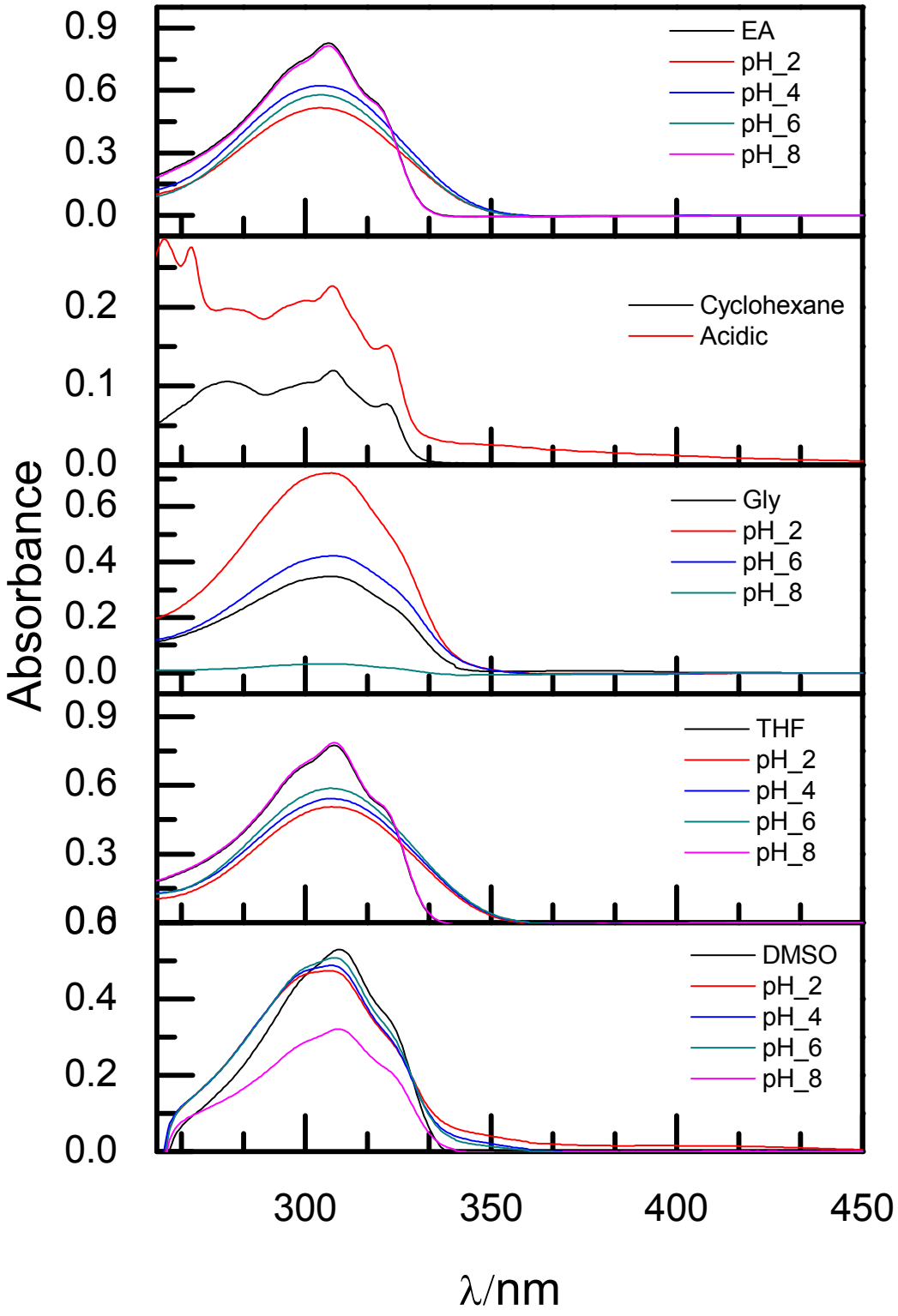


Figure S1: Absorption spectrum of 3PBI in various solvents and at different H^+ concentrations.

