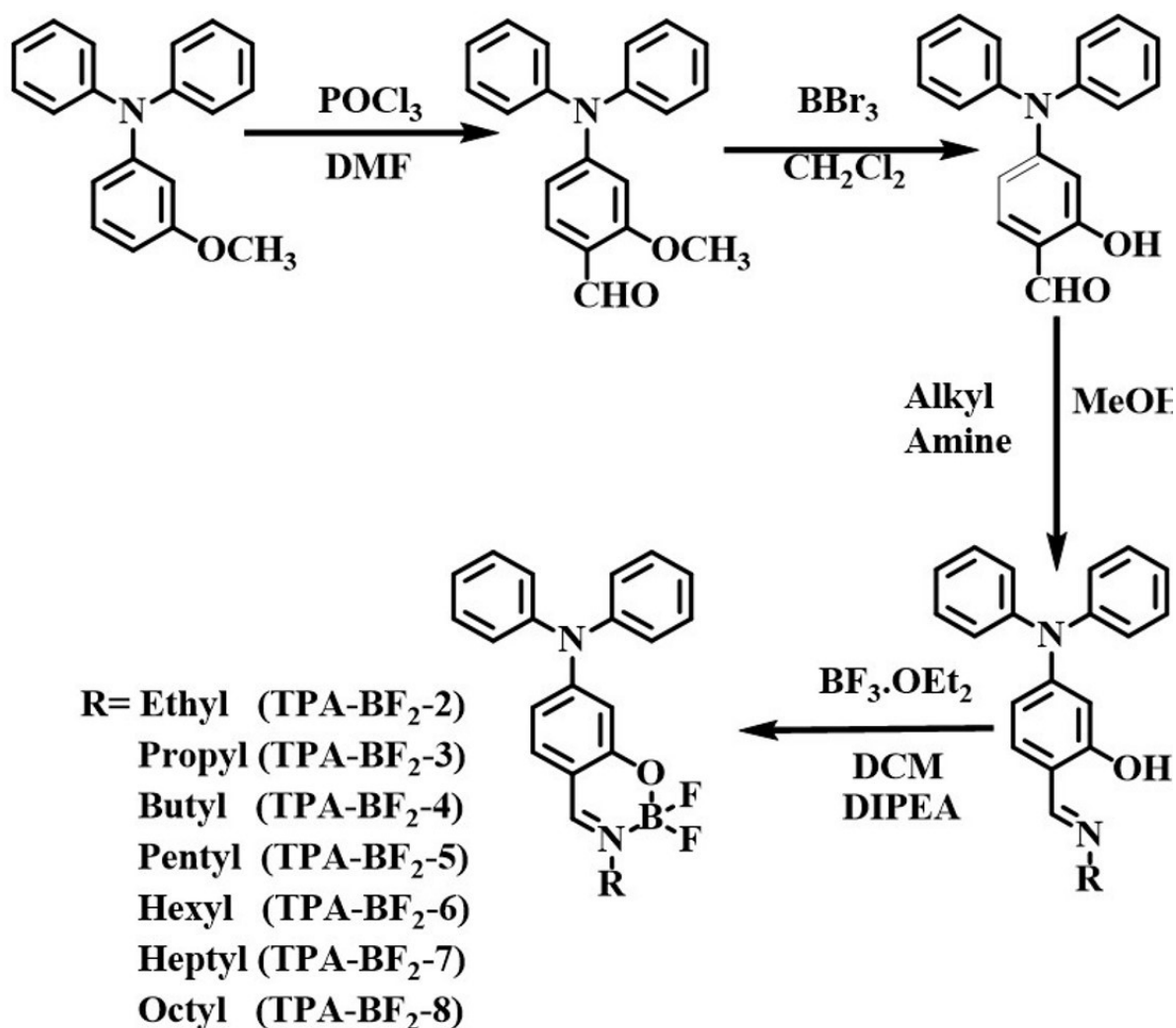
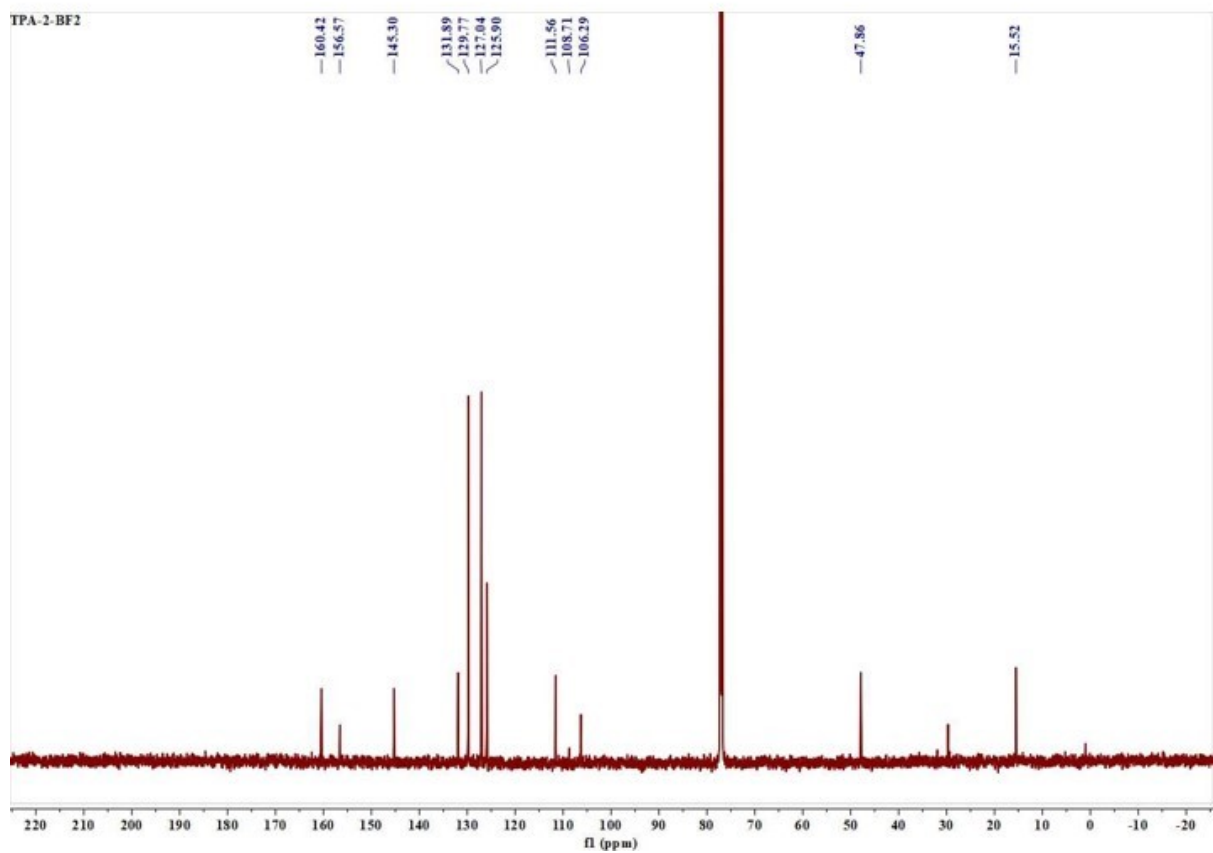
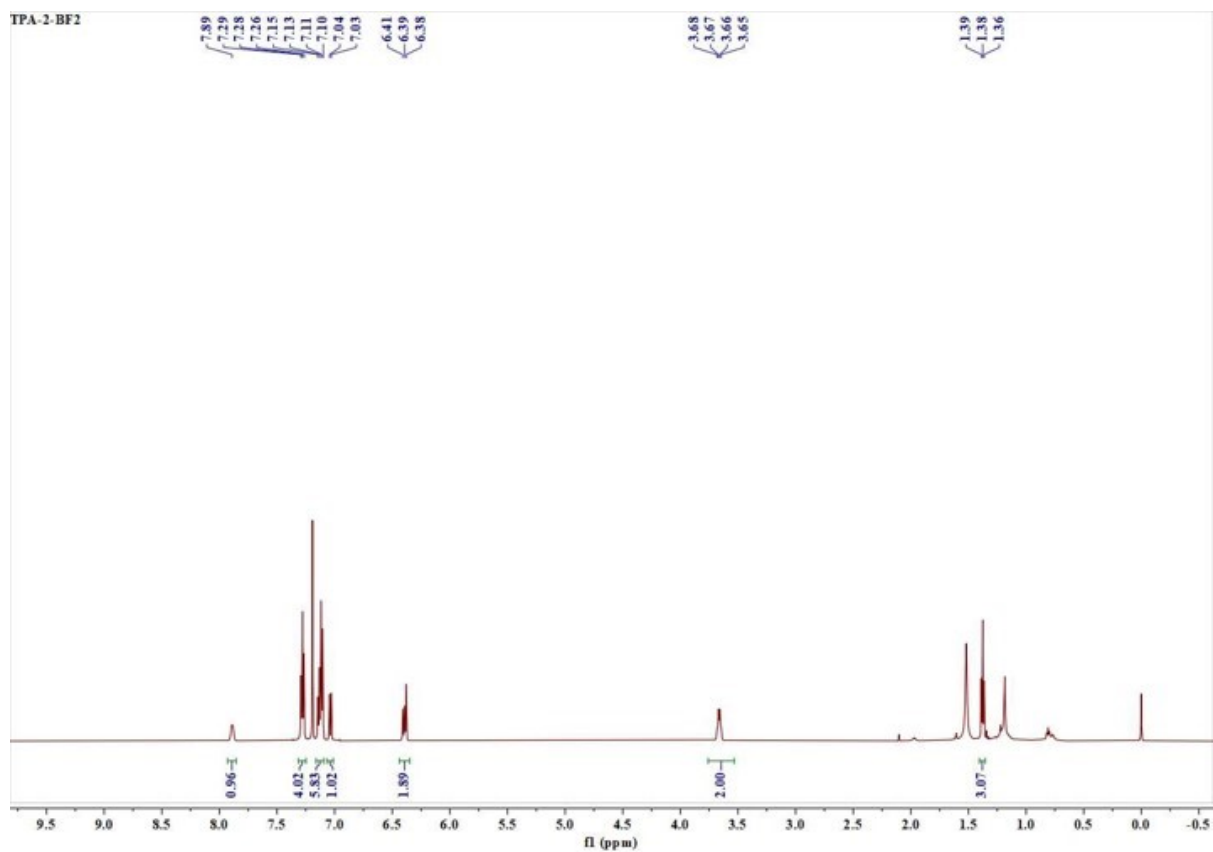


Electronic Supplementary Information (ESI)

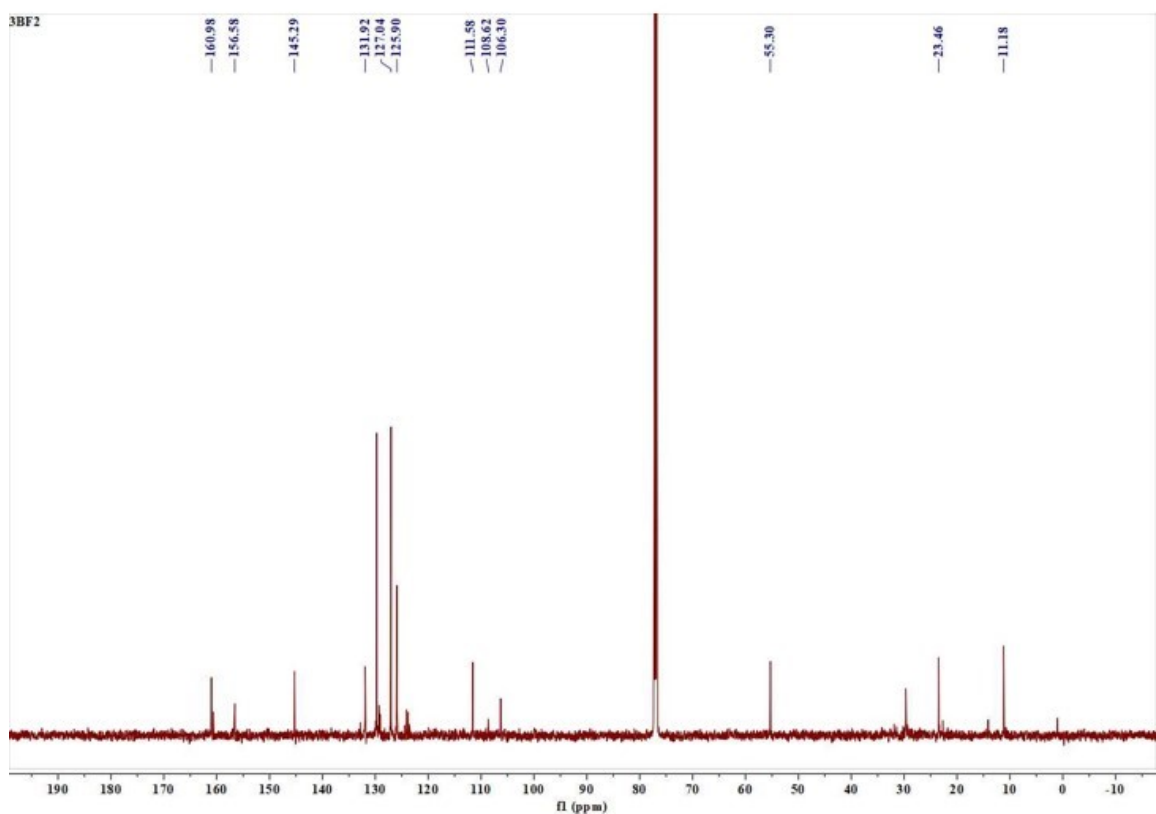
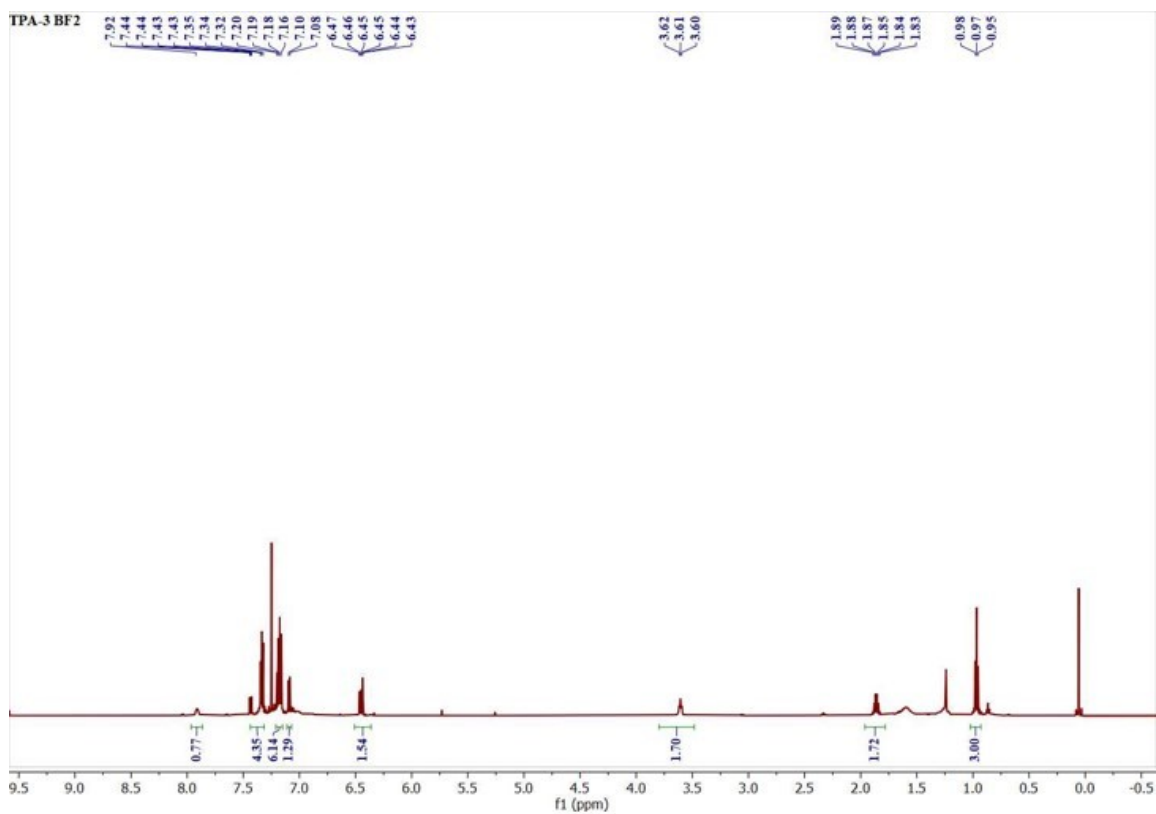
Triphenylamine-boron complexes: Molecular thermometer and alkyl chain controlled molecular fluorescent liquids



