SUPPORTING INFORMATION

Carbazole-Corrole and Carbazole-Prophyrin Dyads:

Synthesis, Fluorescence and Electrochemical Studies

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List of Contents **Page No.**

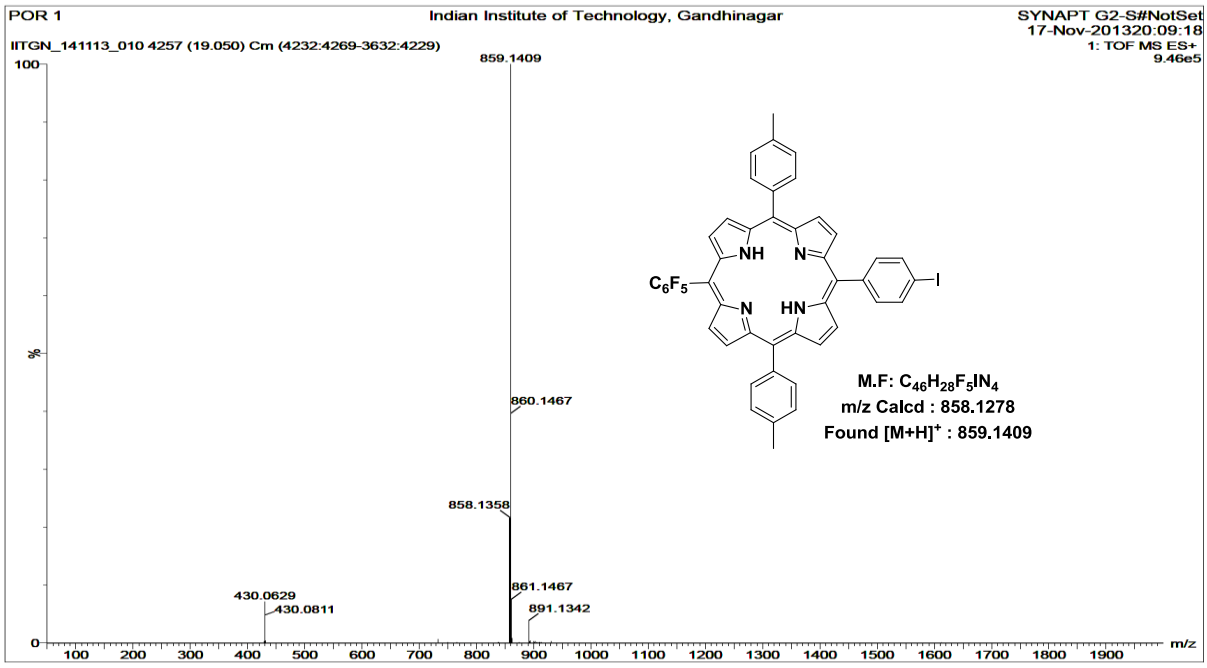


Figure 1. ESI-MS of compound **3**

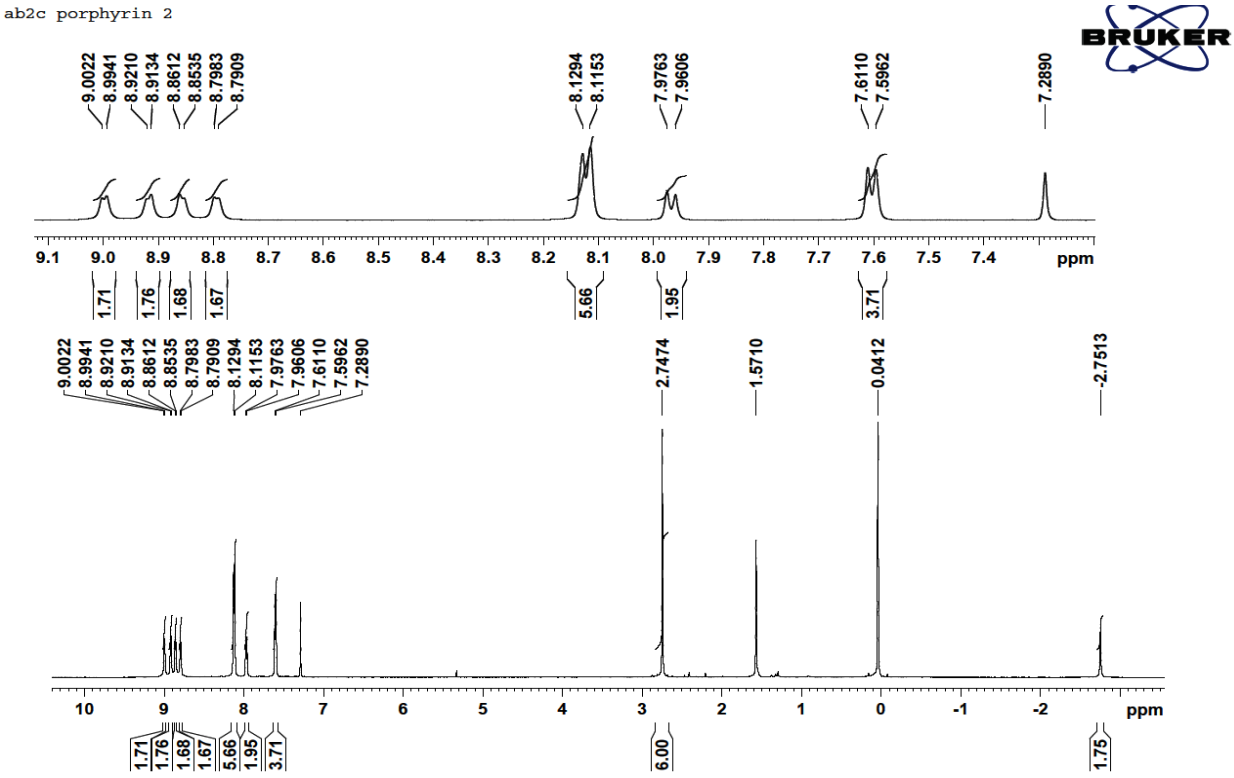


Figure 2.^{1}H NMR of compound **3** in $CDCl_3$

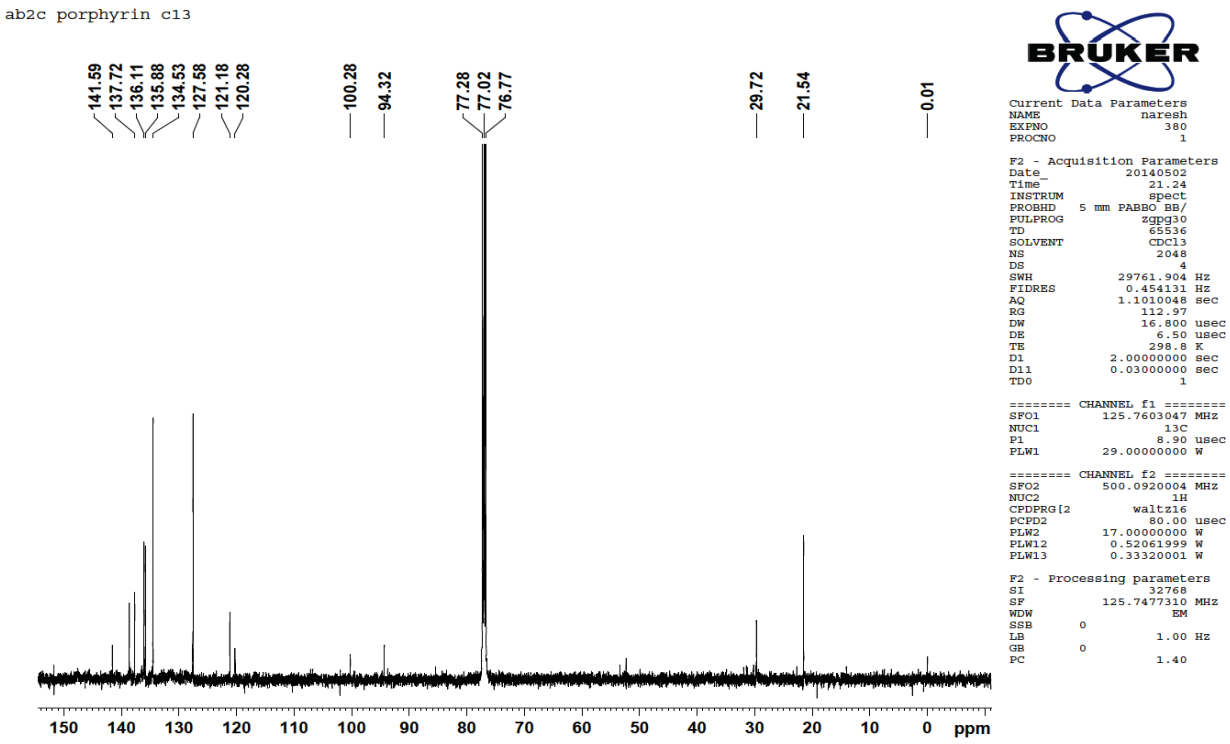


Figure 3. ^{13}CNMR of compound **3** in $CDCl_3$

