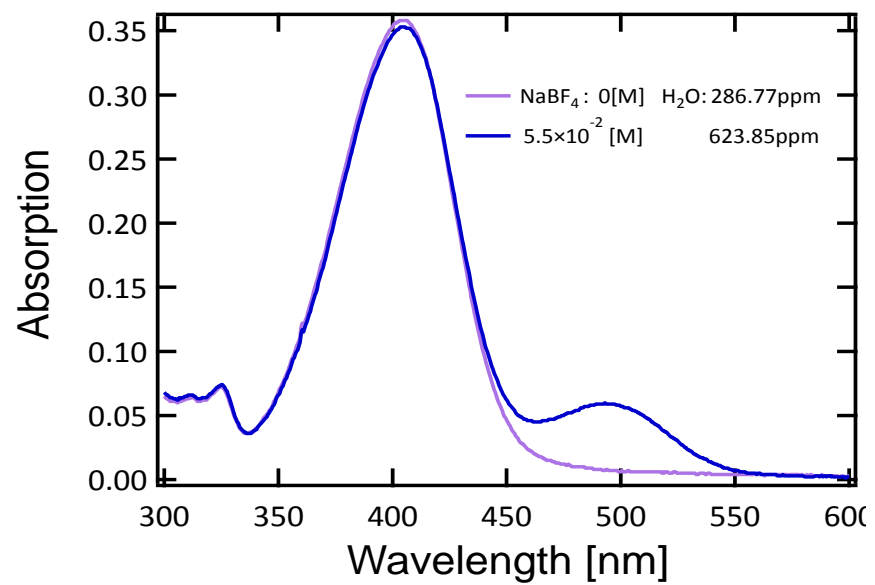


Fig. S2. Absorption spectra of DEAHF in acetonitrile adding NaBF<sub>4</sub> solution. The water and NaBF<sub>4</sub> contents of each solution are showed the inset of figure.