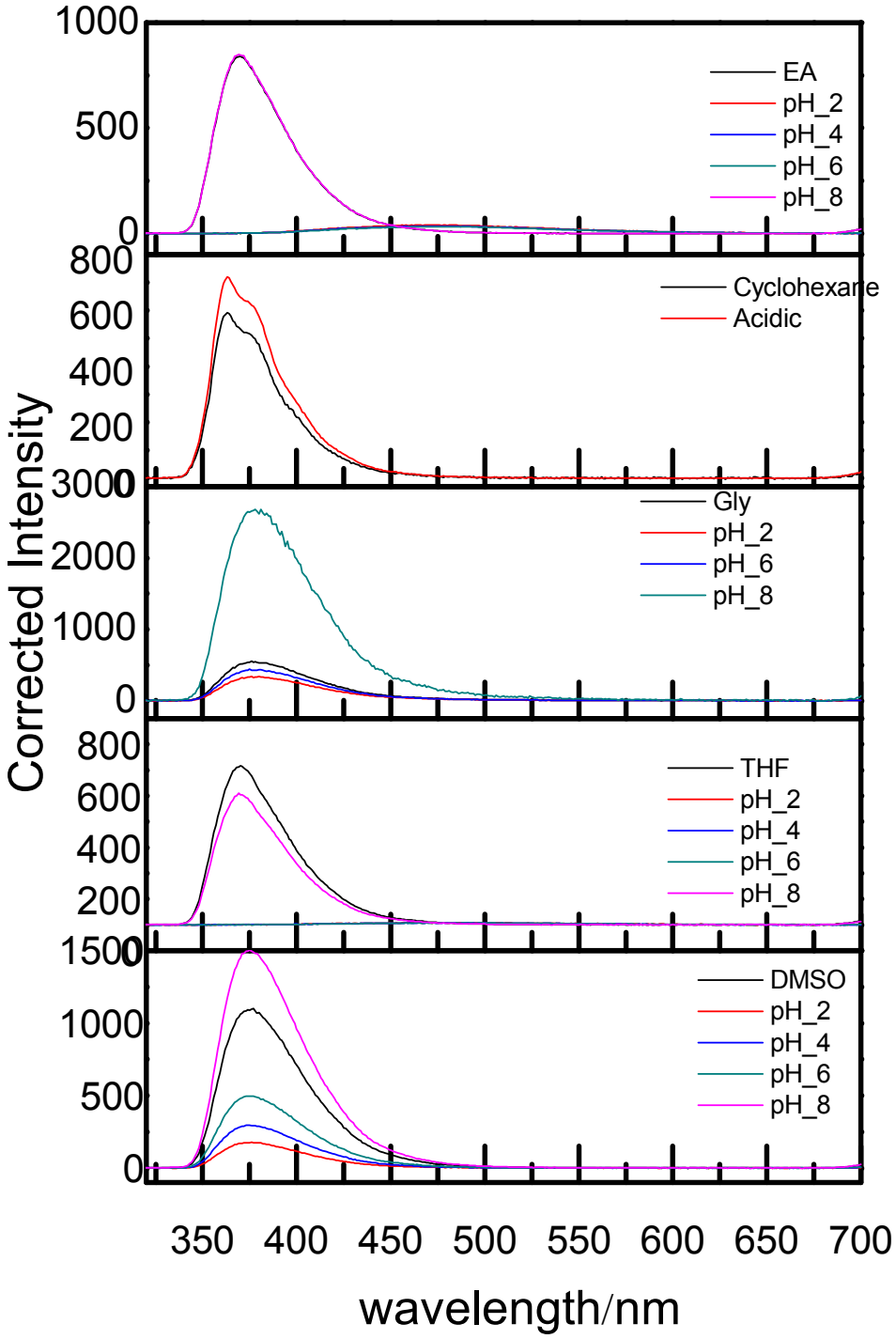


Figure: S2 Fluorescence spectrum of 3PBI in different solvents at different H^+ concentrations.