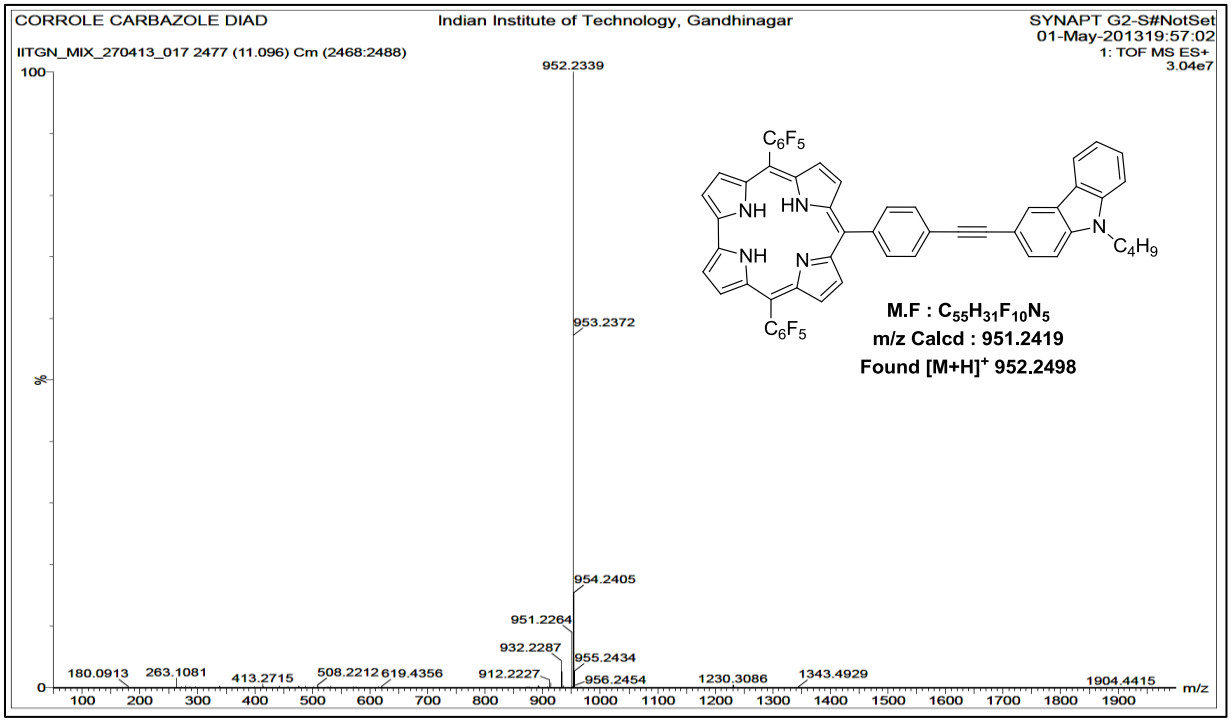


Figure 4. ESI-MS of compound **4**

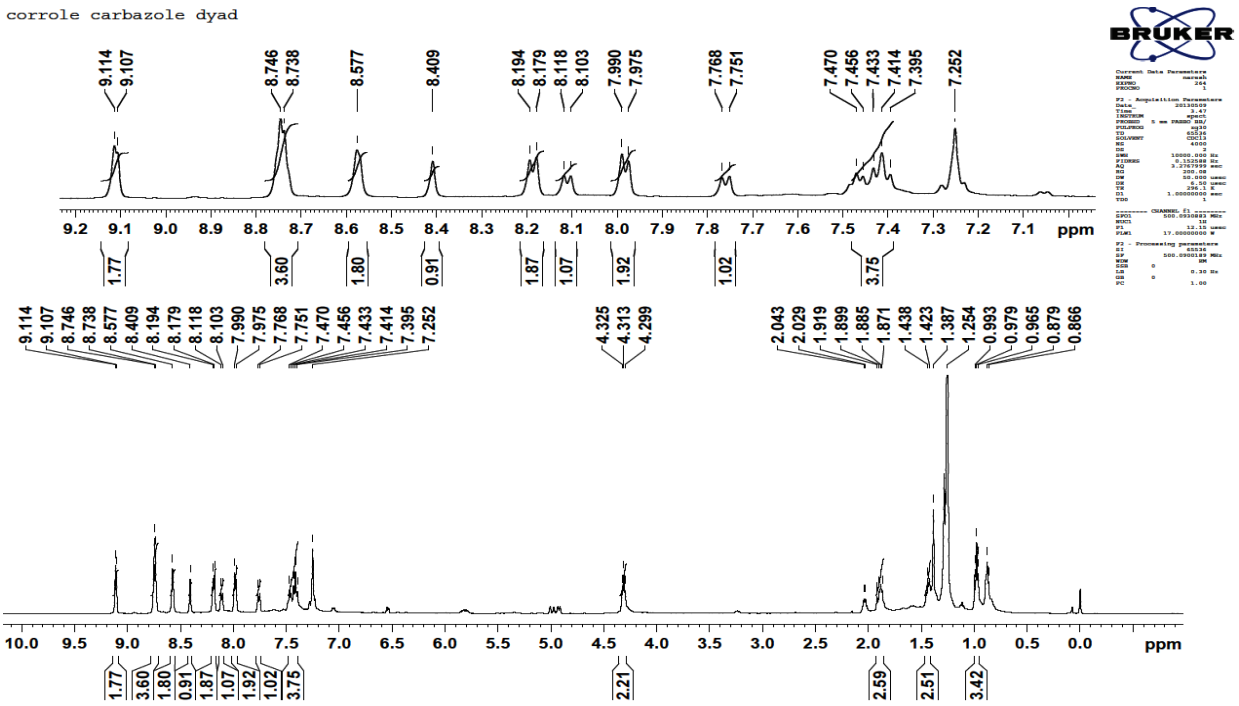


Figure 5. ^{1}H NMR of compound **4** in $CDCl_3$

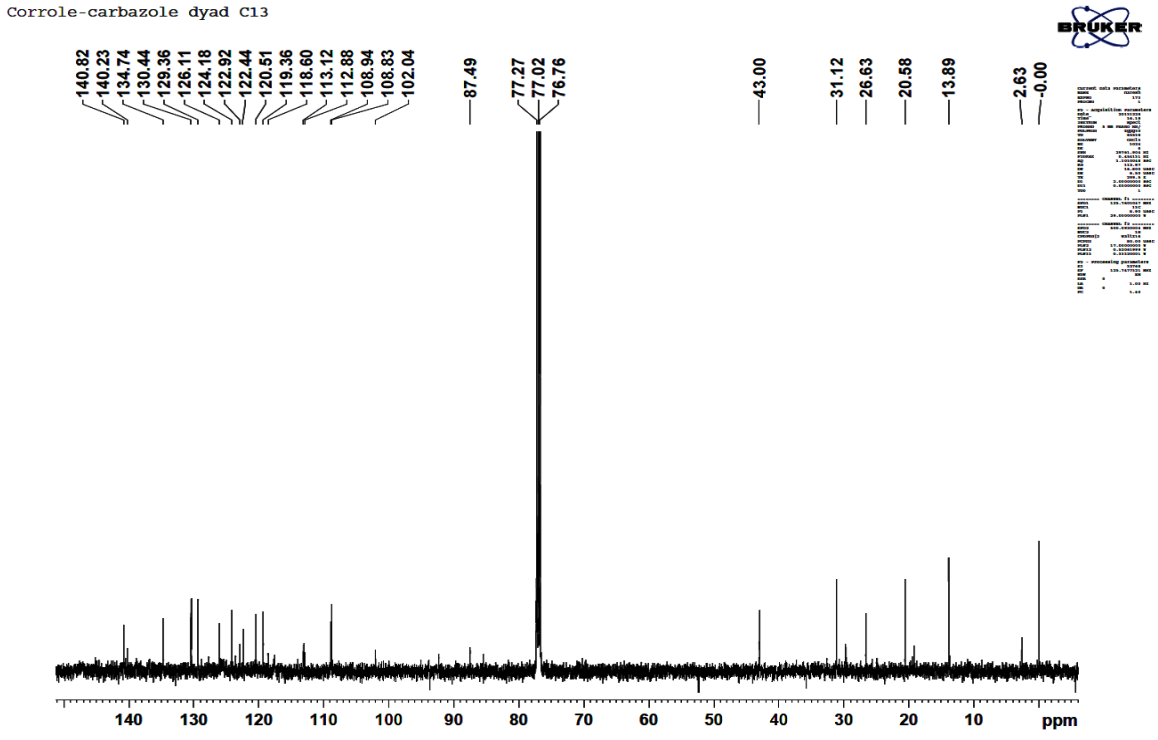


Figure 6.^{13}CNMR of compound **4** in $CDCl_3$

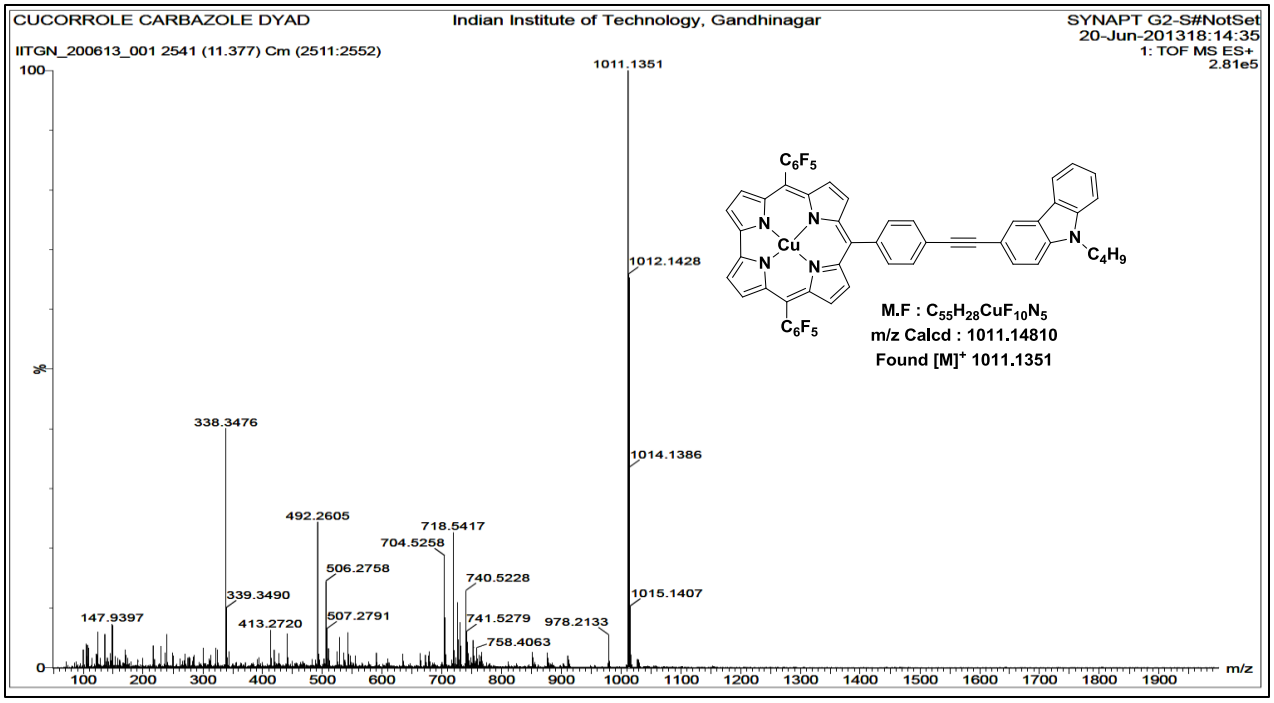


Figure 7. ESI-MS of compound **5**

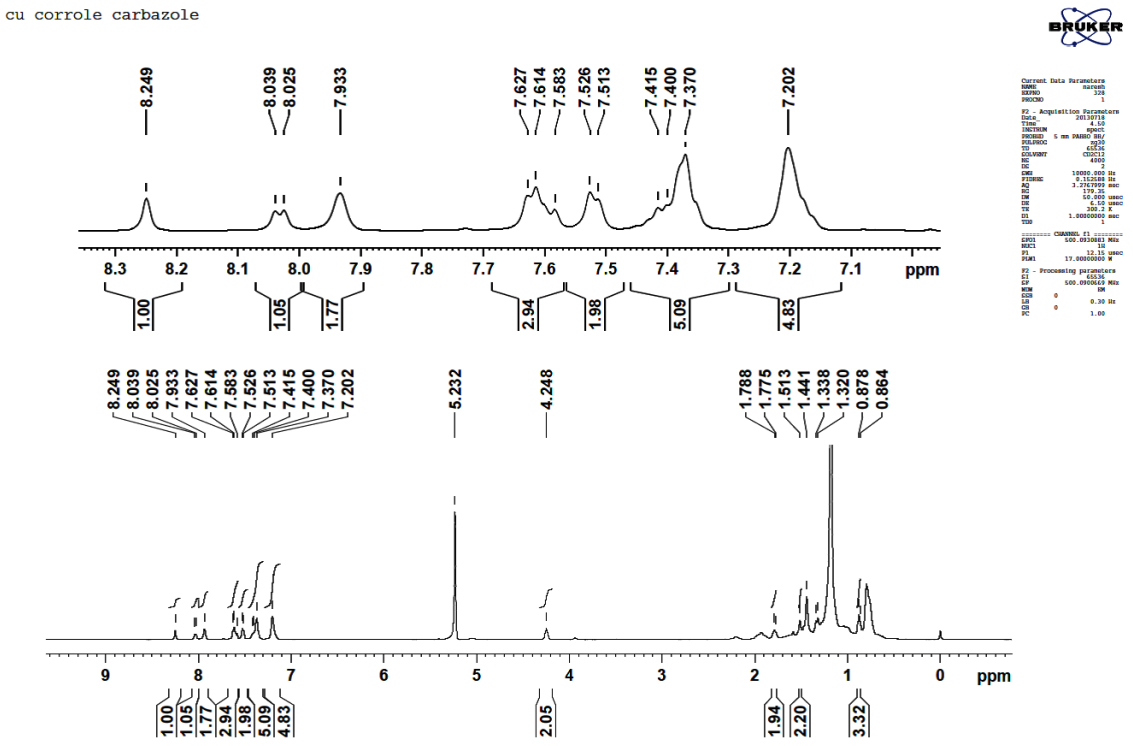


Figure 8.^{1}HNMR of compound **5** in $CDCl_3$