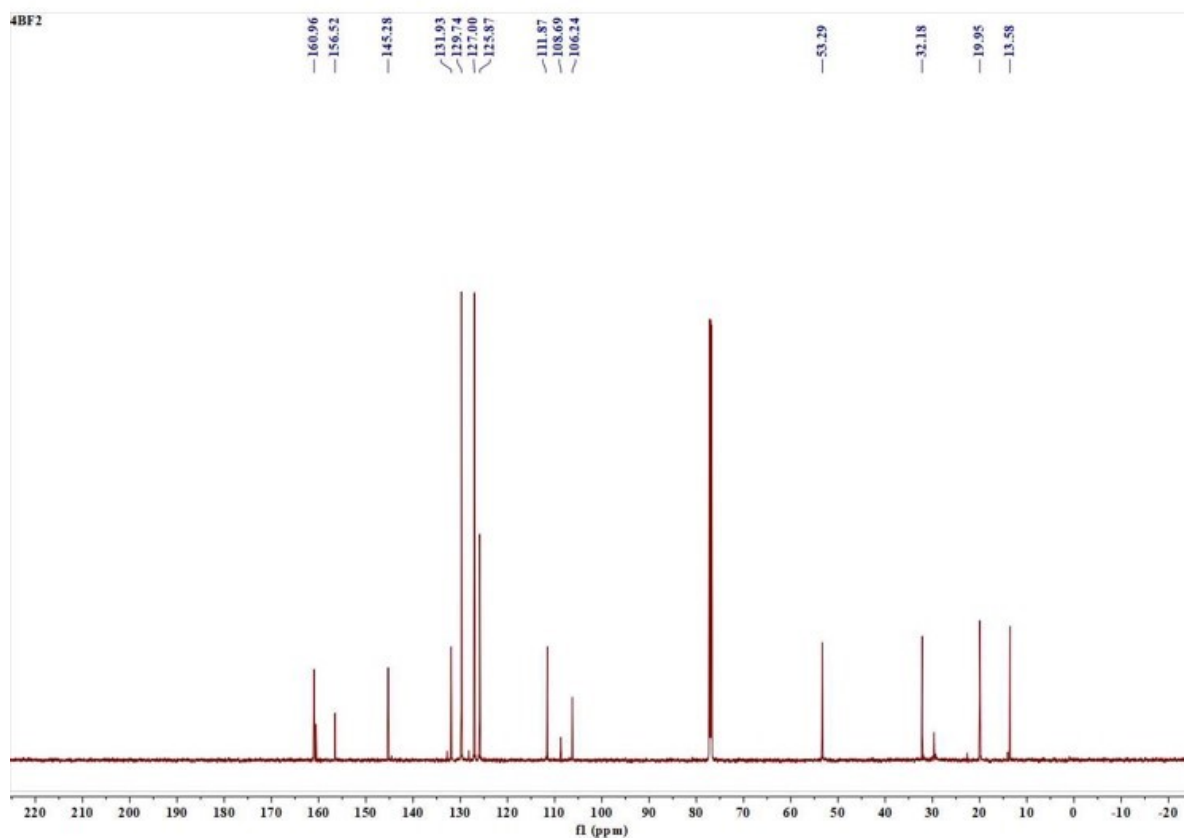
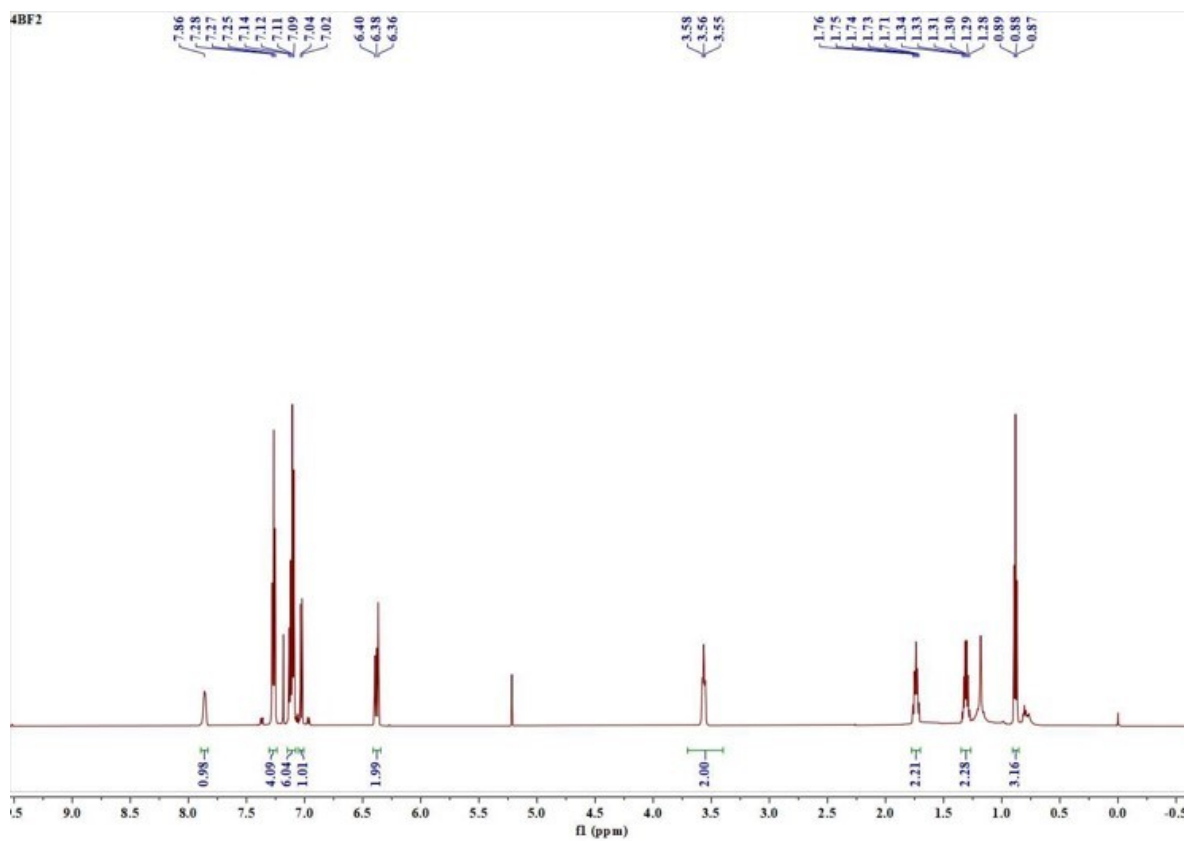
Scheme S1. Synthesis of TPA-BF₂ complexes.



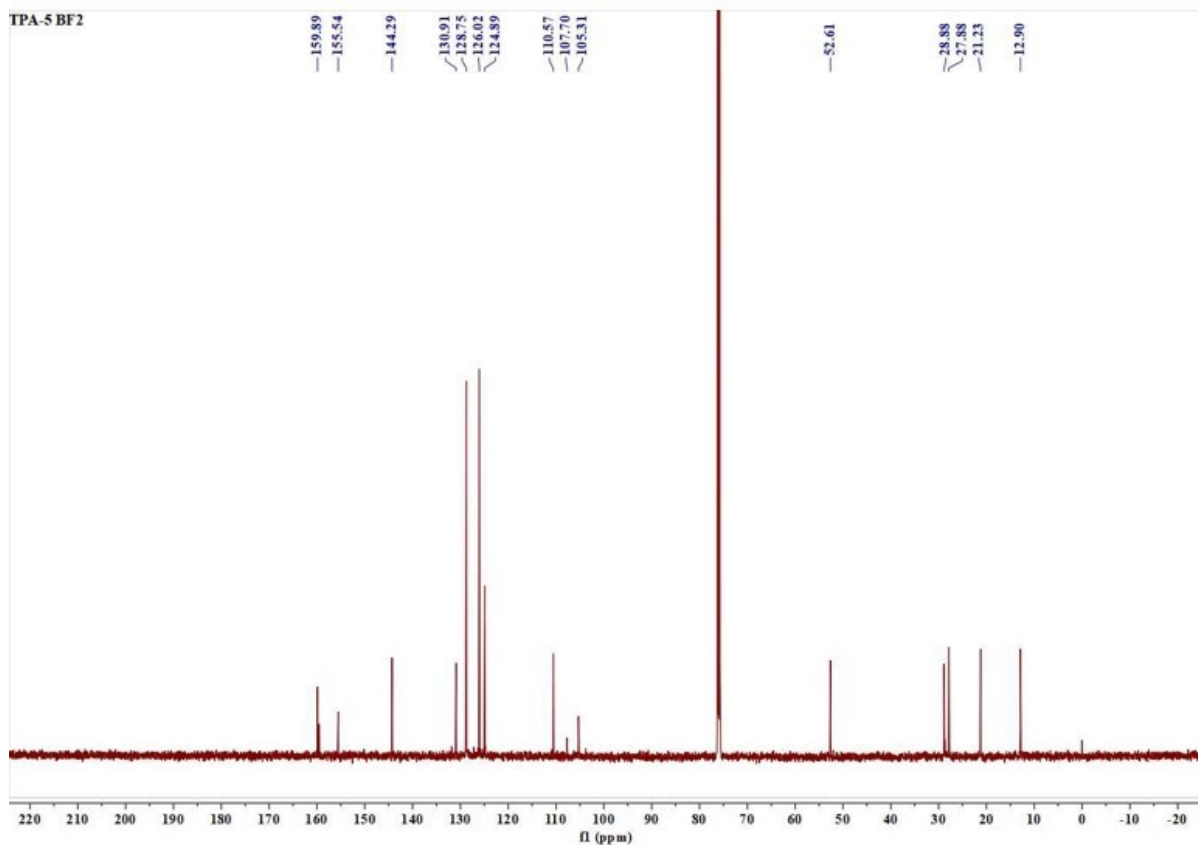
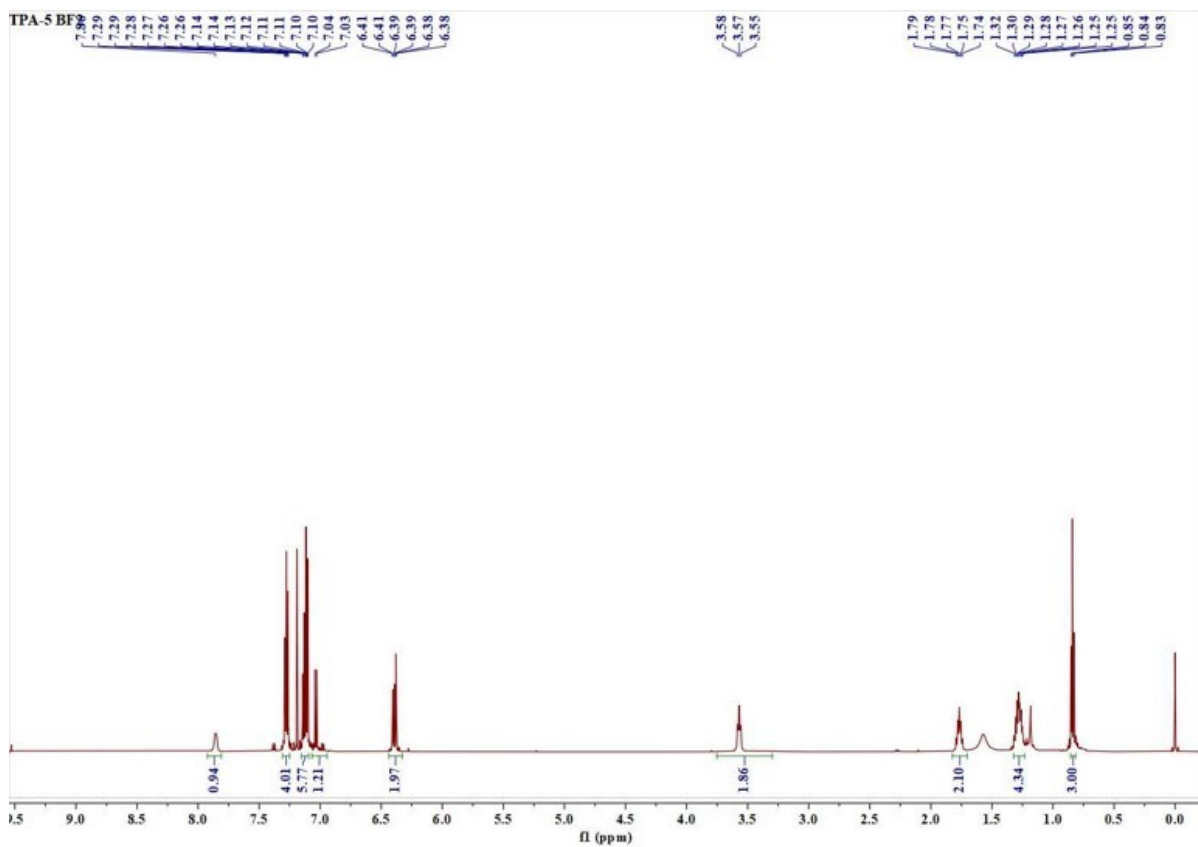
^1H & ^{13}C NMR of TPA-BF₂-2