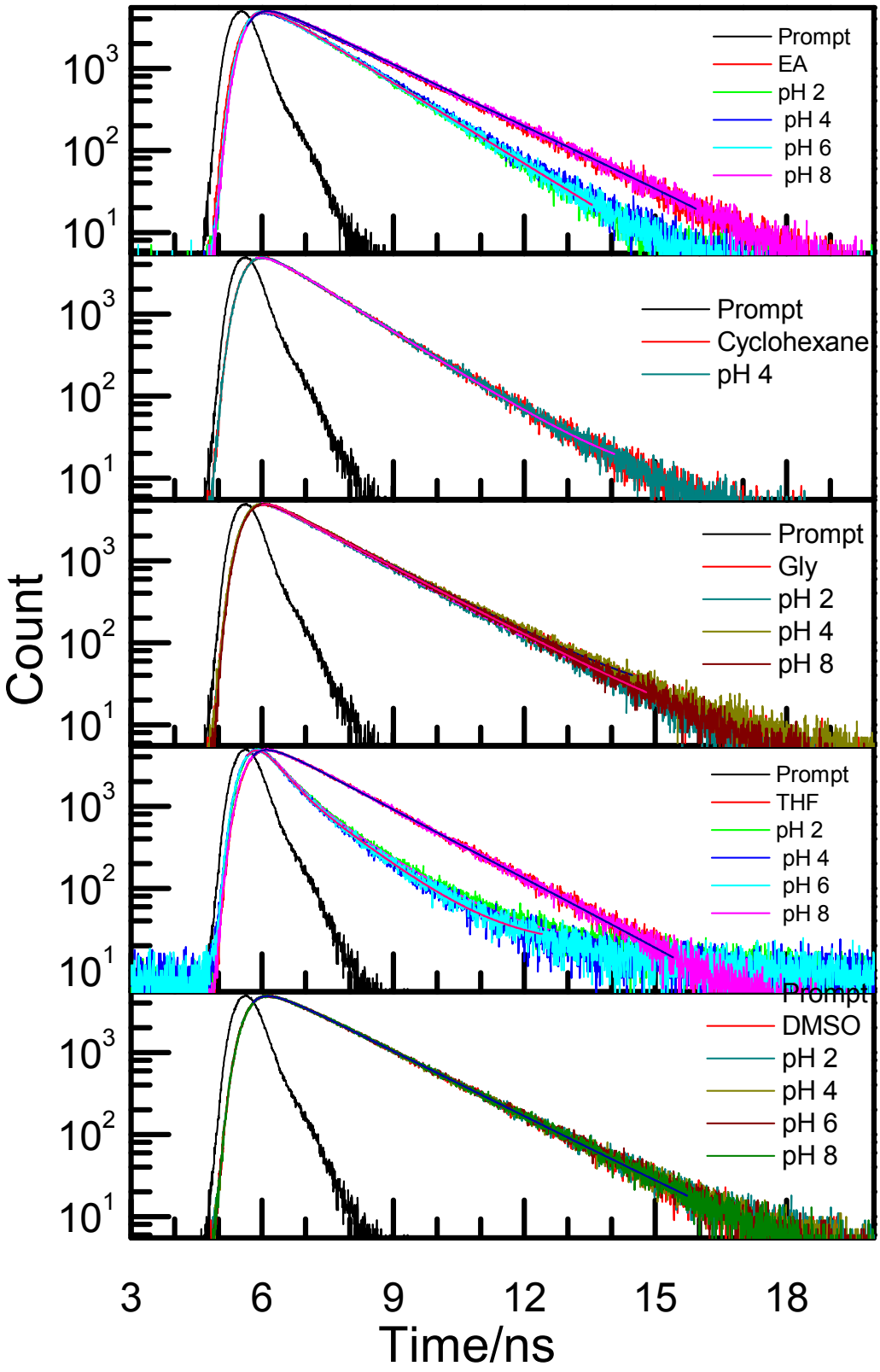


Figure S3. Temporal features of fluorescence of 3PBI

Figure S4. Optimized structure of 3PBI in ground state

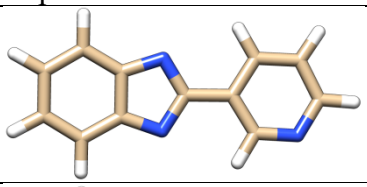
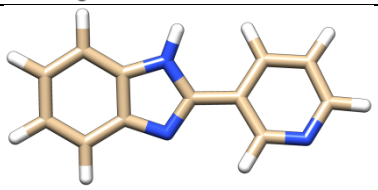
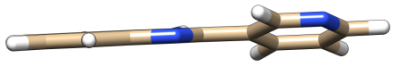
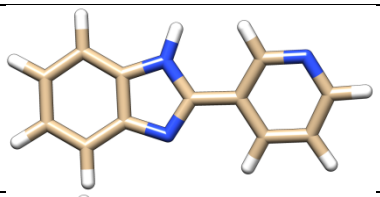
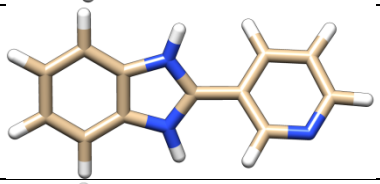
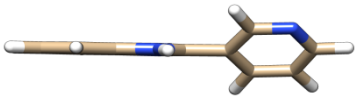
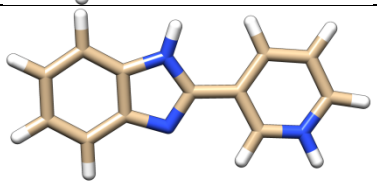
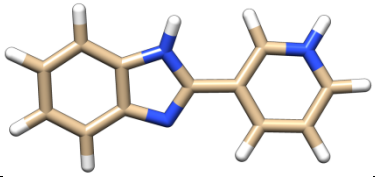
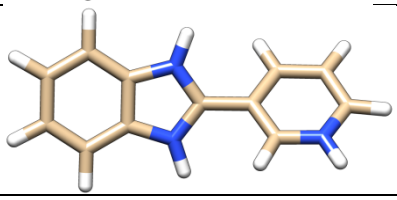
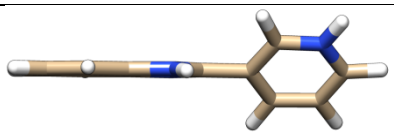
	Top	Side
A		
N_{trans}		
N_{cis}		
C		
T_{trans}		
T_{cis}		
D		