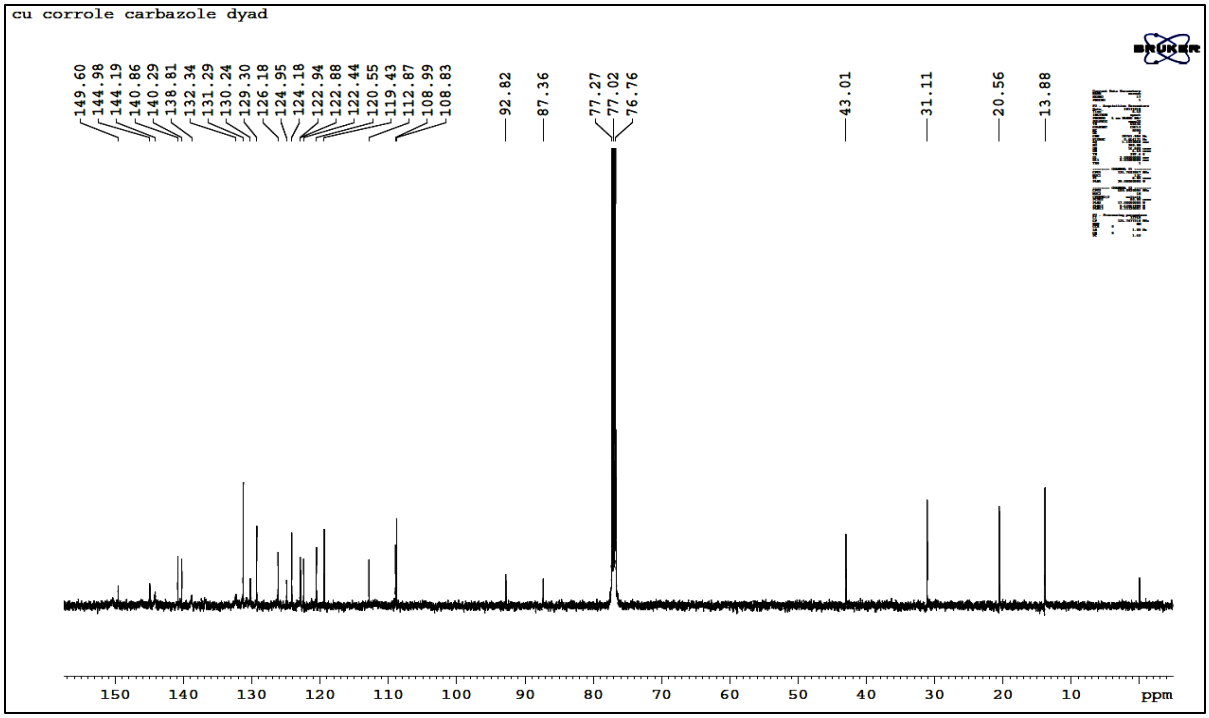
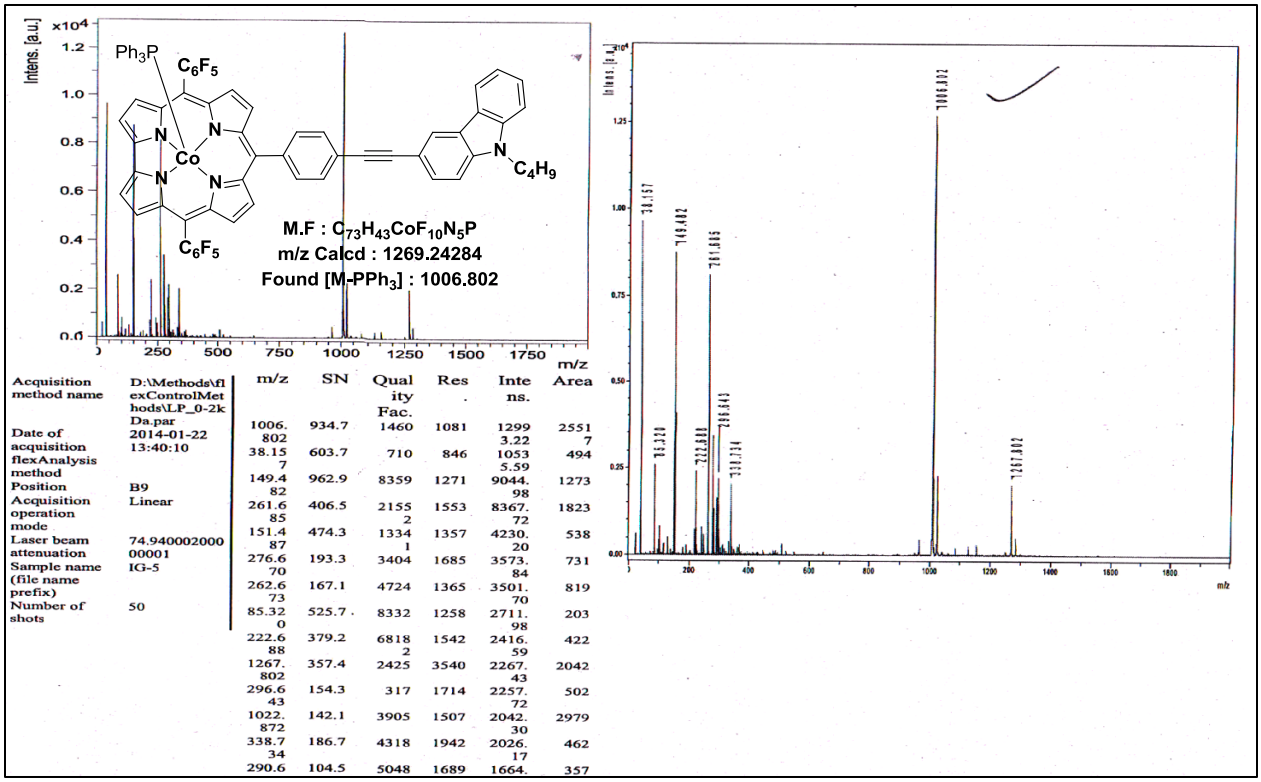


Figure 9. ^{13}CNMR of compound **5** in $CDCl_3$



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Position	B9
Acquisition operation mode	Linear
Laser beam attenuation	74.940002000
Sample name (file name prefix)	00001 IG-5
Number of shots	50

m/z	SN	Quality Fac.	Res.	Intens.	Area
1006.802	934.7	1460	1081	1299 3.22	2551 7
38.157	603.7	710	846	1053 5.59	494
149.482	962.9	8359	1271	9044. 98	1273
261.685	406.5	2155 2	1553	8367. 72	1823
151.487	474.3	1334 1	1357	4230. 20	538
276.670	193.3	3404	1685	3573. 84	731
262.673	167.1	4724	1365	3501. 70	819
85.320	525.7	8332	1258	2711. 98	203
222.688	379.2	6818 2	1542	2416. 59	422
1267.802	357.4	2425	3540	2267. 43	2042
296.643	154.3	317	1714	2257. 72	502
1022.872	142.1	3905	1507	2042. 30	2979
338.734	186.7	4318	1942	2026. 17	462
290.6	104.5	5048	1689	1664.	357