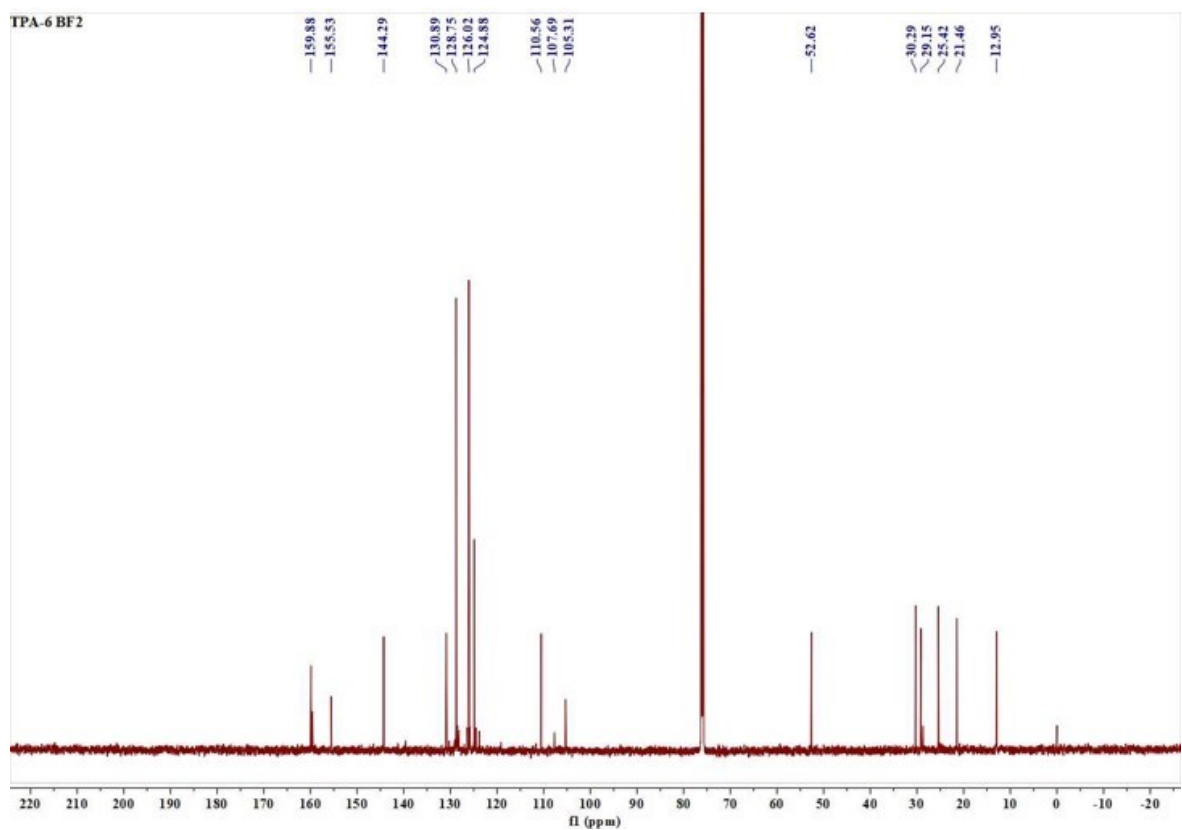
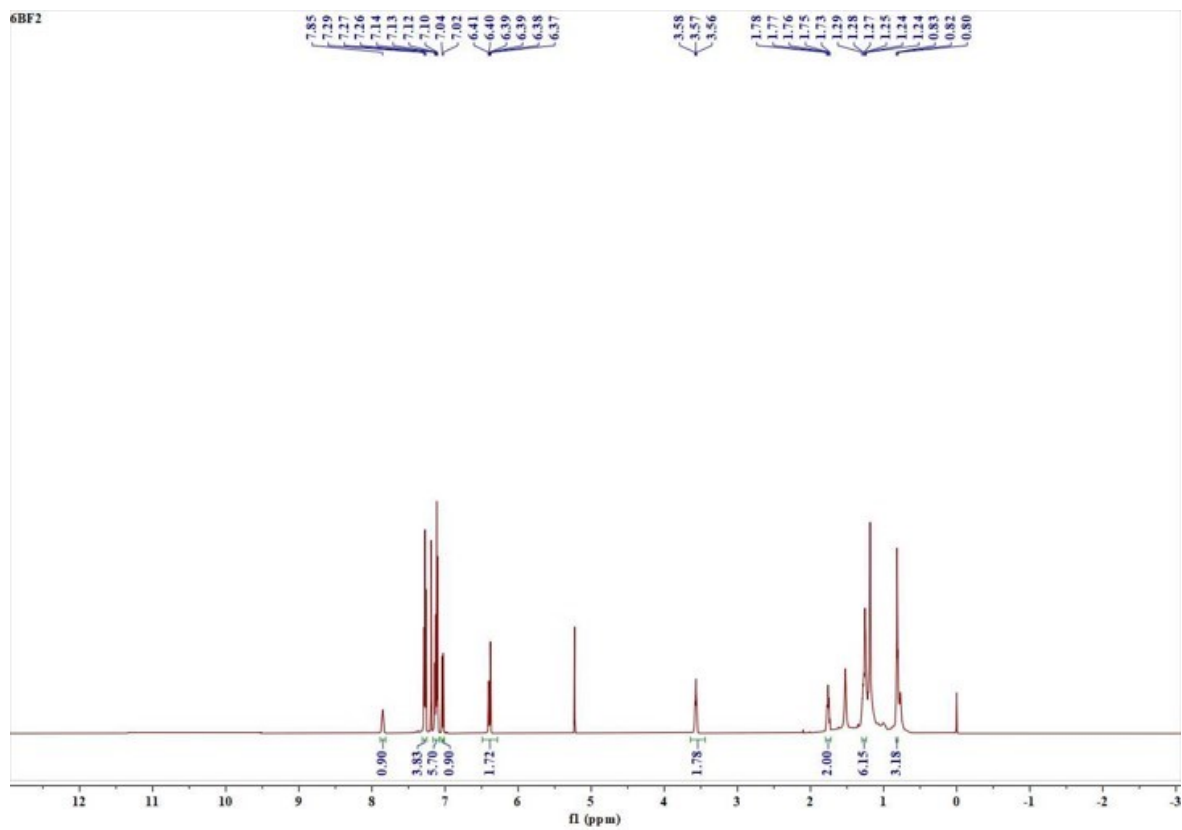
^1H & ^{13}C NMR of TPA-BF₂-3



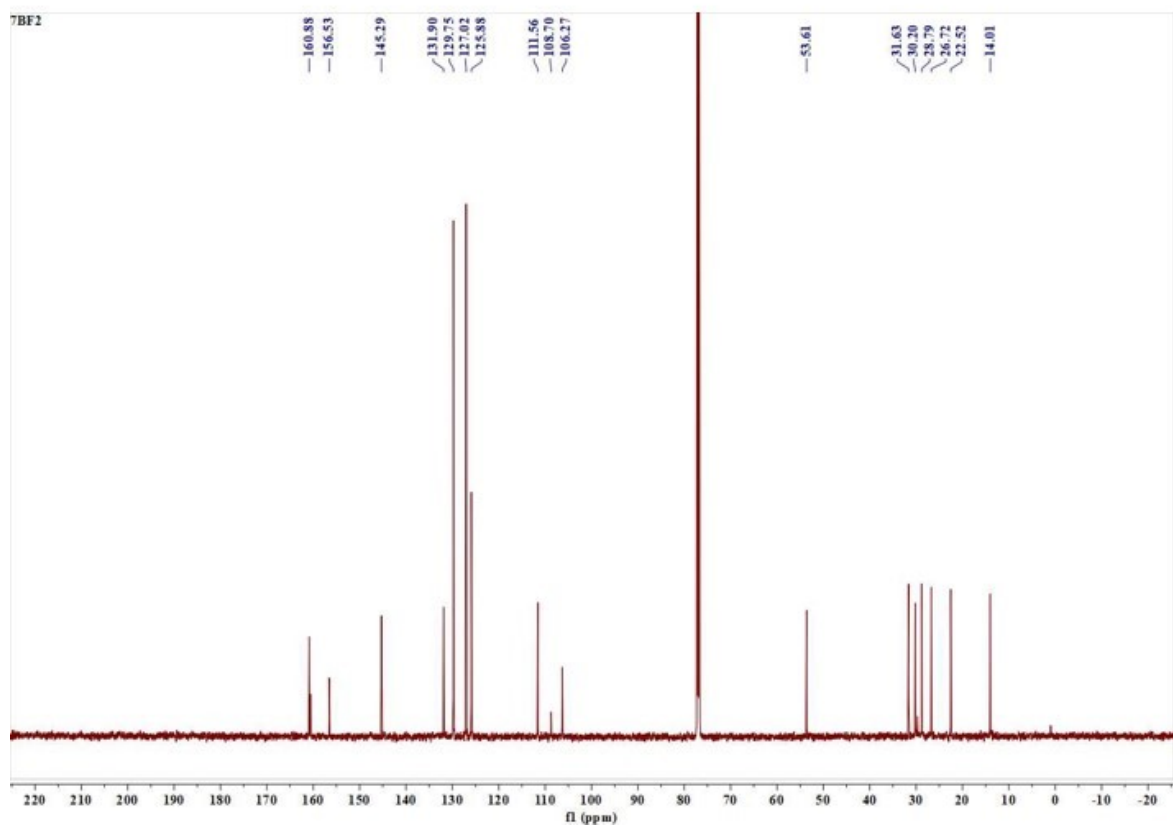
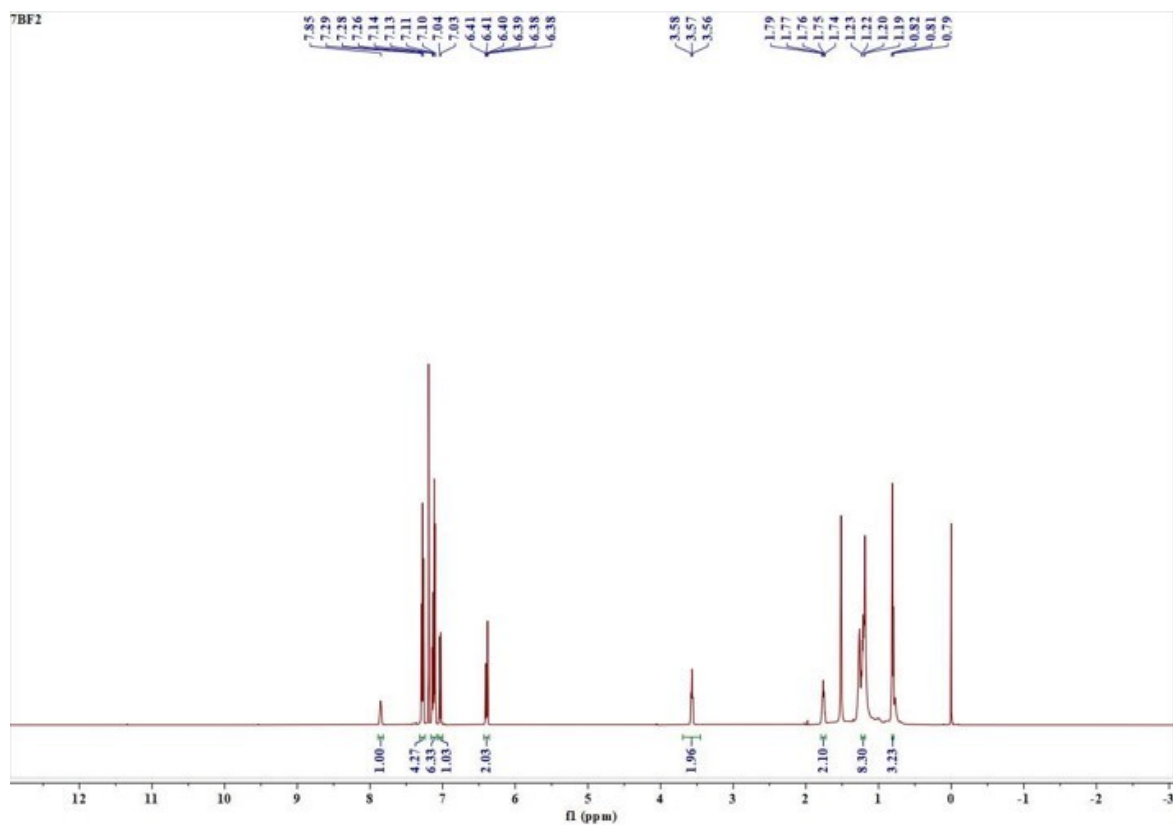
^1H & ^{13}C NMR of TPA- BF_2 -4



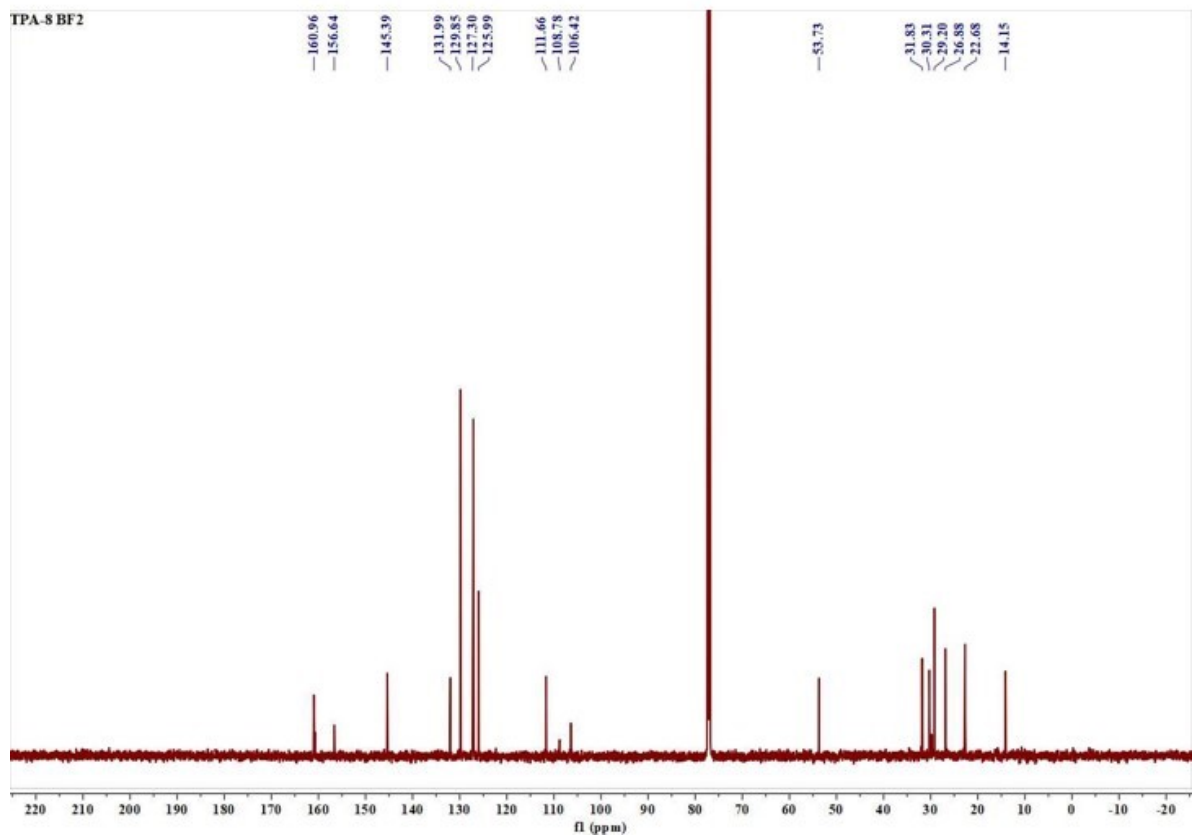
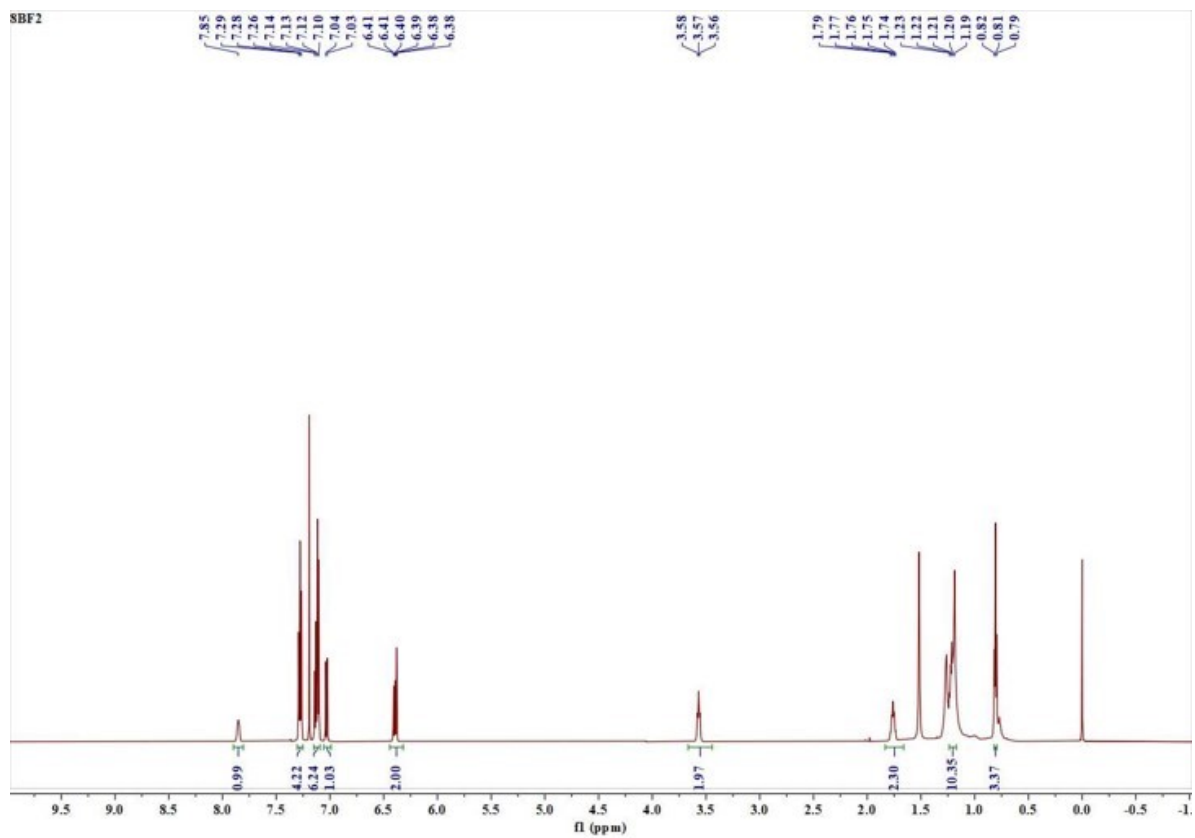
¹H & ¹³C NMR of TPA-BF₂-5