Figure S5. Optimized structure of 3PBI in excited state

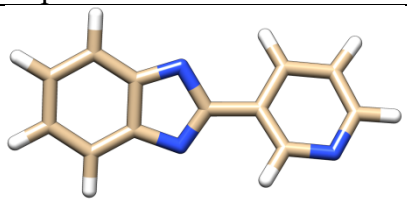
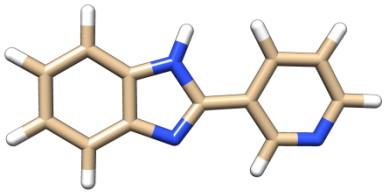
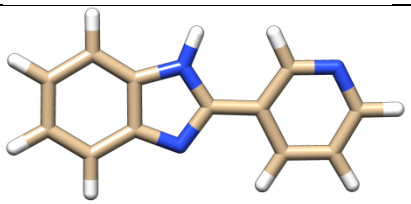
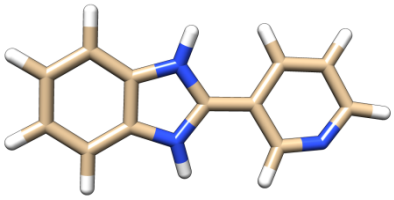
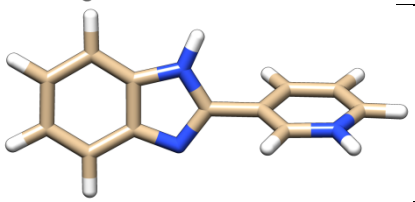
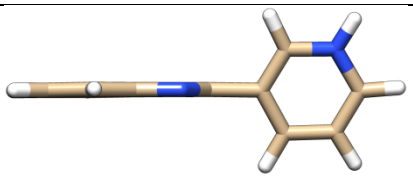
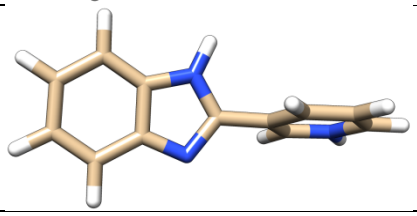
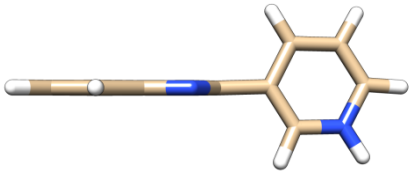
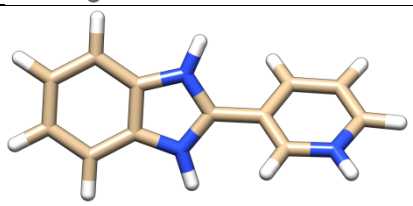
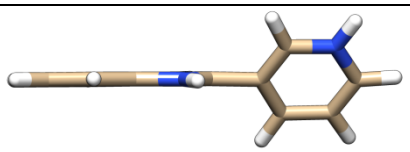
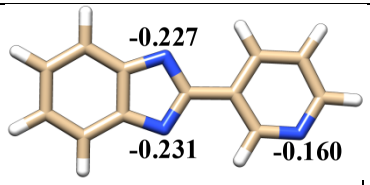
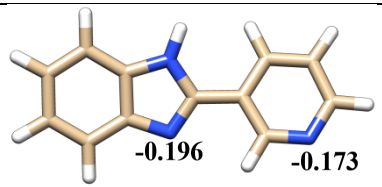
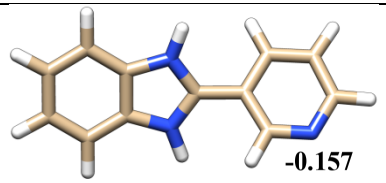
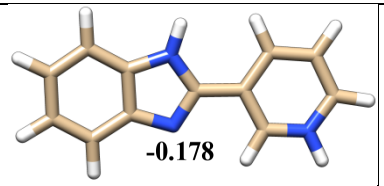
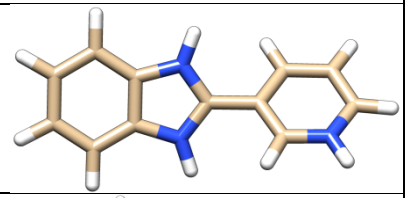