Figure 10. MALDI-MS of compound **6**

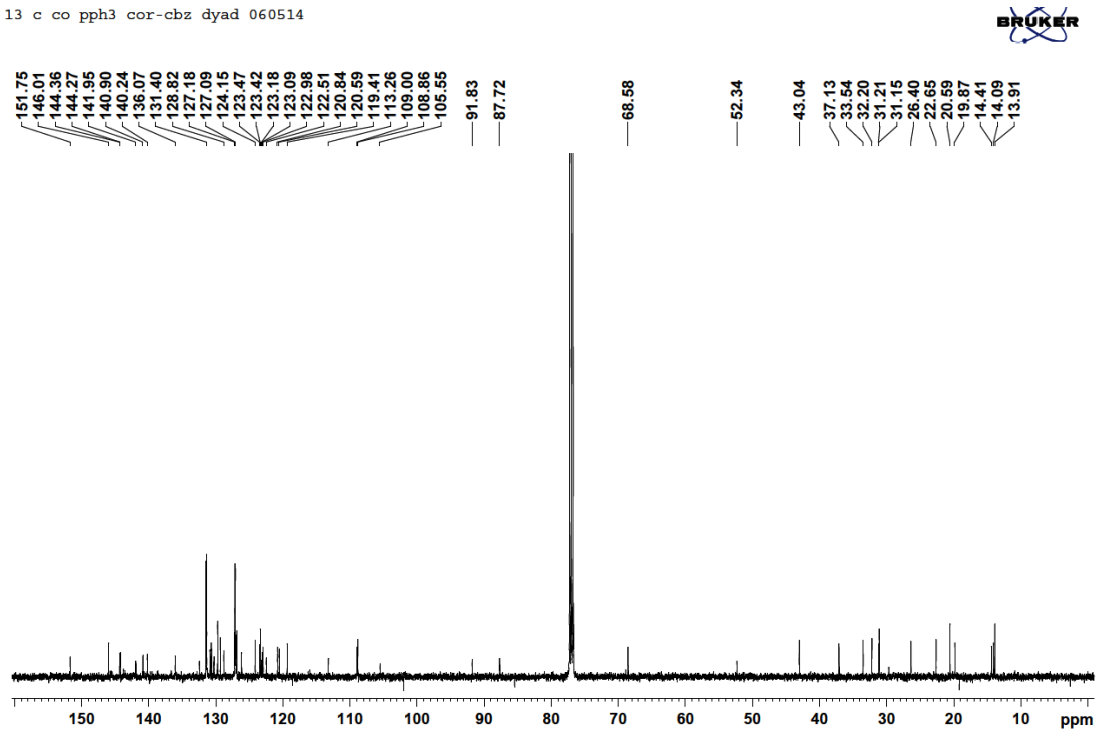

Figure 11. ^{13}CNMR of compound **6** in $CDCl_3$

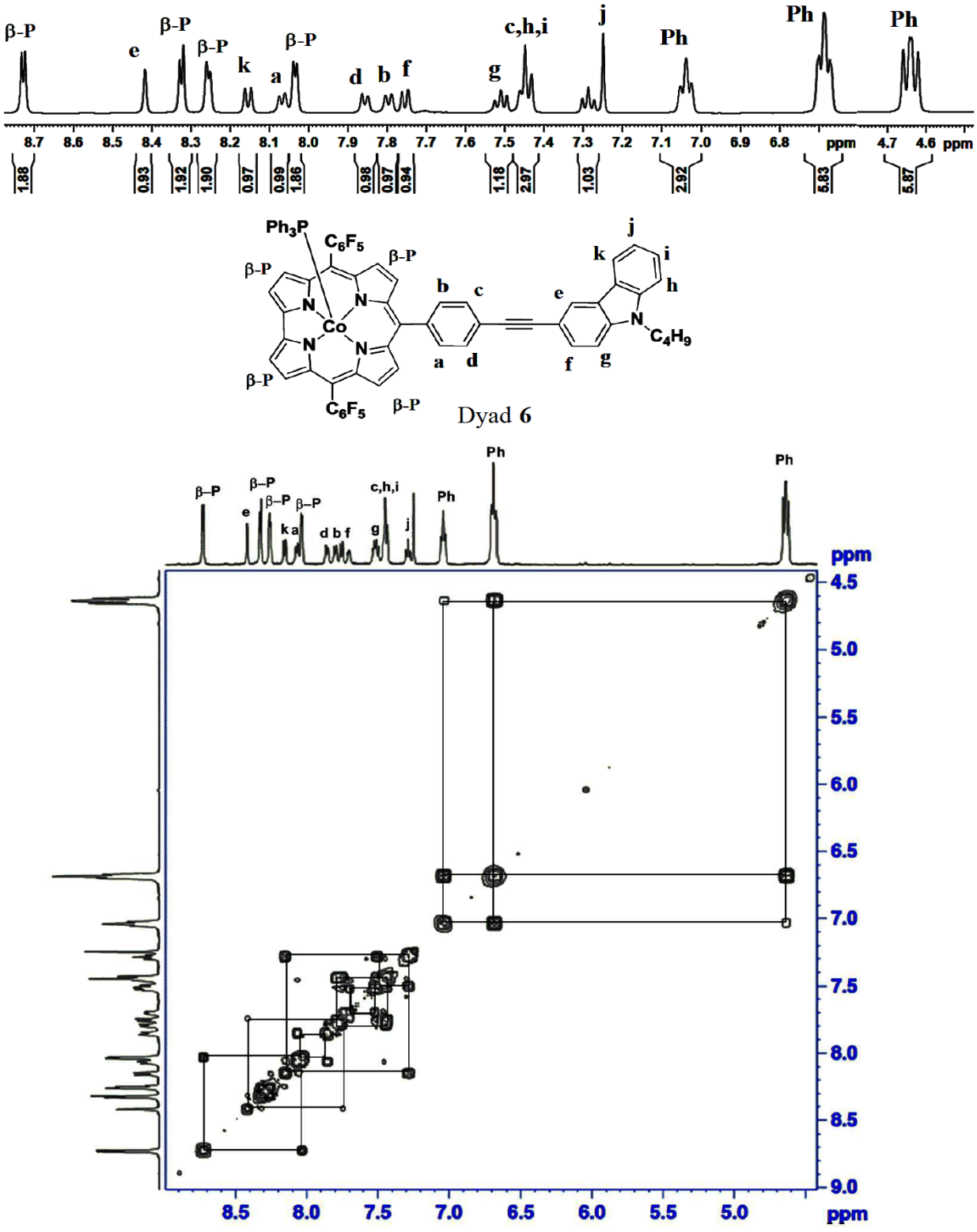

Figure 12**.** Partial ^{1}H-NMR and ^{1}H-^{1}H COSY spectra of dyad **6** recorded in $CDCl_3$.