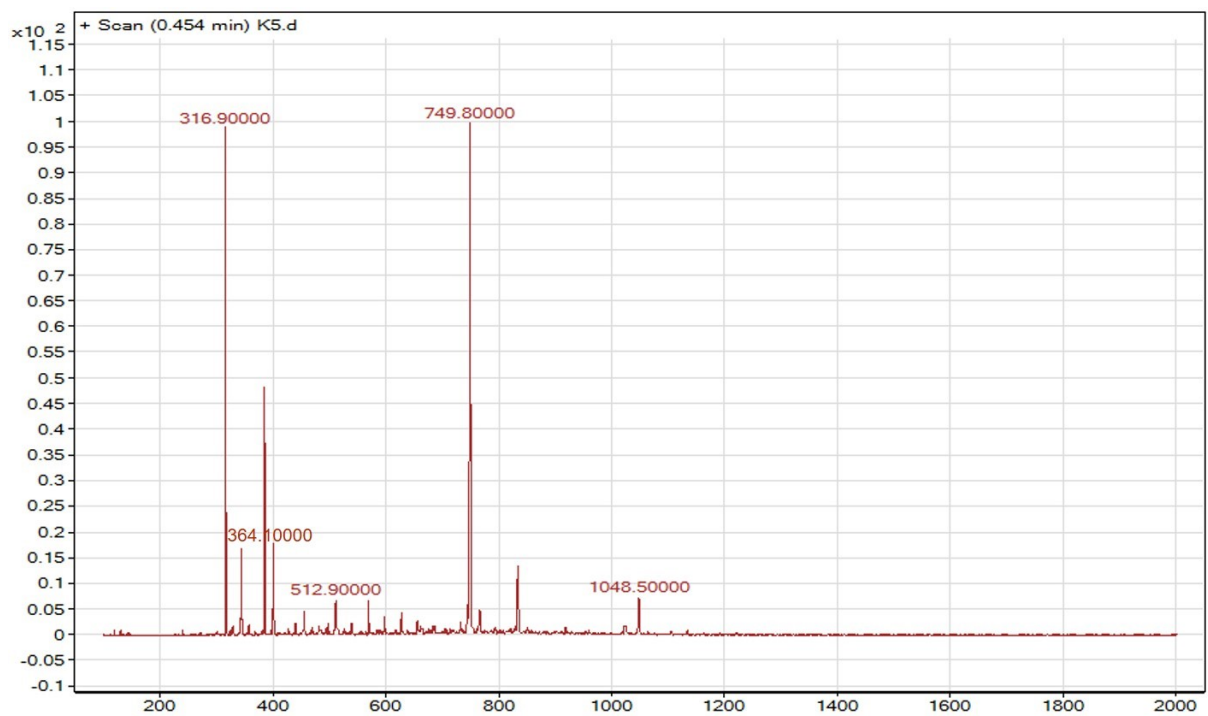
^1H & ^{13}C NMR of TPA- BF_2 -6



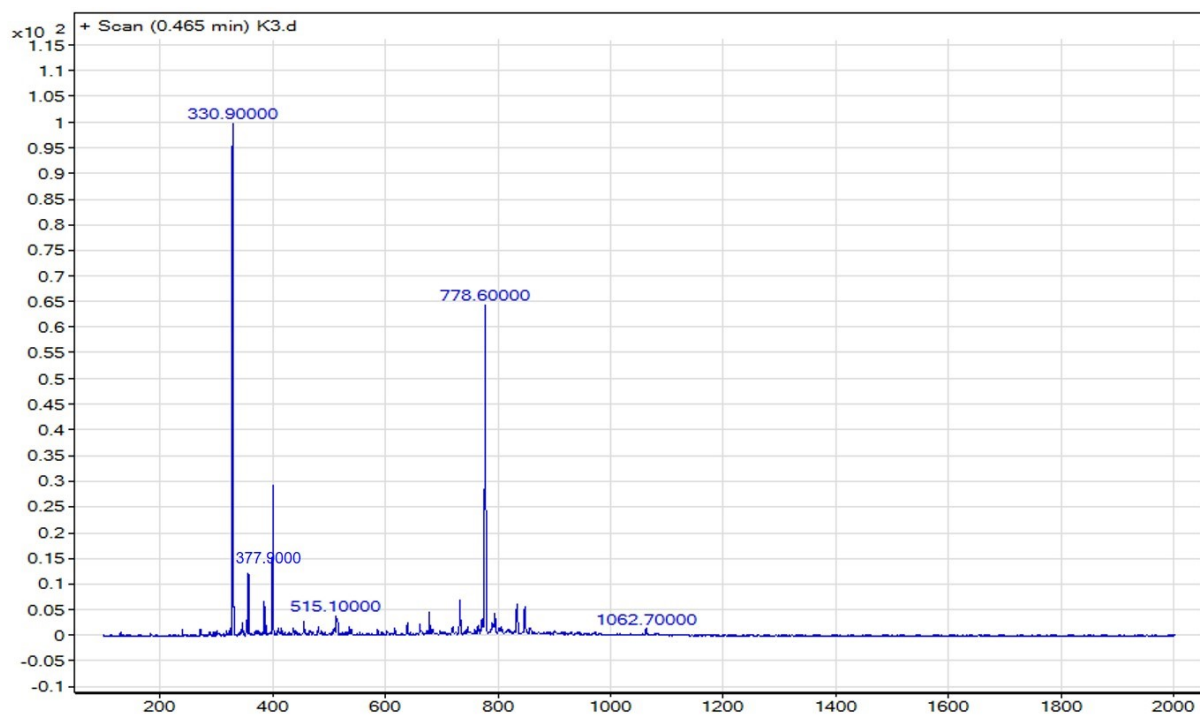
^1H & ^{13}C NMR of TPA- BF_2 -7



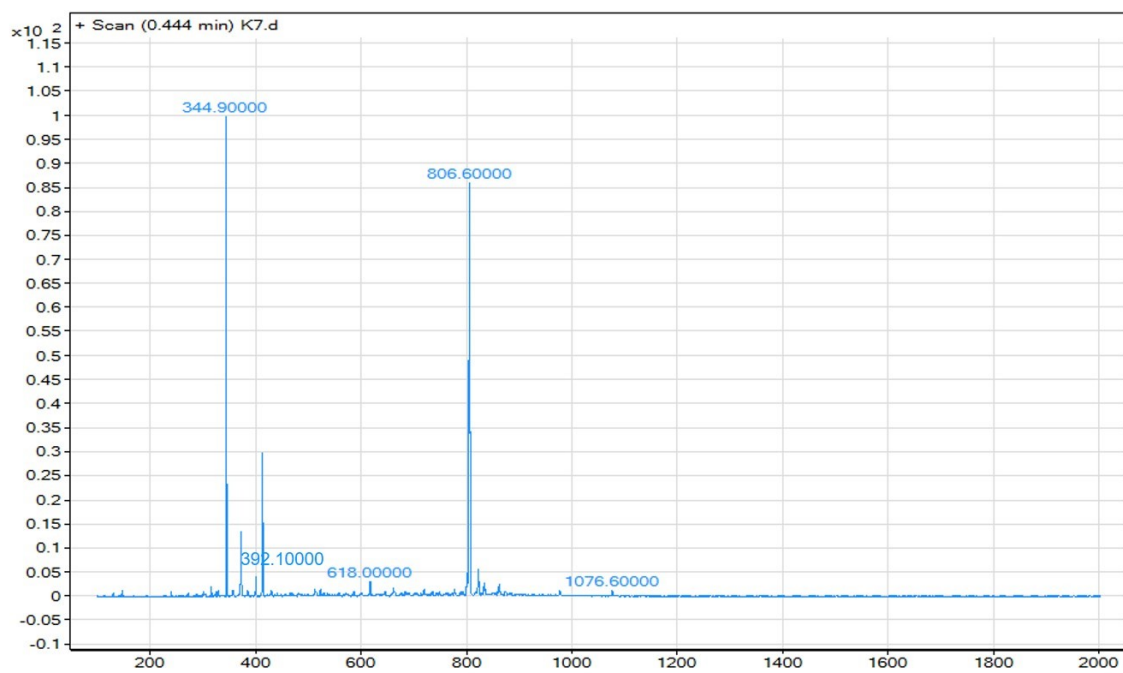
^1H & ^{13}C NMR of TPA- BF_2 -8



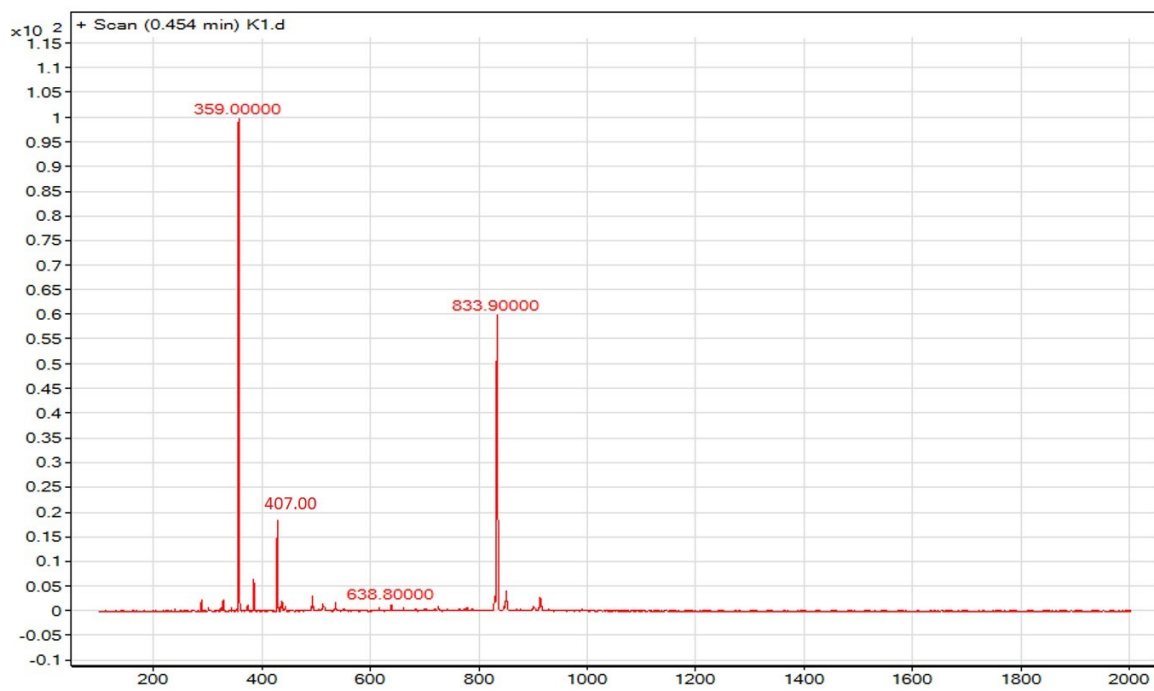
TPA-BF₂-2: m/z calculated C₂₁H₁₉BF₂N₂O (M + H): 364.16, found: 364.10



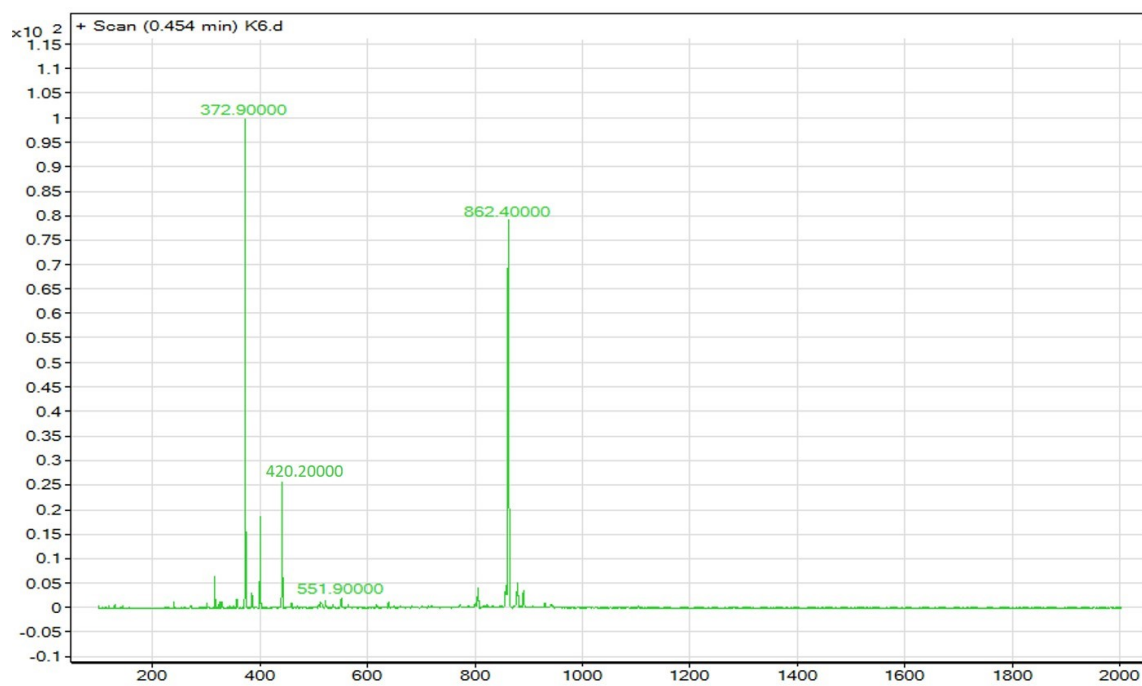
TPA-BF₂-3: m/z calculated C₂₂H₂₁BF₂N₂O (M + H): 378.17, found: 377.90.



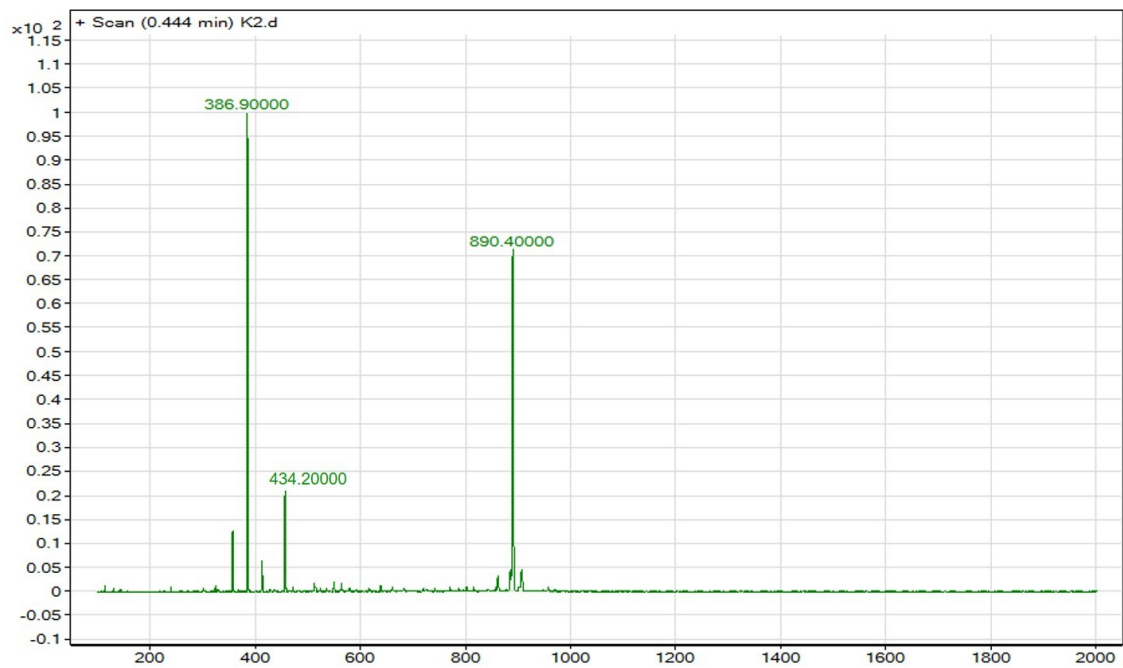
TPA-BF₂-4: m/z calculated C₂₃H₂₃BF₂N₂O (M + H): 392.19, found: 392.10.