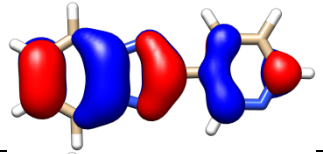
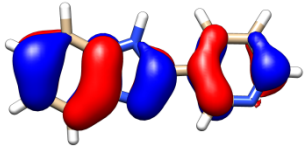
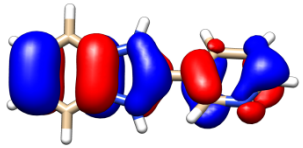
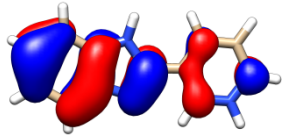
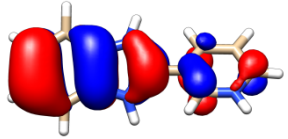
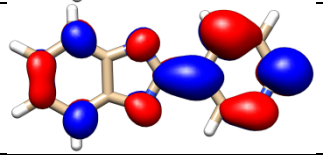
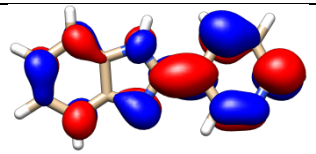
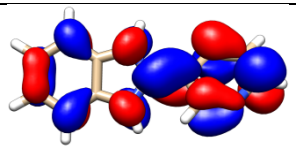
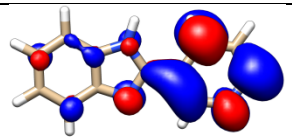
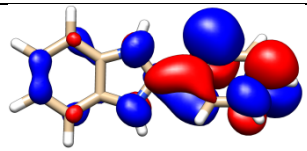
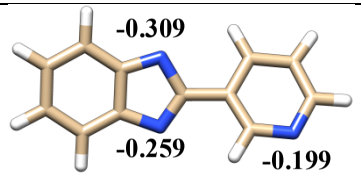
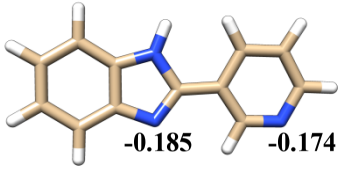
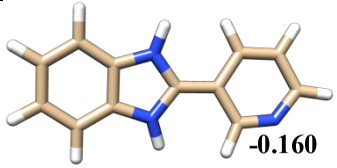
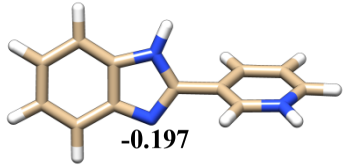
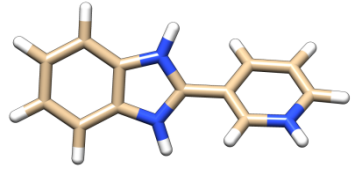
	Top	Side
A		
N_{trans}		
N_{cis}		
C		
T_{trans}		
T_{cis}		
D		