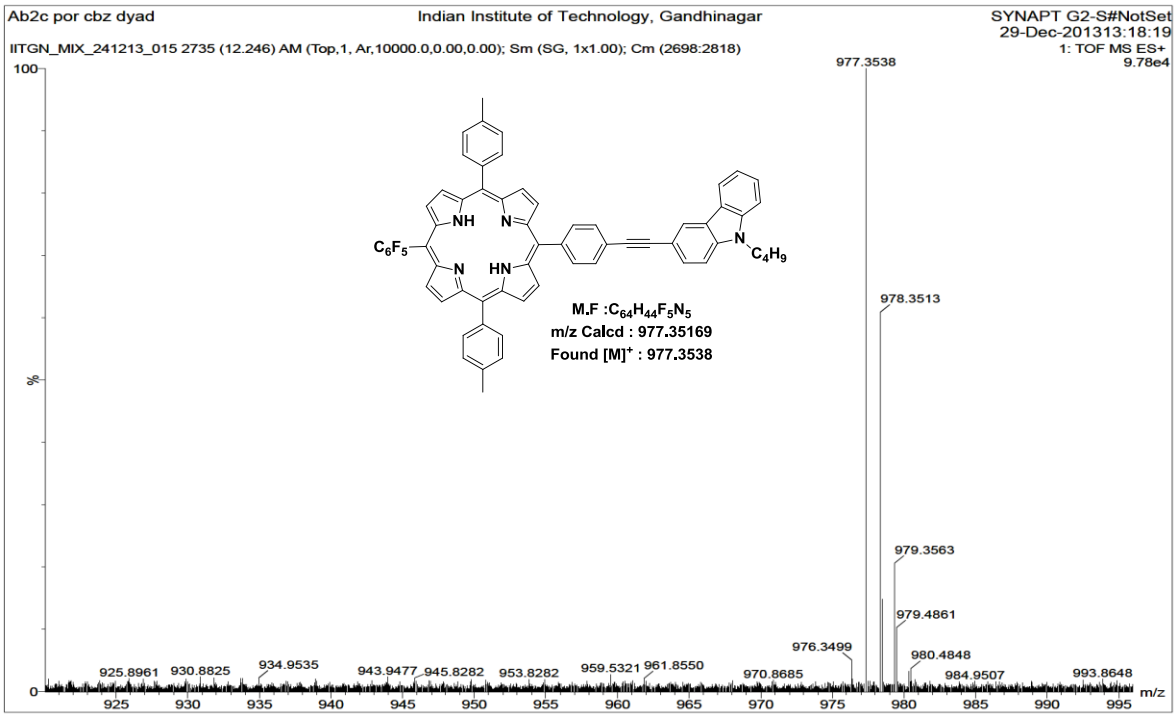

Figure 13. ESI-MS of compound **7**

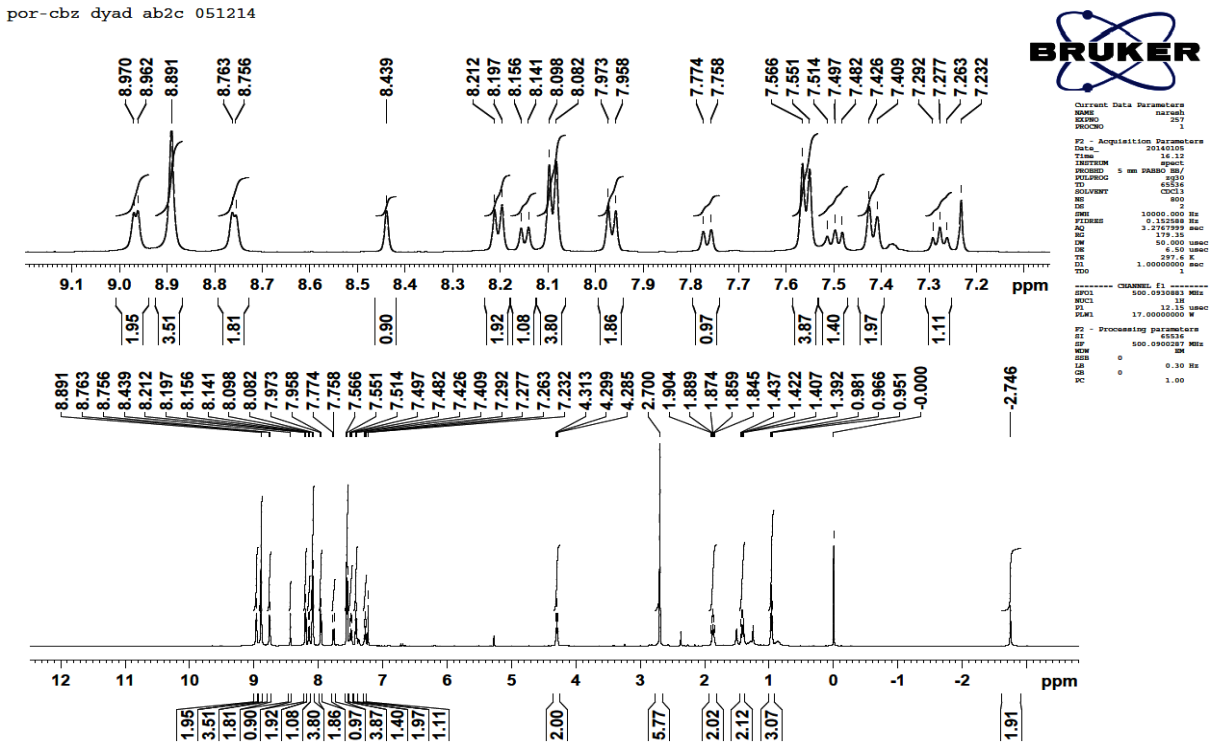

Figure 14.^{1}HNMR of compound **7** in $CDCl_3$

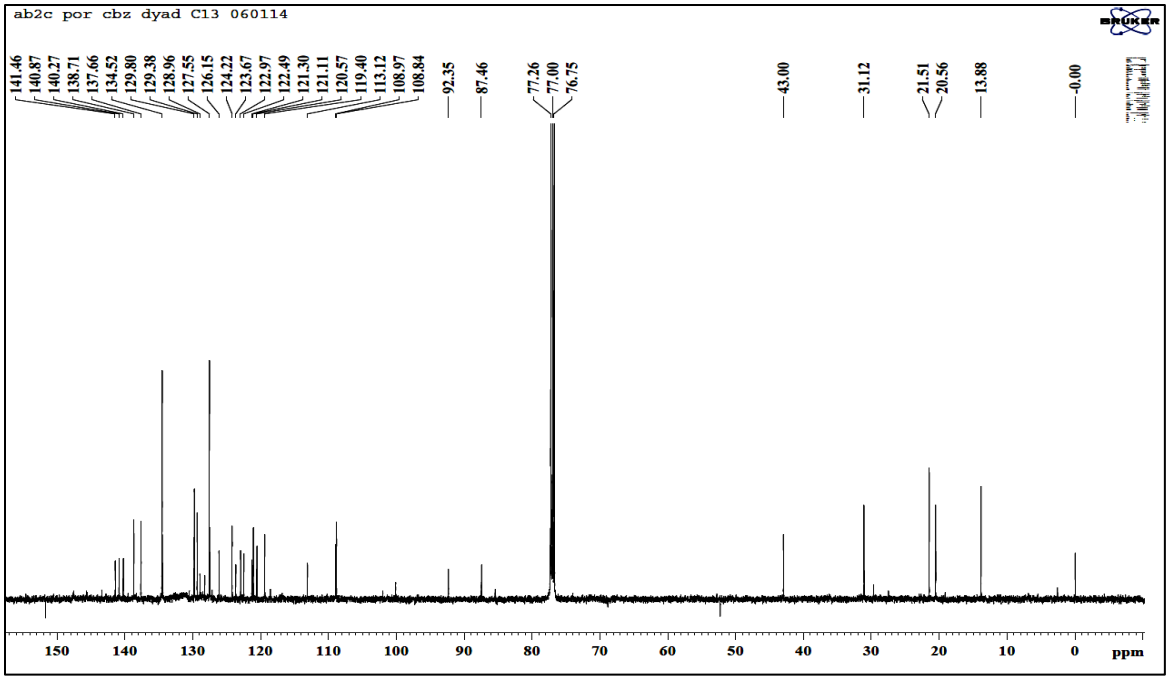

Figure 15.^{13}CNMR of compound **7** in $CDCl_3$

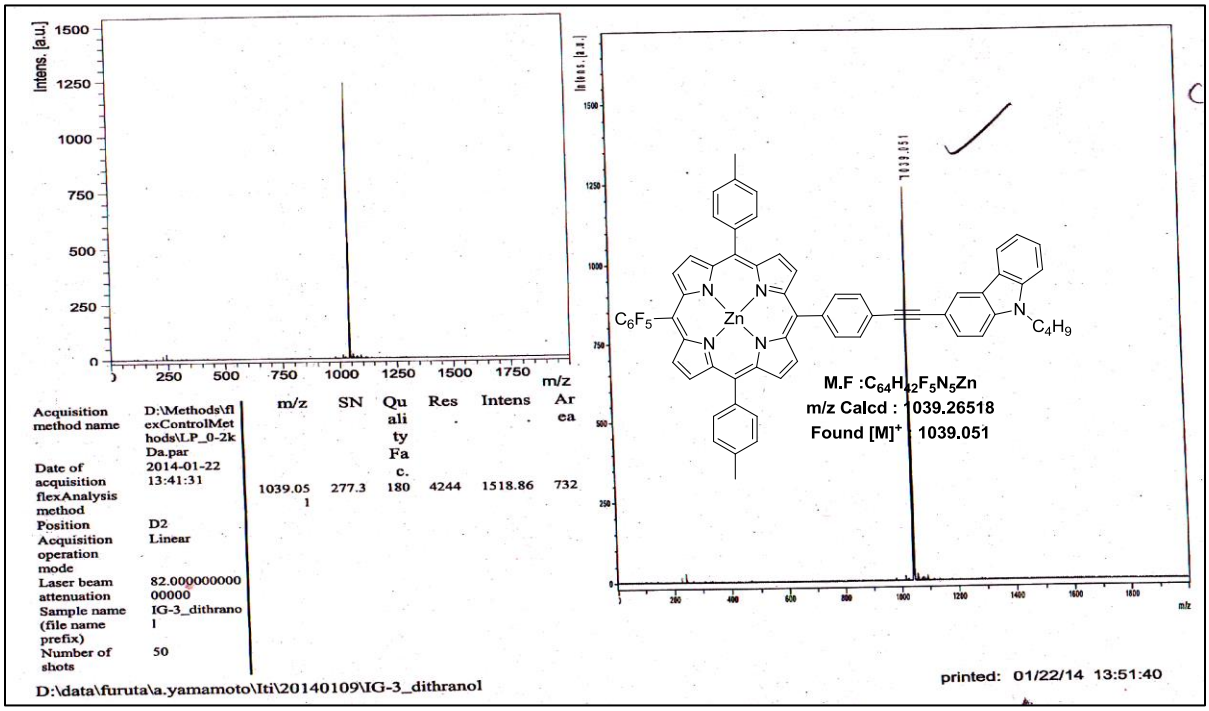

Figure 16. MALDI-MS of compound **8**

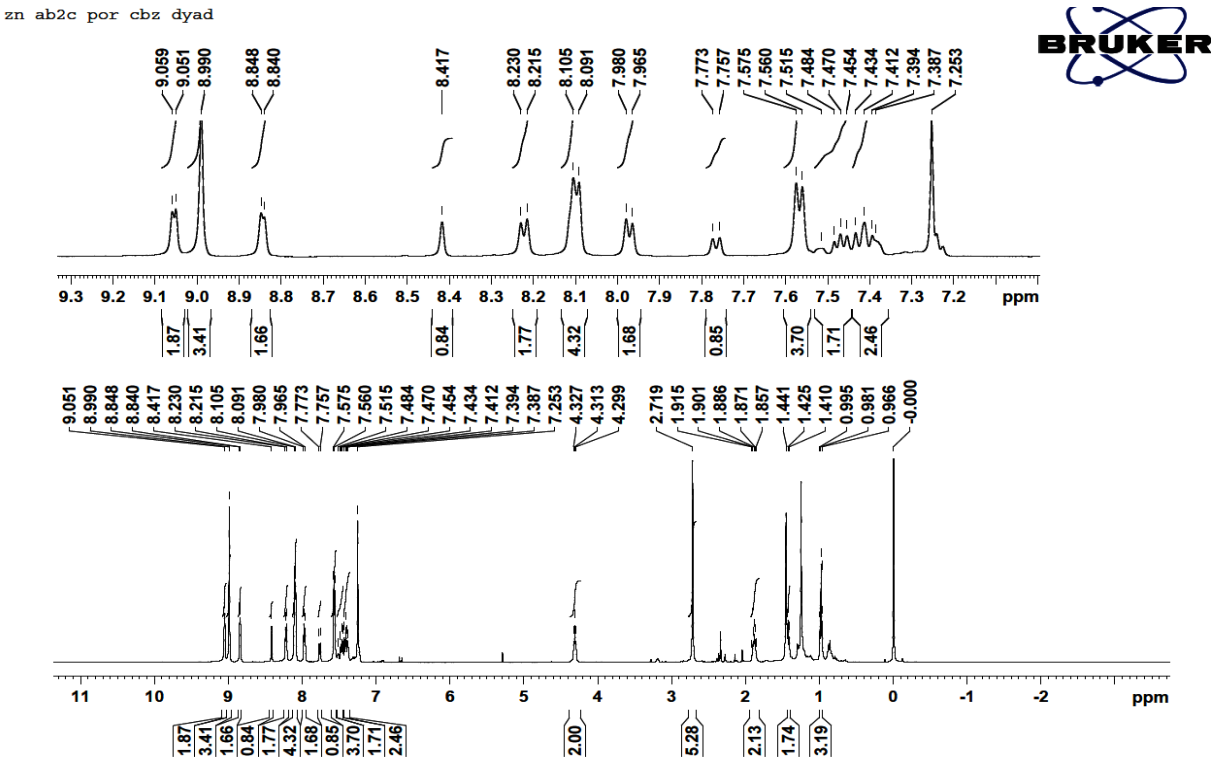

Figure 17.[1]HNMR of compound **8** in $CDCl_3$

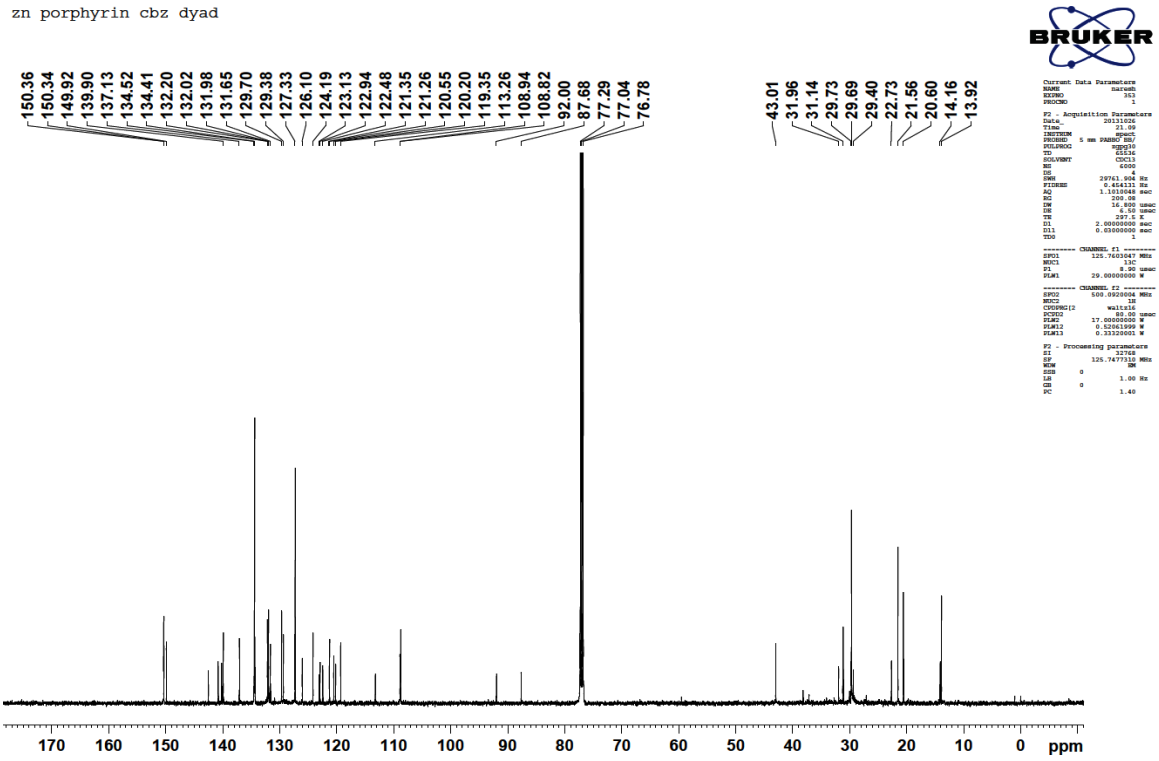

Figure 18. [13]CNMR of compound **8** in $CDCl_3$

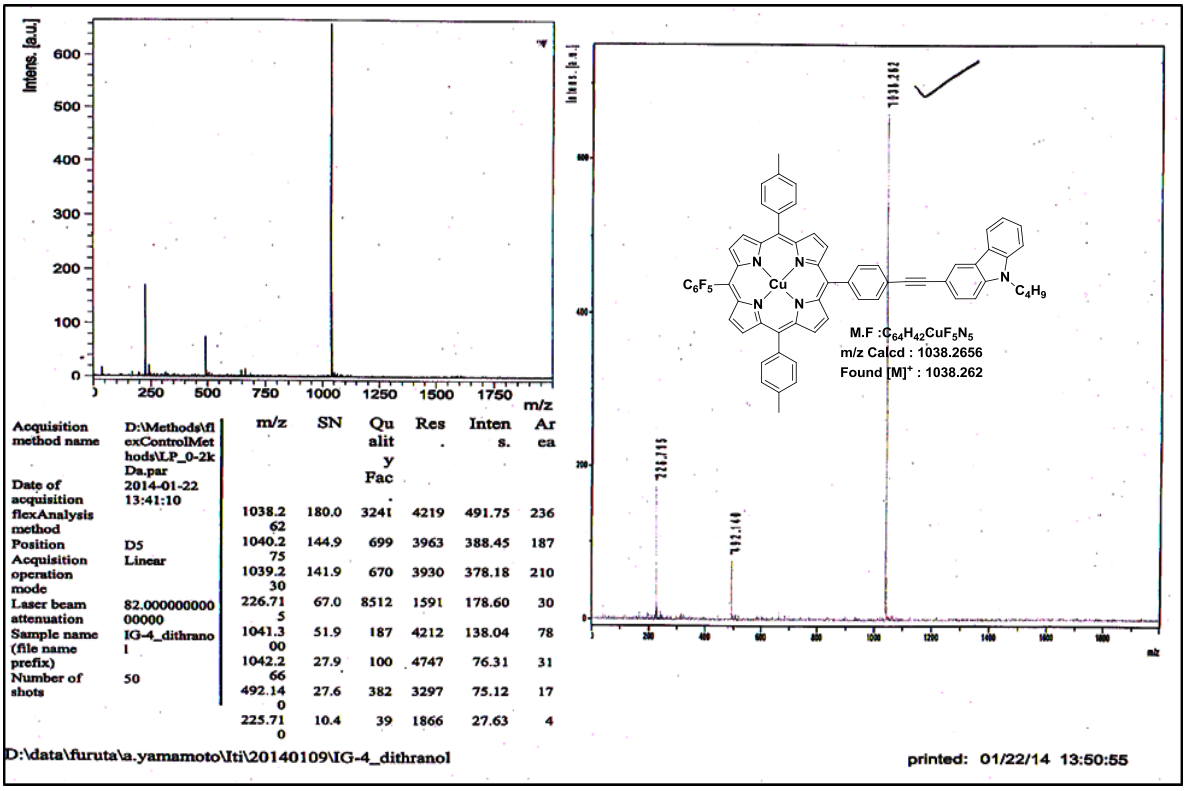

Figure 19. MALDI-MS of compound **9**

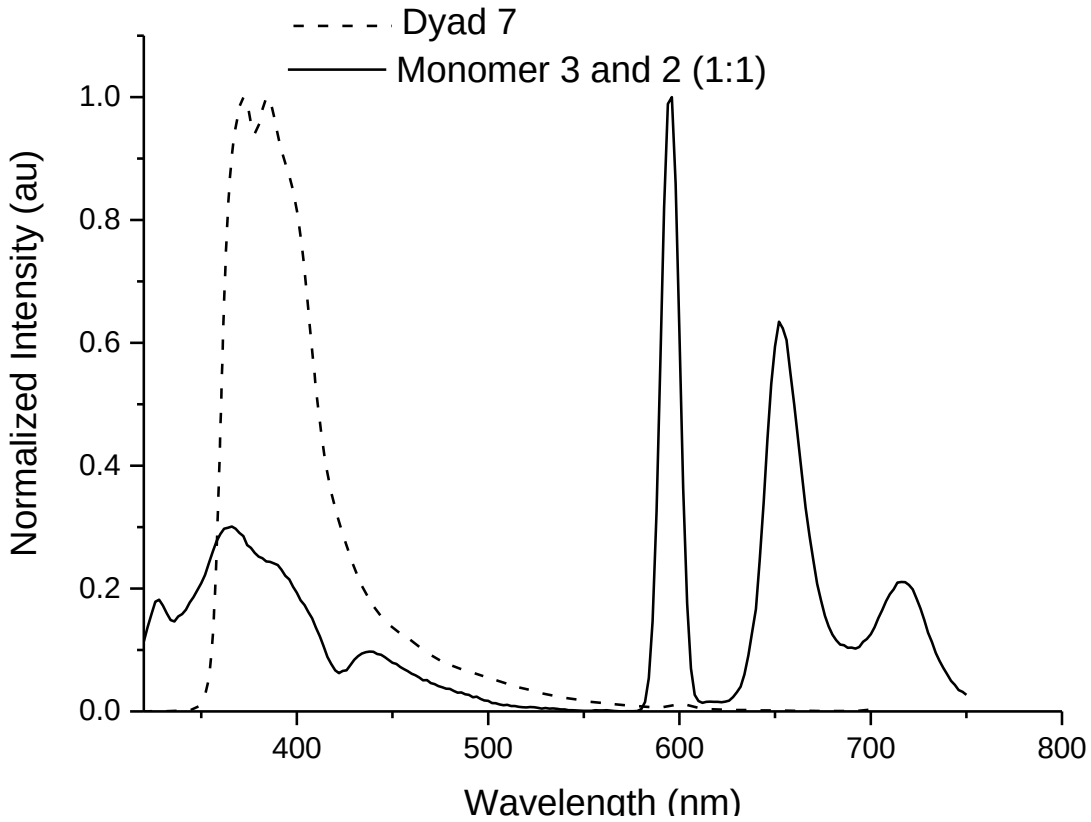

Figure 20. Comparison of emission spectra of dyad **7** and a 1:1 mixture of N-butylcarbazole and porphyrin **3** in toluene (λ_{ex} = 300 nm). The sharp peak at 600 nm is due to the scattering which is observed exactly at the double of excitation wavelength 300 nm (second order diffraction through emission monochromator in the fluorescence instrument).[1]

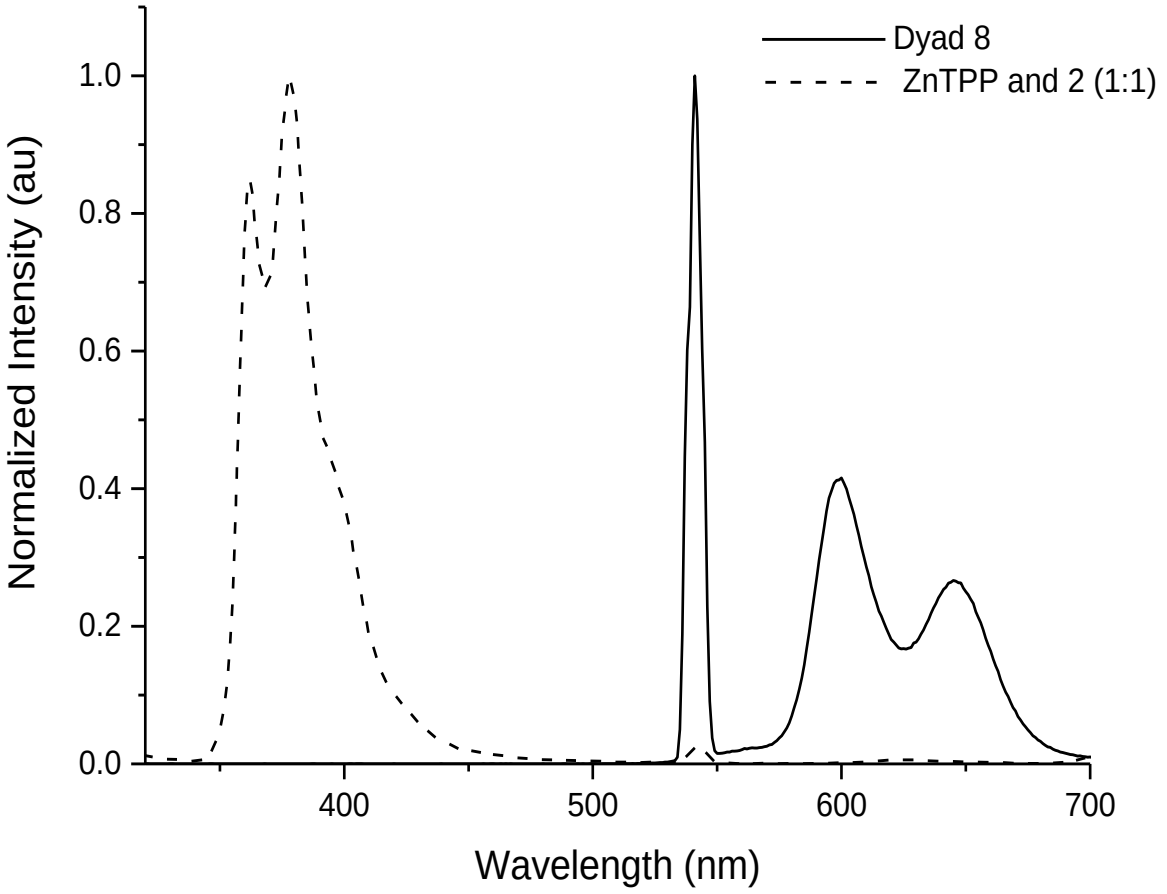