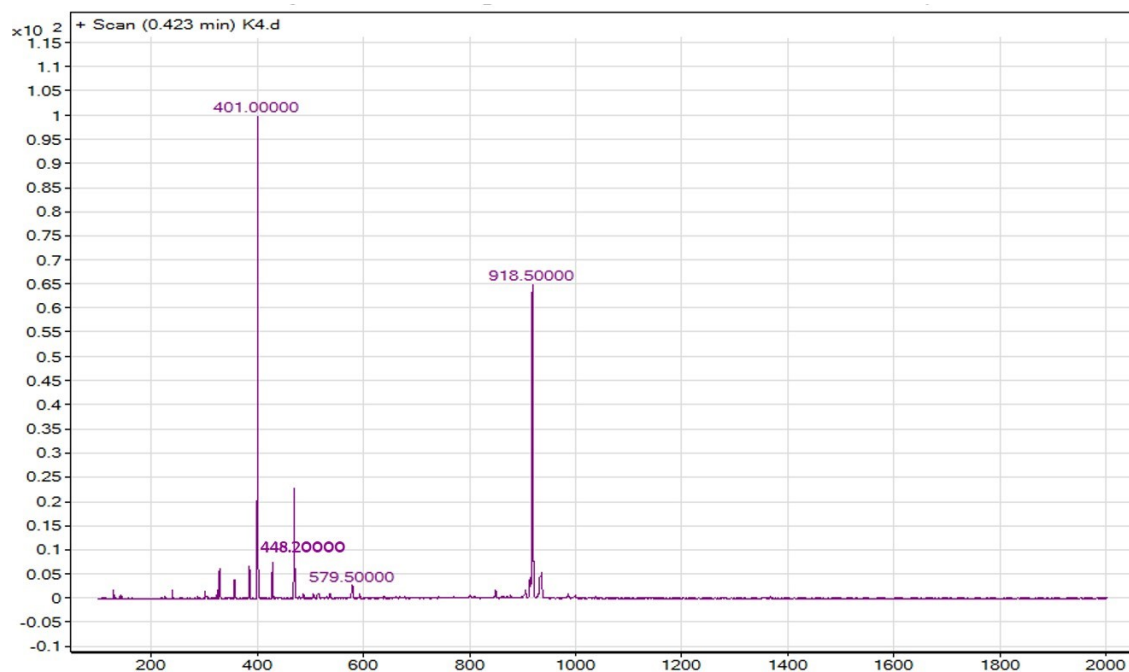
TPA-BF₂-5: m/z calculated C₂₄H₂₅BF₂N₂O (M + H): 406.20, found: 407.00.



TPA-BF₂-6: m/z calculated C₂₅H₂₇BF₂N₂O (M + H): 420.23, found: 420.20.



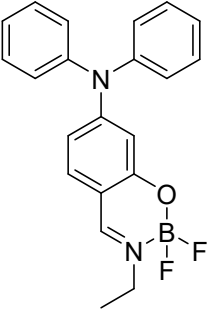
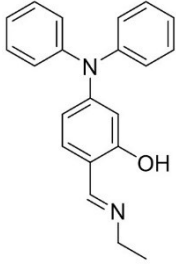
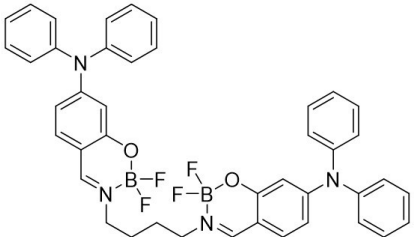
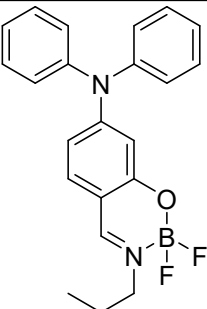
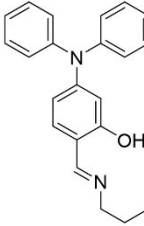
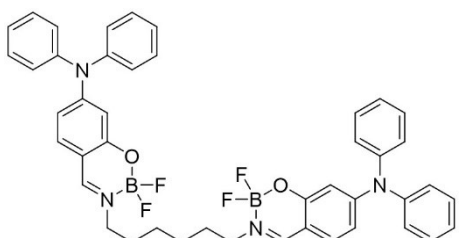
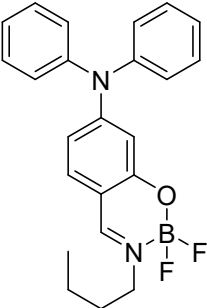
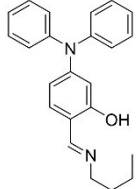
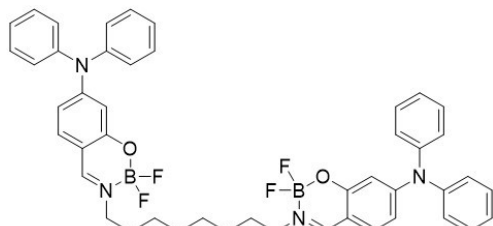
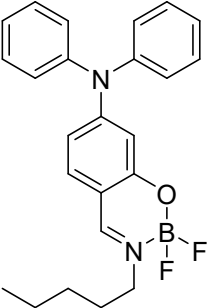
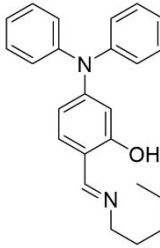
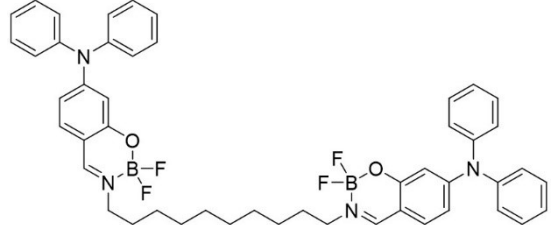
TPA-BF₂-7: m/z calculated C₂₆H₂₉BF₂N₂O (M + H): 434.33, found: 434.20.

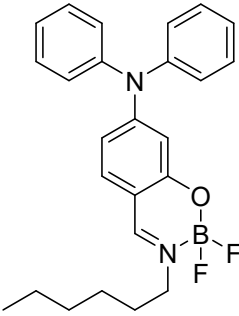
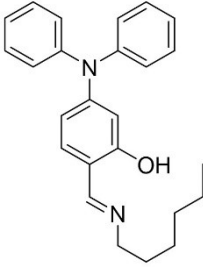
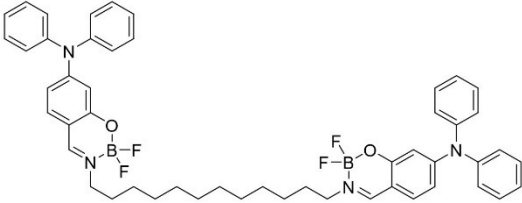
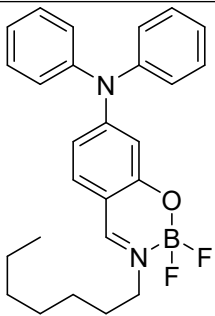
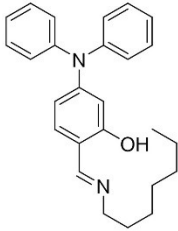
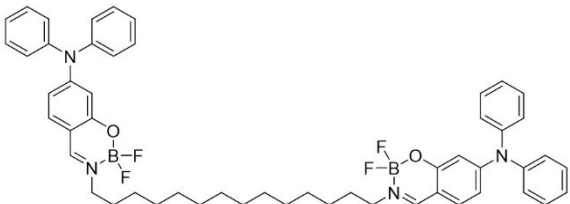


TPA-BF₂-8: m/z calculated C₂₇H₃₁BF₂N₂O (M + H): 448.25, found: 448.20.

Table. Structure corresponding to the major two peaks of mass spectra.

Structure	Found M.wt.
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 <p>TPA-BF₂-2</p>	<p>Fragment 1: peak value: 316.90 M.wt: 316.40</p>  <p>Fragment 2: Peak value (M + Na): 749.800 Found (M+ Na): 749.38</p> 
 <p>TPA-BF₂-3</p>	<p>Fragment 1: peak value: 330.90 M.wt: 330.43</p>  <p>Fragment 2: Peak value (M + Na): 778.60 Found (M+ Na): 777.43</p> 
 <p>TPA-BF₂-4</p>	<p>Fragment 1: peak value: 344.90 M.wt: 344.46</p>  <p>Fragment 2: Peak value (M + Na): 806.600 Found (M+ Na): 805.49</p> 
	<p>Fragment 1: Peak value: 359.00 M.wt: 358.49</p>  <p>Fragment 2: Peak value (M + Na): 833.90 Found (M+ Na): 833.54</p> 

<p>TPA-BF₂-5</p>	
 <p>TPA-BF₂-6</p>	<p>Fragment 1: Peak value: 372.900 M.wt: 372.51</p>  <p>Fragment 2: Peak value (M + Na): 862.40 Found (M+ Na): 861.6</p> 
 <p>TPA-BF₂-7</p>	<p>Fragment 1: Peak value: 386.90 M.wt: 386.54</p>  <p>Fragment 2: Peak value (M + Na): 890.40 Found (M+ Na): 889.65</p> 

	Quantum yield (%)
TPA-BF₂-2	1.9
TPA-BF₂-3	2.2
TPA-BF₂-4	4.1

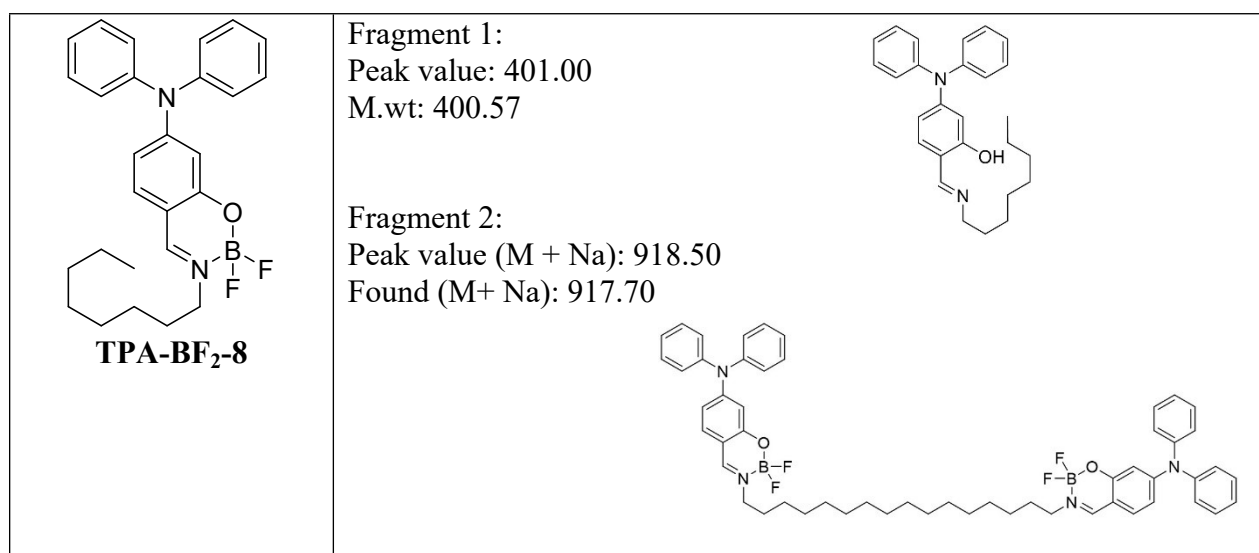


Table S1. Fluorescence efficiency of **TPA-BF₂** complexes.

TPA-BF₂-5	7.5
TPA-BF₂-6	7.8
TPA-BF₂-7	12.6
TPA-BF₂-8	8.2

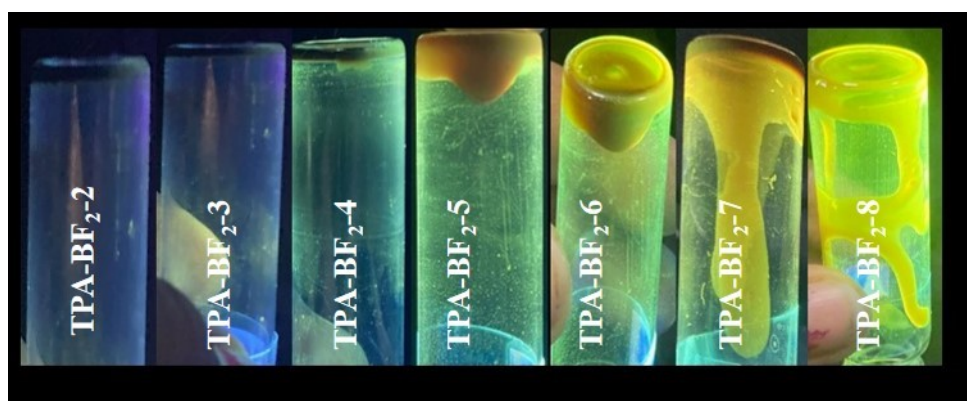


Figure S1. Digital fluorescence images of **TPA-BF₂** complexes. $\lambda_{\text{exc}} = 365$ nm.

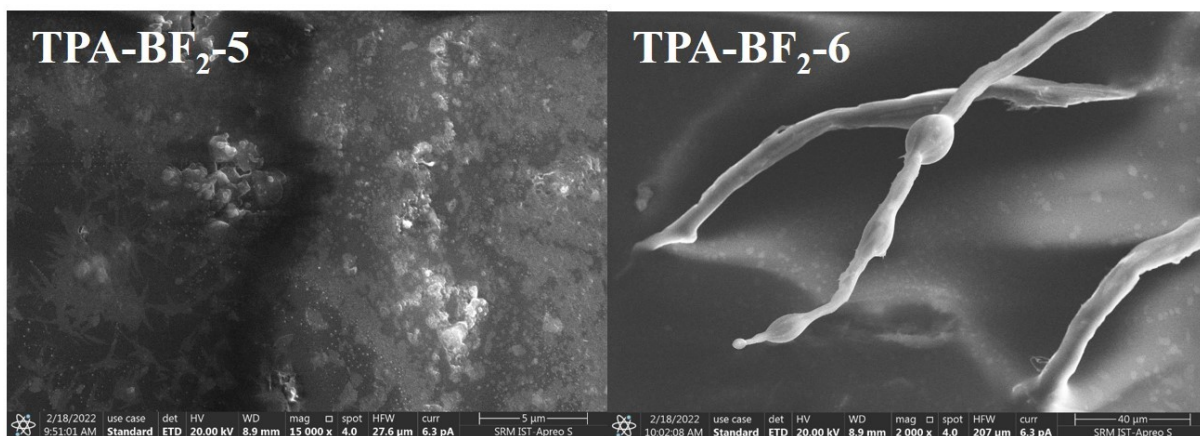


Figure S2. FE-SEM images of TPA-BF₂-5 and TPA-BF₂-6 complexes.

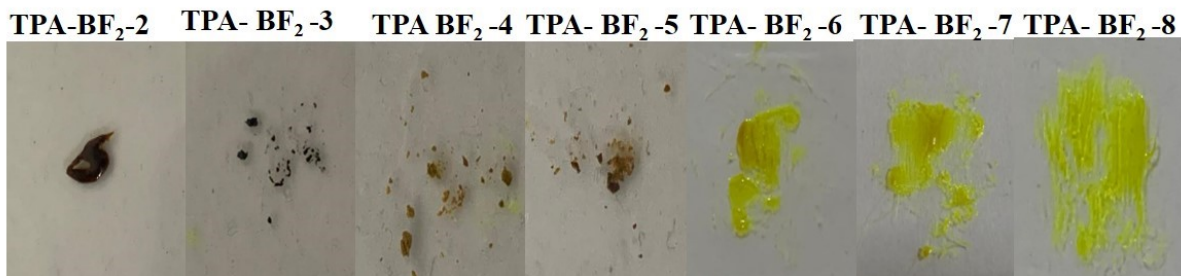


Figure S3. Digital images of TPA-BF₂ complexes.