Table S1. Calculated photophysical properties of 3PBI using B3LYP/TZVP level.[a]

	A	N_{trans}	C	T_{trans}	D
Ground state					
Optimized structure[a]					
HOMO					
LUMO					
ω[b]	-4	-15	-36	-7	-42
PA[c]	-	-47.7	-29.8	-30.0	-23.5
Excited state					
	A^*	N_{trans}^*	C^*	T_{trans}^*	D^*
Optimized structure[a]					
ω[b]	-28	4	-9	-77	-49
PA[c]	-	-39.4	-41.2	-49.9	-12.6

[a] Löwdin charges (in a.u) on nitrogens are shown
[b] ω denotes dihedral angles (in degrees) between the two heterocyclic rings
[c] PA denotes proton affinity (kcal mol^{-1})

Table S2: Anisotropy of 3PBI in various solvents and nafion at different hydration levels

System	Anisotropy
Cyclohexane	0.0224
DMSO	0.04174
EA	0.01674
THF	0.02899
Gly	0.29812
Nafion (λ = 6)	0.00601
Nafion (λ= 1)	0.32509

Table S3: Temporal features of flurescence of 3PBI in various solvents at different acid concentrations.

Solvents		τ_1/ps	τ_2/ps	a_1	a_2	χ^2
Cyclohexane	Neat solvent	1340±2				1.08
	pH4	1300±2				1.09
Glycerol	Neat solvent	1560±2				1.07
	pH2	1500±3				1.19
	pH6	1580±2				1.06
	pH8	1560±2				1.16
DMSO	Neat solvent	1628±2				1.05
	pH2	1638±2				1.06
	pH4	1635±2				1.02
	pH6	1628±2				1.03
	pH8	1644±2				1.00
Ethyl acetete	Neat solvent	1711±2				1.01
	pH2	1299±2				1.03
	pH4	1359±2				1.11
	pH6	1321±2				1.10
	pH8	1733±2				1.03
THF	Neat solvent	1526±2	--	--	--	1.12
	pH2	1315±18	500±4	0.27	0.73	1.11
	pH4	1180±18	300±4	0.19	0.81	1.63
	pH6	1328±52	500±6	0.25	0.75	1.66
	pH8	1555±2	--	--	--	1.07