Figure 21. Comparison of emission spectra of dyad **8** and a 1:1 mixture of N-butylcarbazole and ZnTPP in toluene (λ_{ex} = 270 nm). The sharp peak at 600 nm is due to the scattering which is observed exactly at the double of excitation wavelength 300 nm (second order diffraction through emission monochromator in the fluorescence instrument).[1]

Table 1. Fröster Energy Transfer Calculations of dyad **4** using PhotoChemCAD[2] software

Results of Forster Energy Transfer Calculation

Donor	
Acceptor	
Solvent	
Refractive index (n)	1.490
Orientation factor	1.125
Quantum yield	0.127
Actual distance	15.200
Epsilon	21600.000
Wavelength for epsilon (nm)	300.000
Low wavelength (nm)	310.000
High wavelength (nm)	700.000
J value (cm(6)/mmol)	1.145e-013
Forster distance	37.798
Efficiency (%)	99.579
Fluorescence lifetime (ns)	8.890
Rate of energy transfer (1/s)	2.660e+010
Dexter overlap integral (1/eV)	6.095e-001

Table 2. Fröster Energy Transfer Calculations of dyad **7** using PhotoChemCAD software

Results of Forster Energy Transfer Calculation

Donor	
Acceptor	
Solvent	
Refractive index (n)	1.490
Orientation factor	1.125
Quantum yield	0.127
Actual distance	15.200