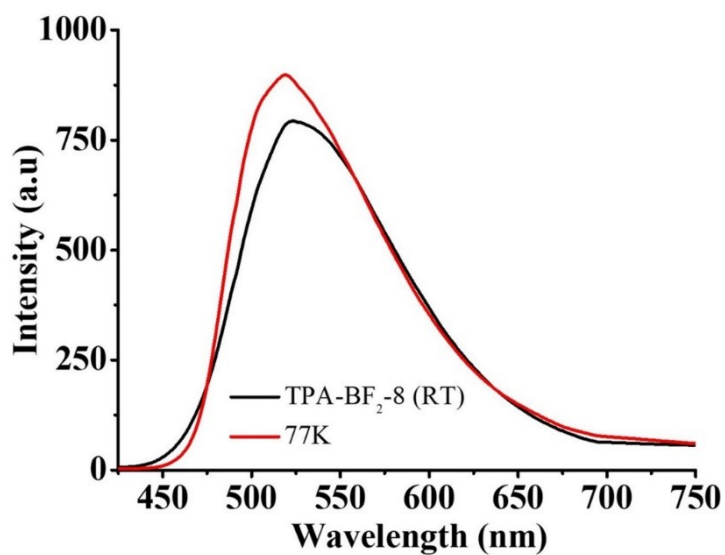


Figure S4. Fluorescence spectra of TPA-BF₂-8 at RT and 77K.

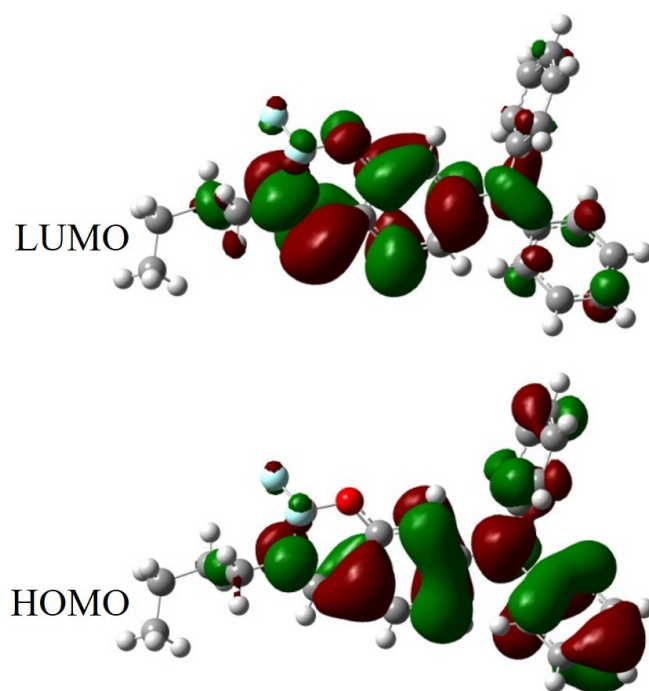


Figure S5. HOMO-LUMO molecular orbital diagram of TPA-BF₂-4.

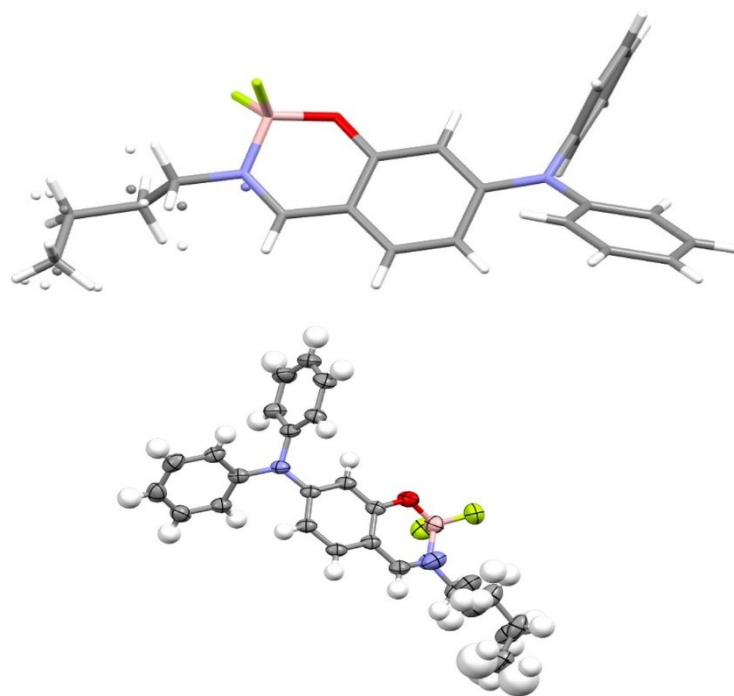


Figure
S6.

Disordered molecular structure and ORTEP (50% probability) structure of TPA-BF₂-4.

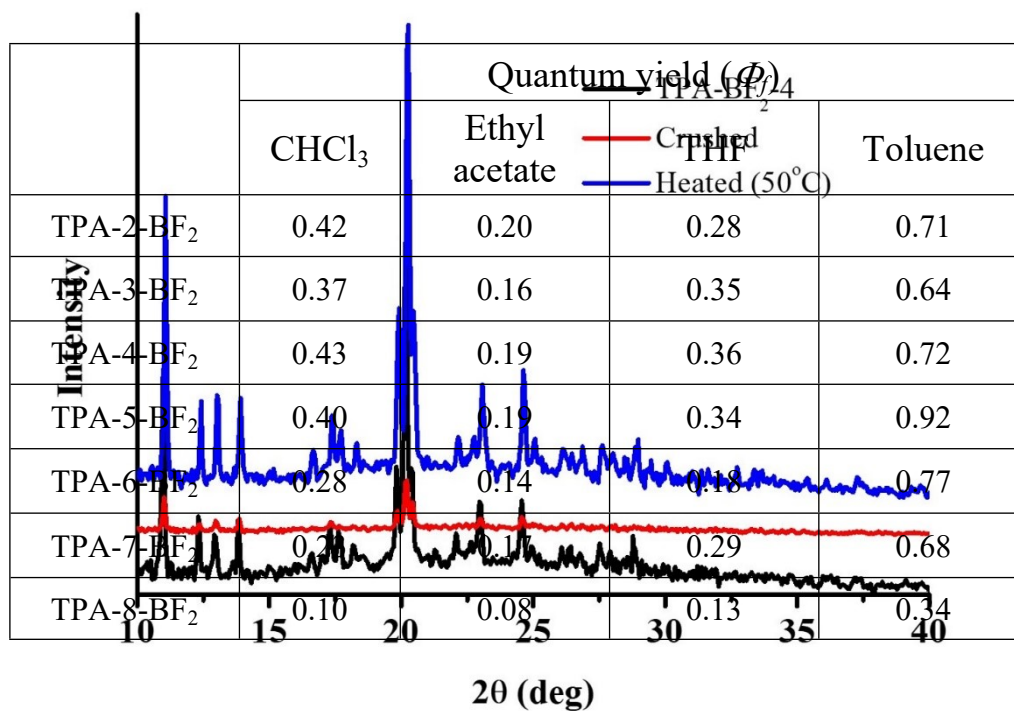


Figure S7. PXRD of TPA-BF₂-4.

Table S2. Quantum yield of TPA-BF₂ complexes in different solvent compared to quinine sulphate standard.

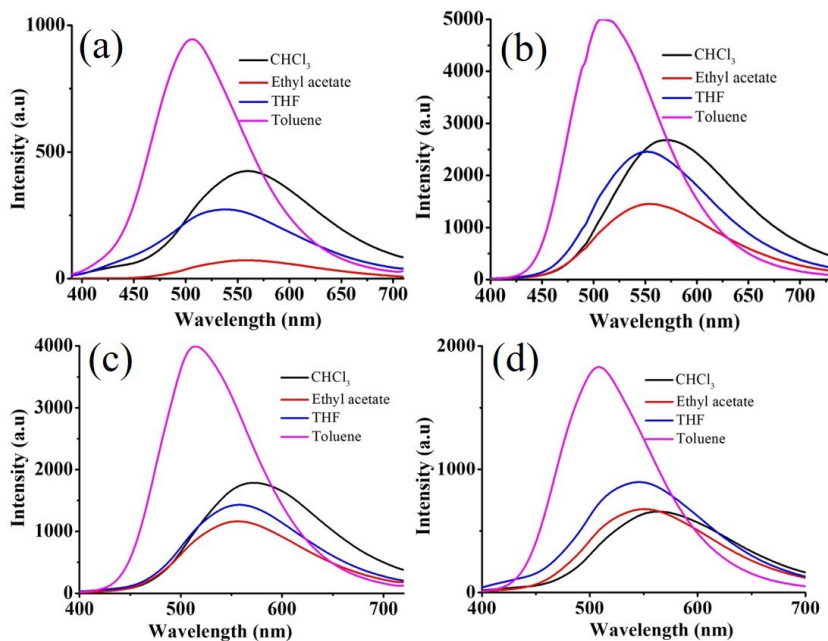


Figure S8. Fluorescence spectra of (a) TPA-BF₂-3, (b) TPA-BF₂-4, (c) TPA-BF₂-6 and (d) TPA-BF₂-8 in different solvent polarity.

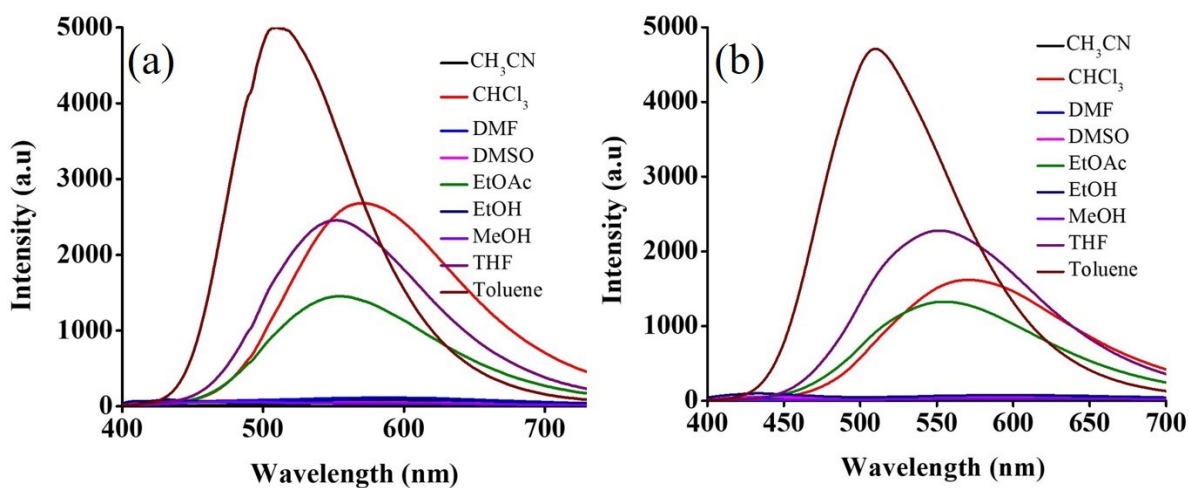


Figure S9. Fluorescence spectra of (a) TPA-BF₂-4 and (b) TPA-BF₂-7 in different solvent polarity.

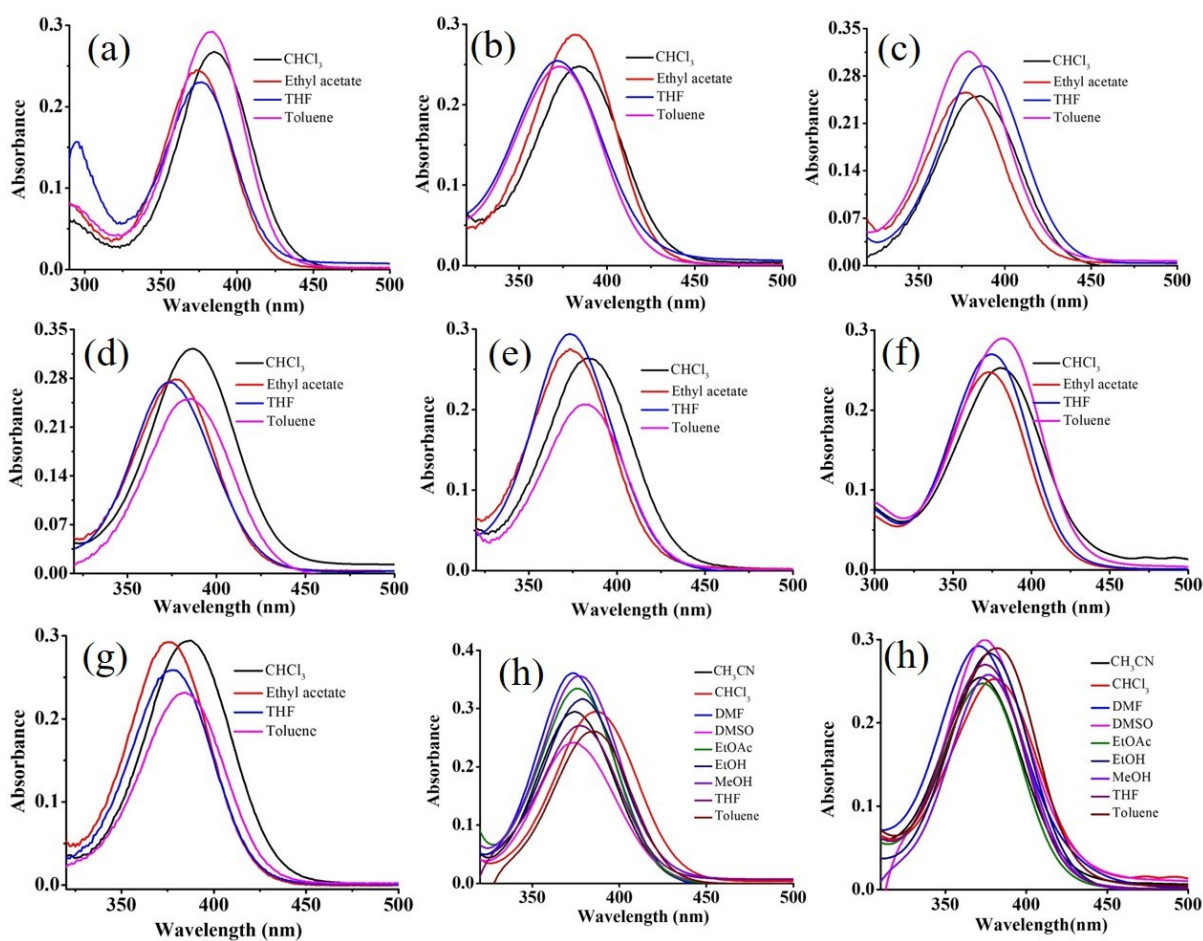


Figure S10. Absorption spectra of (a) TPA-BF₂-2, (b) TPA-BF₂-3, (c, h) TPA-BF₂-4, (d) TPA-BF₂-5, (e) TPA-BF₂-6, (f, h) TPA-BF₂-7 and (g) TPA-BF₂-8 in different solvent polarity.