Epsilon	18125.000
Wavelength for epsilon (nm)	300.000
Low wavelength (nm)	310.000
High wavelength (nm)	700.000
J value (cm(6)/mmol)	9.173e-014
Forster distance	36.426
Efficiency (%)	99.475
Fluorescence lifetime (ns)	8.890
Rate of energy transfer (1/s)	2.131e+010
Dexter overlap integral (1/eV)	4.437e-001

Table 3. Fröster Energy Transfer Calculations of dyad **8** using PhotoChemCAD software

Results of Forster Energy Transfer Calculation

Donor	
Acceptor	
Solvent	
Refractive index (n)	1.490
Orientation factor	1.125
Quantum yield	0.127
Actual distance	15.200
Epsilon	29655.000
Wavelength for epsilon (nm)	270.000
Low wavelength (nm)	310.000
High wavelength (nm)	700.000
J value (cm(6)/mmol)	8.078e-014
Forster distance	35.663
Efficiency (%)	99.404
Fluorescence lifetime (ns)	8.890
Rate of energy transfer (1/s)	1.876e+010
Dexter overlap integral (1/eV)	3.219e-001

Reference:

1. S. Ik Yang, J. Li, H. Sun Cho, D. Kim, D. F. Bocian, D. Holten and J. S. Lindsey, *Journal of Materials Chemistry*, 2000, **10**, 283-296.

2. *Principles of Fluorescence Spectroscopy*, J. R. Lakowicz, 3rd Edn. Springer, **2006.**