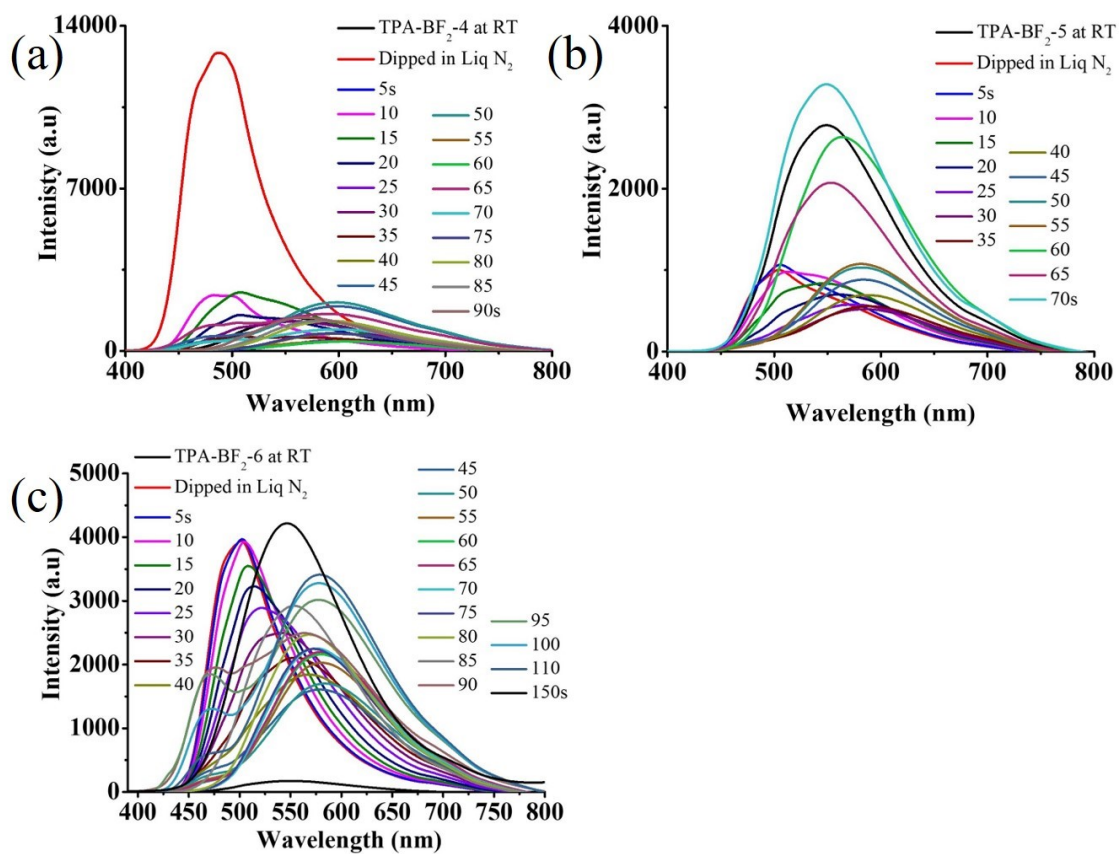


Figure S11. Fluorescence tuning of (a) TPA-BF₂-4, (b) TPA-BF₂-5 and (c) TPA-BF₂-6 complexes in CHCl₃ while warming from 77K to RT. $\lambda_{exc} = 370$ nm.

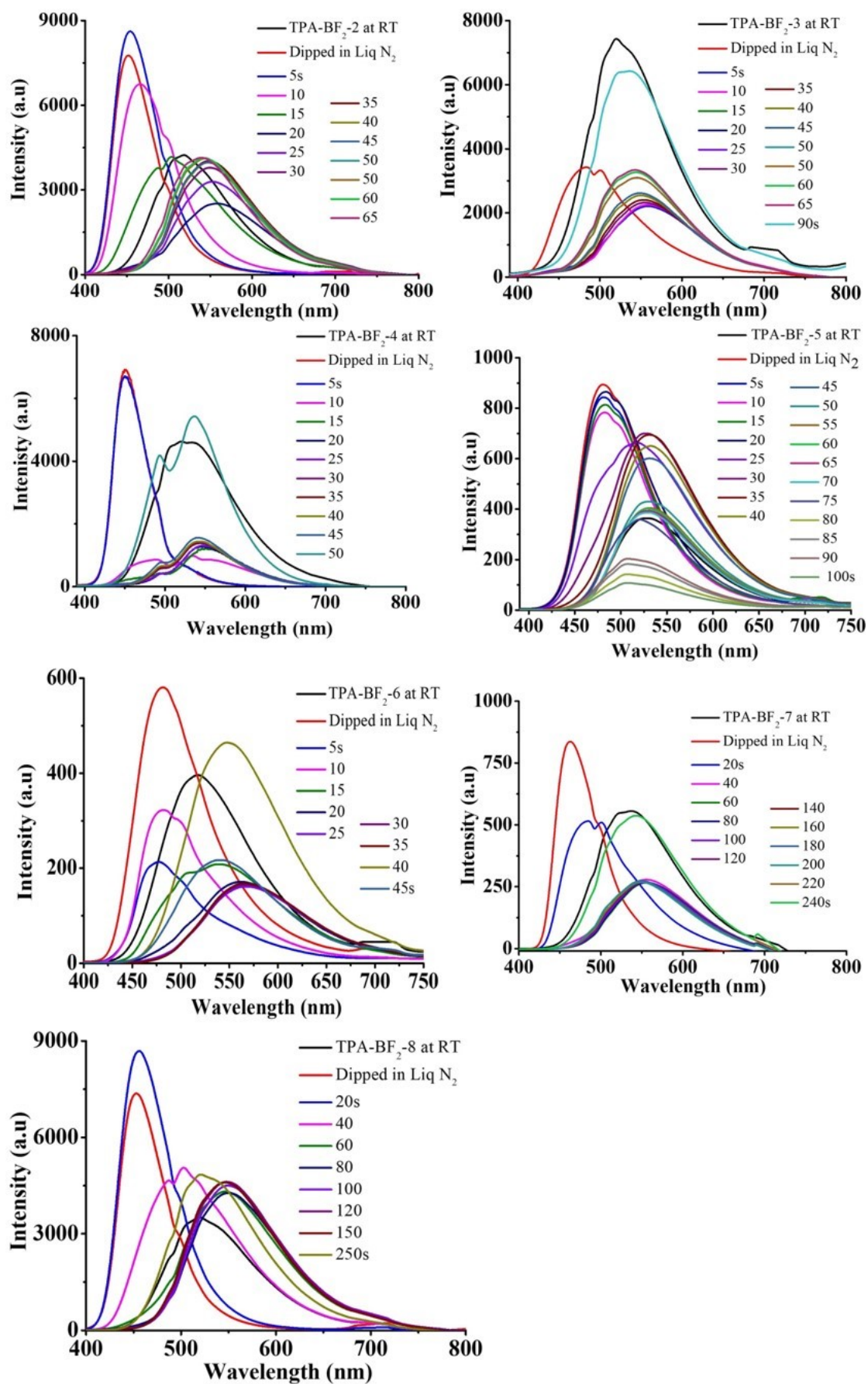


Figure S12. Fluorescence tuning of TPA-BF₂ complexes in toluene while warming from 77K to RT. $\lambda_{exc} = 370$ nm.

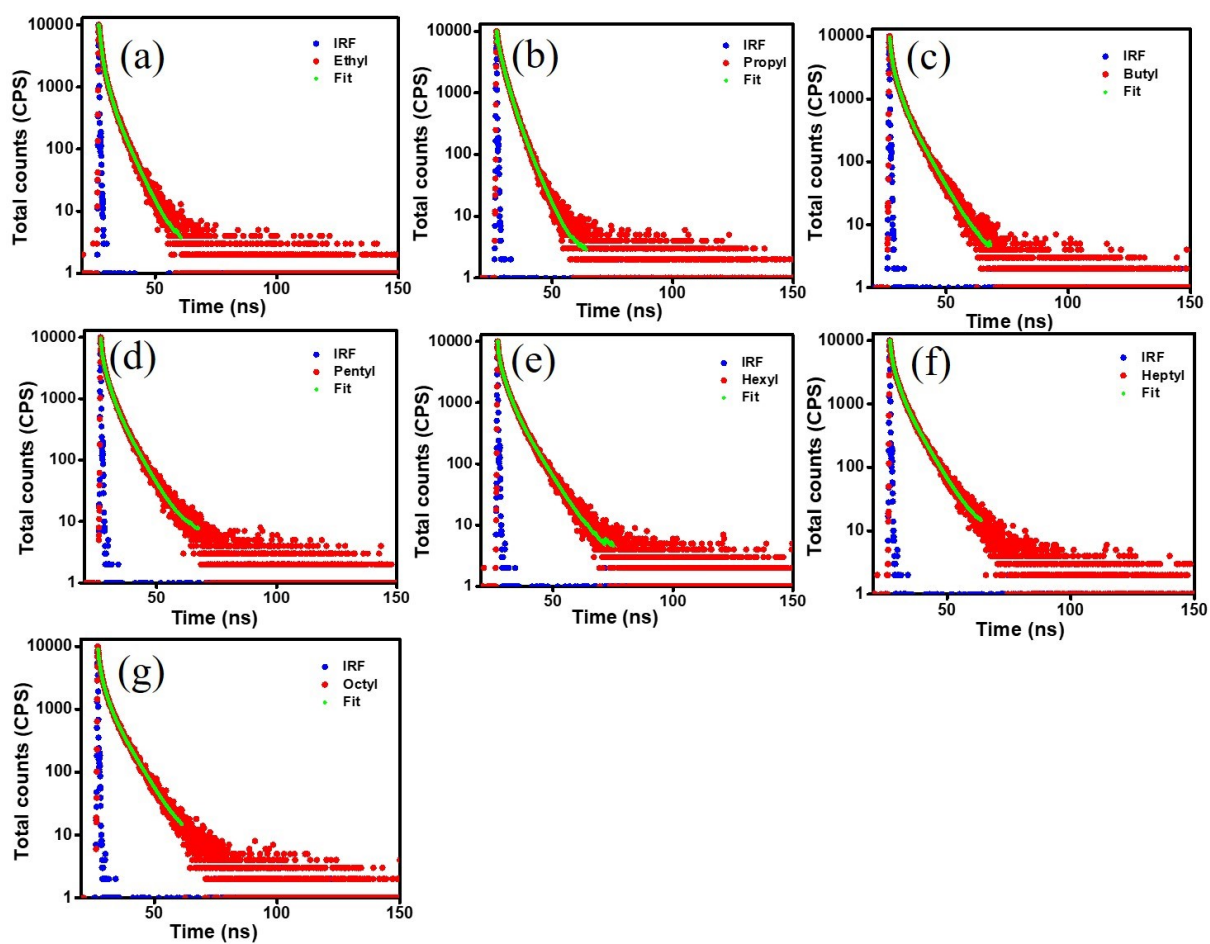


Figure S13. Fluorescence lifetime decay (a) **TPA-BF₂-2**, (b) **TPA-BF₂-3**, (c) **TPA-BF₂-4**, (d) **TPA-BF₂-5**, (e) **TPA-BF₂-6**, (f) **TPA-BF₂-7** and (g) **TPA-BF₂-8** complexes in CHCl₃ at RT.

Table S3. Shows the χ^2 value and fluorescence life time decay of ethyl, propyl, butyl, pentyl, hexyl, octyl respectively in solution state, B_1 , B_2 , B_3 are relative individual component contributions to τ_1 , τ_2 , τ_3 . $\langle \tau \rangle$ (ns) is the average lifetime from multiple decay profiles.

	B_1	B_2	B_3	τ_1	τ_2	τ_3	$\langle \tau \rangle$ (ns)	χ^2
TPA-2-BF ₂	0.26	0.09	0.65	1.935	5.079	0.554	2.64	1.10
TPA-3-BF ₂	0.38	0.14	0.49	2.264	4.654	0.354	2.99	1.09
TPA-4-BF ₂	0.27	0.10	0.63	2.06	6.248	0.397	3.60	1.17
TPA-5-BF ₂	0.25	0.10	0.65	2.104	6.043	0.293	3.64	1.31
TPA-6-BF ₂	0.28	0.11	0.61	2.419	6.816	0.316	4.20	1.07
TPA-7-BF ₂	0.26	0.15	0.59	2.061	6.331	0.319	4.29	1.12
TPA-8-BF ₂	0.28	0.13	0.60	1.946	6.396	0.338	4.08	1.03

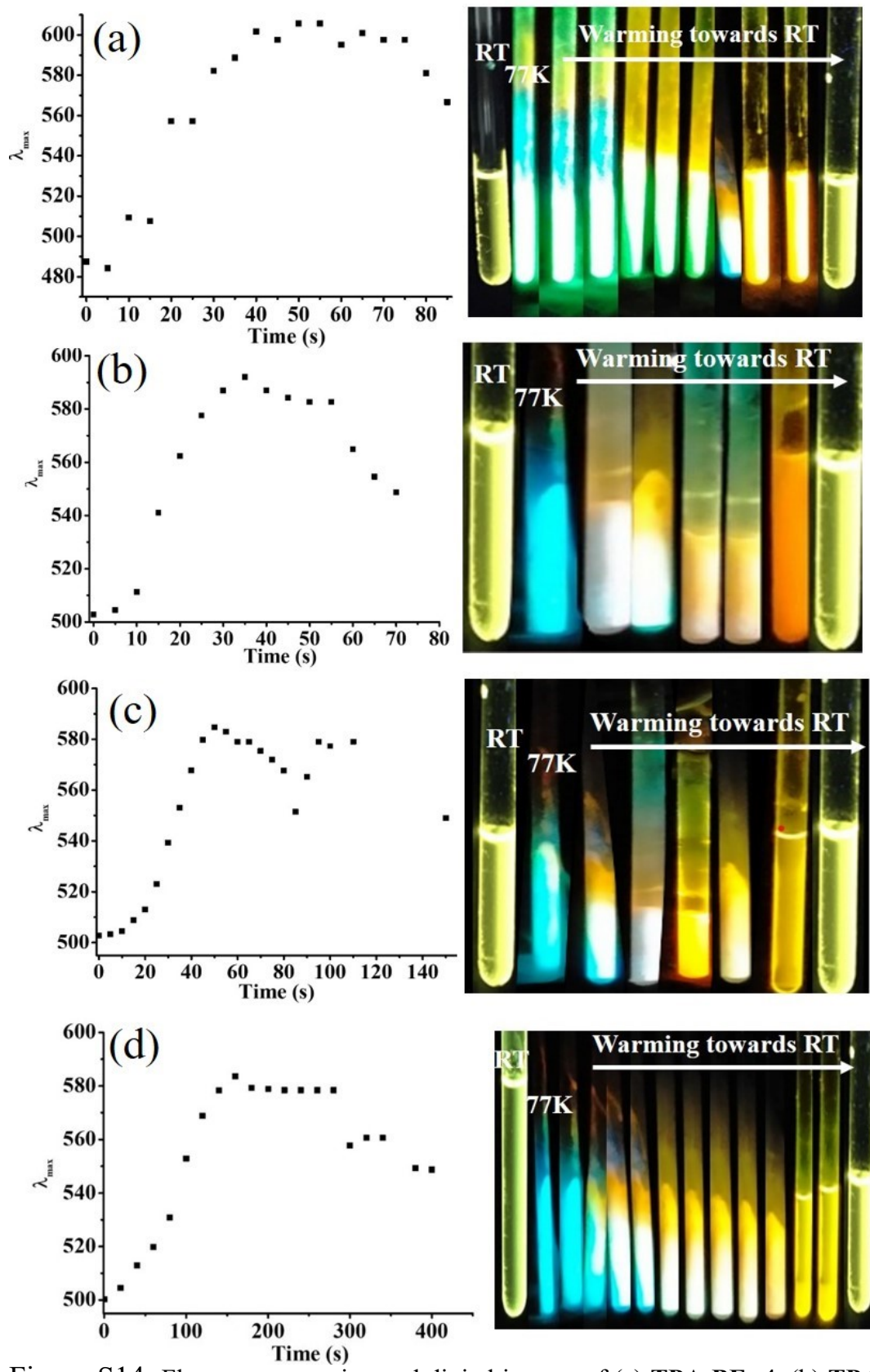


Figure S14. Fluorescence tuning and digital images of (a) TPA-BF₂-4, (b) TPA-BF₂-5 and (c) TPA-BF₂-6 in CHCl₃ while warming from 77K to RT. $\lambda_{\text{exc}} = 370 \text{ nm}$.

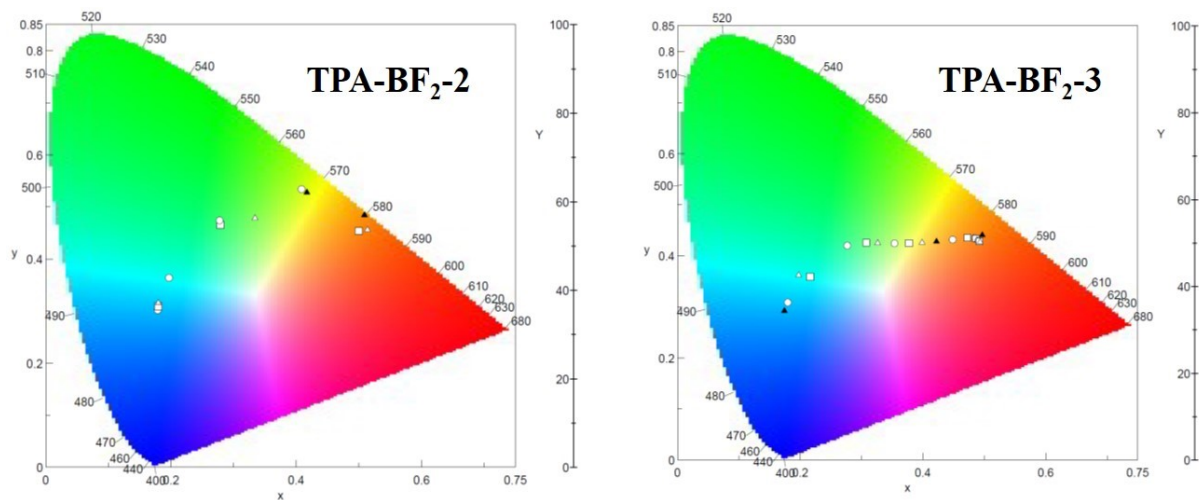


Figure S15. CIE 1931 chromaticity plot with emission colour coordinates of fluorescence tuning in CHCl_3 .

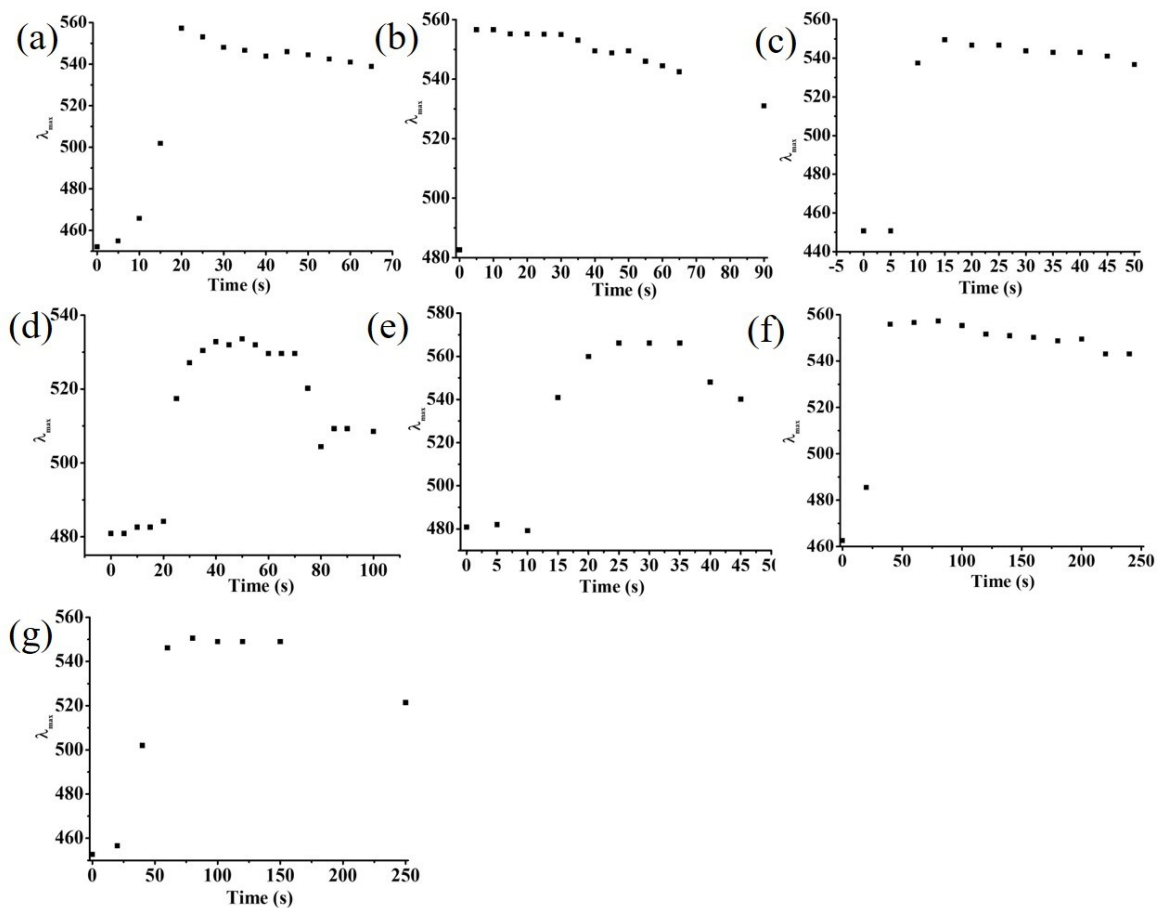


Figure S16. Fluorescence tuning of (a) TPA-BF₂-2, (b) TPA-BF₂-3, (c) TPA-BF₂-4, (d) TPA-BF₂-5, (e) TPA-BF₂-6, (f) TPA-BF₂-7 and (g) TPA-BF₂-8 in toluene while warming from 77K to RT. $\lambda_{exc} = 370$ nm.

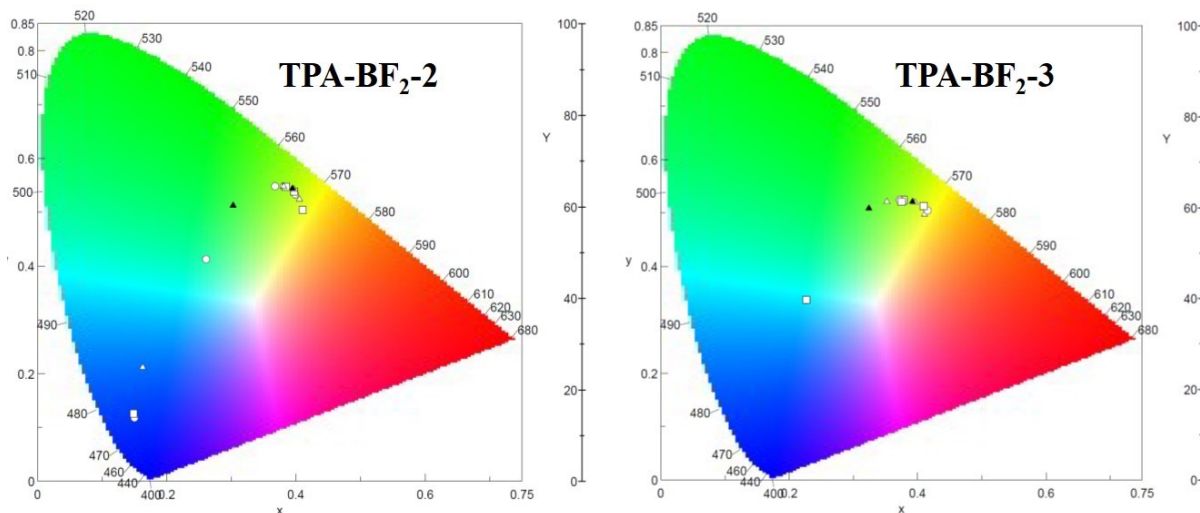


Figure S17. CIE 1931 chromaticity plot with emission colour coordinates of fluorescence tuning in toluene.

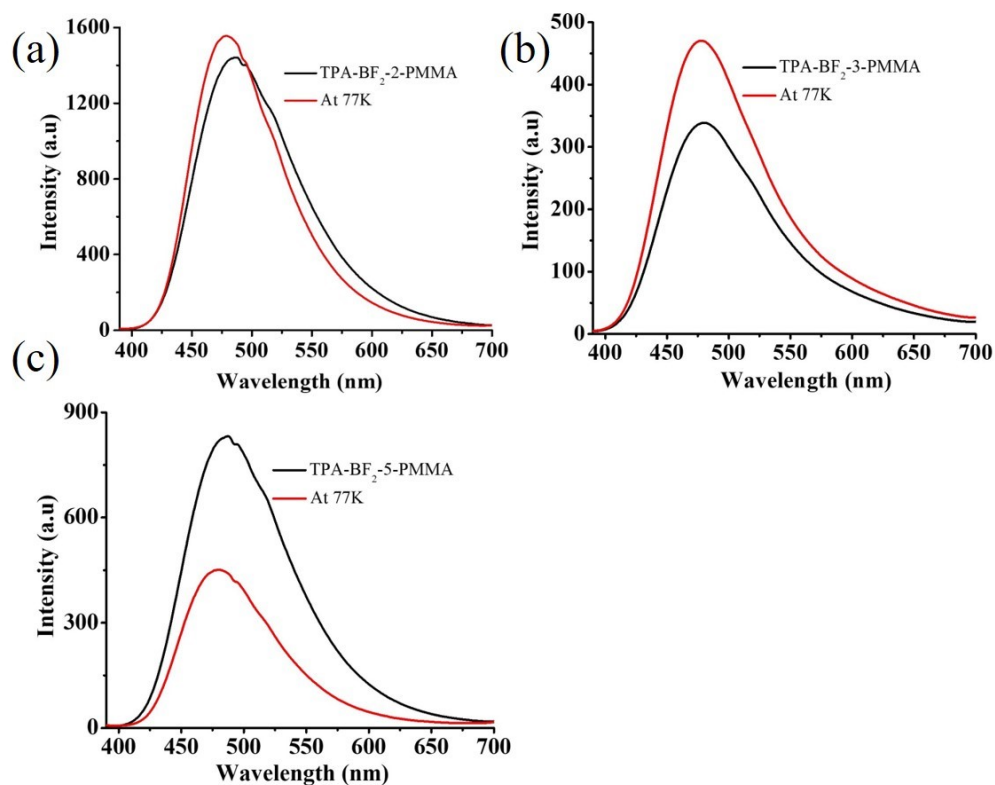


Figure S18. Fluorescence spectra of TPA-BF₂ in PMMA matrix at RT and 77K.

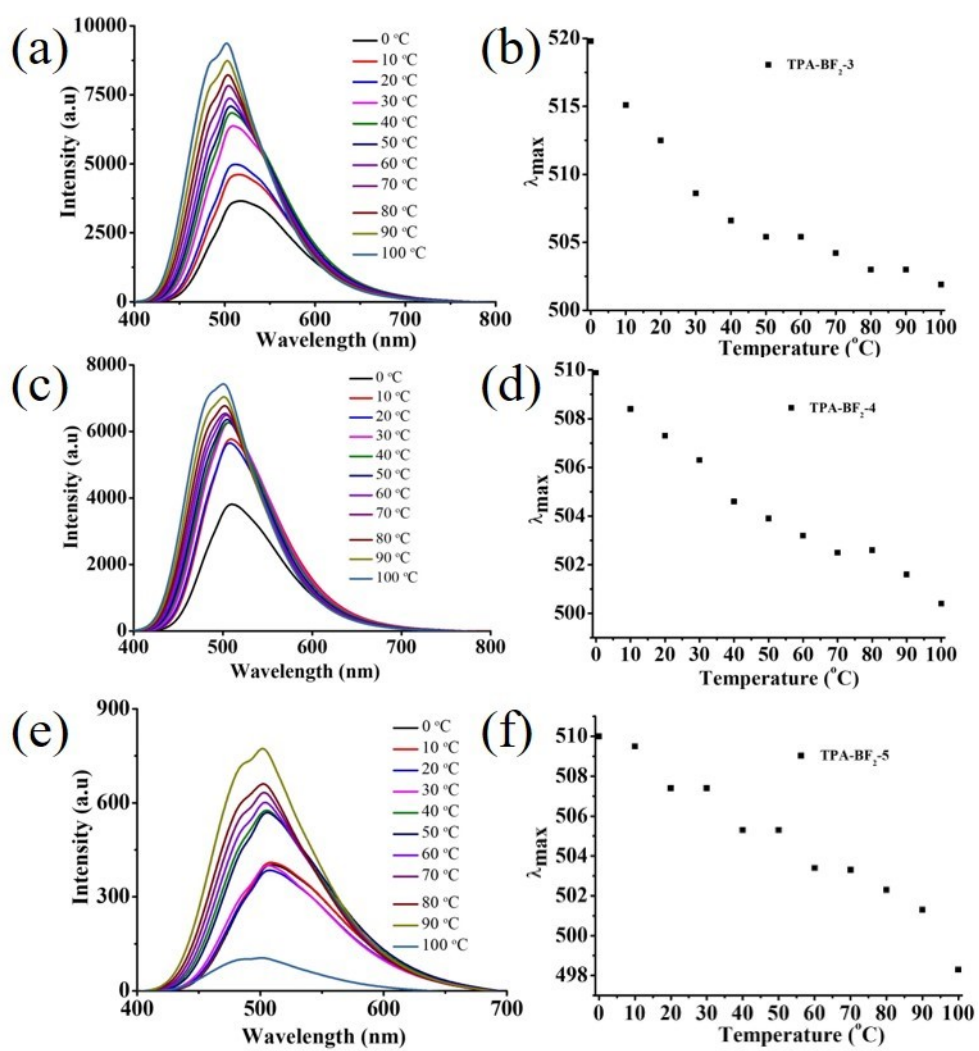


Figure S19. Thermofluorochromism of (a, b) TPA-BF₂-3, (c, d) TPA-BF₂-4 and (e, f) TPA-BF₂-5 in toluene (Conc. = 10⁻⁵ M).

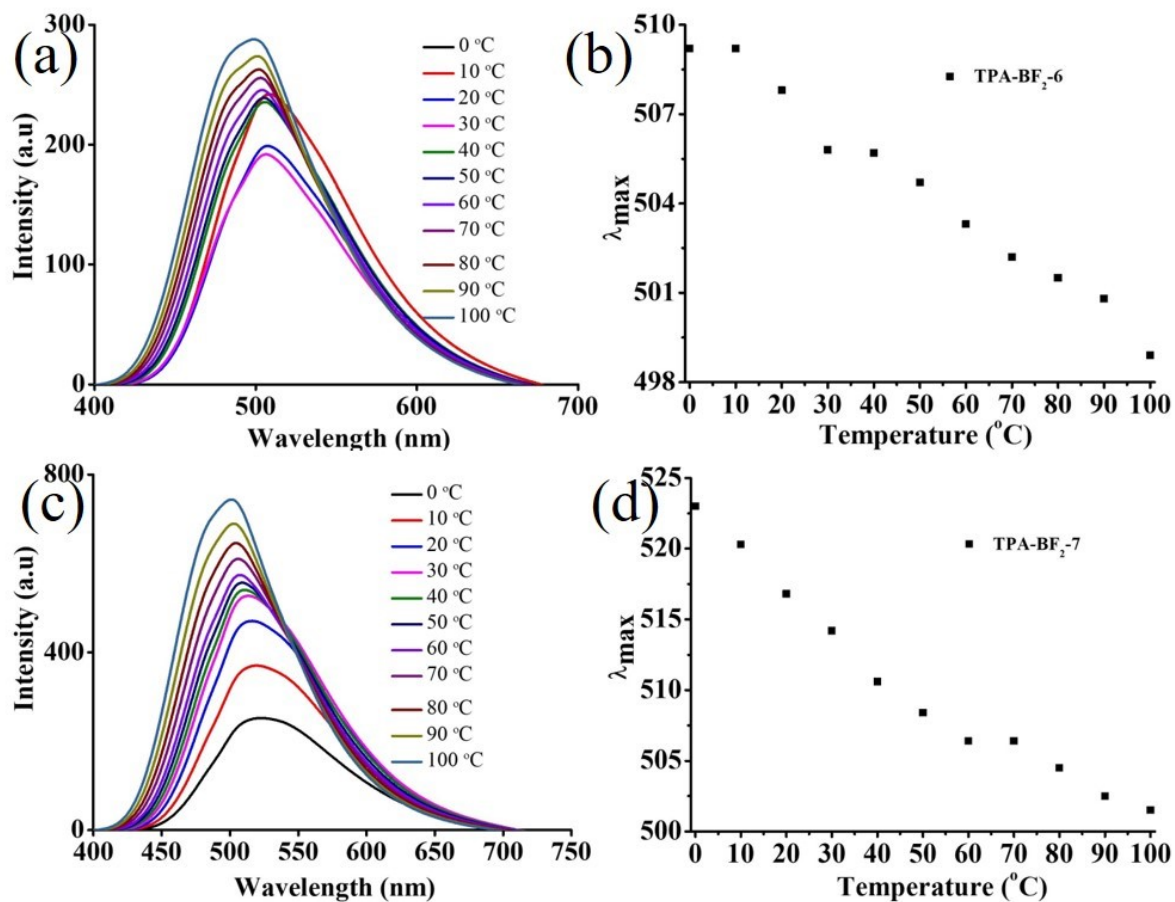


Figure S20. Thermofluorochromism of (a, b) **TPA-BF₂-6** and (c, d) **TPA-BF₂-7** in toluene (Conc. = 10⁻⁵ M).