

Supplementary Information

Interactions of Newly designed Dicationic carbazole derivatives with Double-Stranded DNA: Syntheses, Binding Studies and AFM imaging

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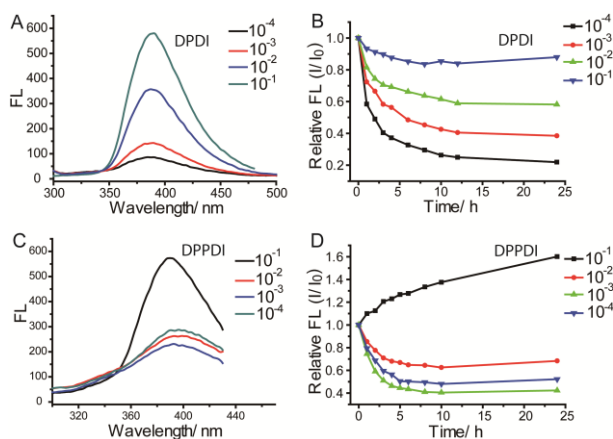


Fig.S1 Fluorescence spectra of DPDI (A) and DPPDI (C) in aqueous solutions with four different ionic strengths. Fluorescence intensity of maximum emissions changes over time for DPDI (B) and DPPDI (D). [dicationic carbazoles] = 0.1 μ M. The different ionic strengths of 10^{-4} M, 10^{-3} M, 10^{-2} M, 10^{-1} M were adjusted by NaCl.

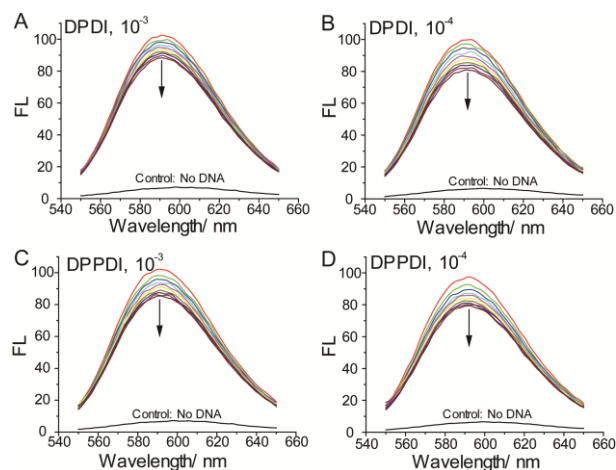


Fig. S2. Fluorescence spectra of EB (2 μ M) and DNA (5 μ M) with the increase of DPDI ((A) ionic strength of 10^{-3} M and (B) ionic strength of 10^{-4} M) and DPPDI ((C) ionic strength of 10^{-3} M and (D) ionic strength of 10^{-4} M). [DPDI] or [DPPDI] = 0, 3.33, 6.67, 10.00, 13.33, 16.67, 20.00, 23.33, 26.67, 30.00 μ M.

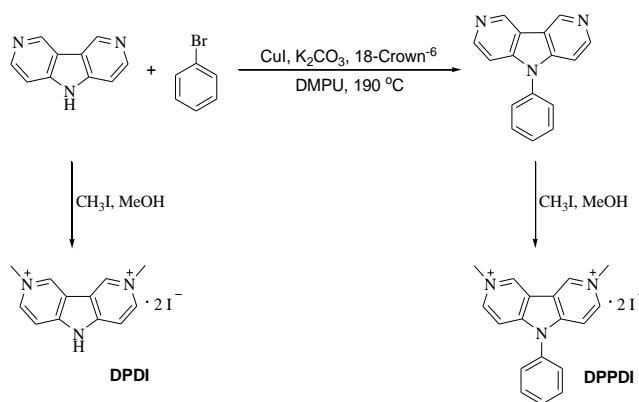


Fig.S3. Synthesis of the two dicationic carbazoles

Spectroscopic data about three synthetic compounds

1. 5-phenyl-5H-pyrrolo[3,2-c:4,5-c']dipyridine (Fig. S4-6)

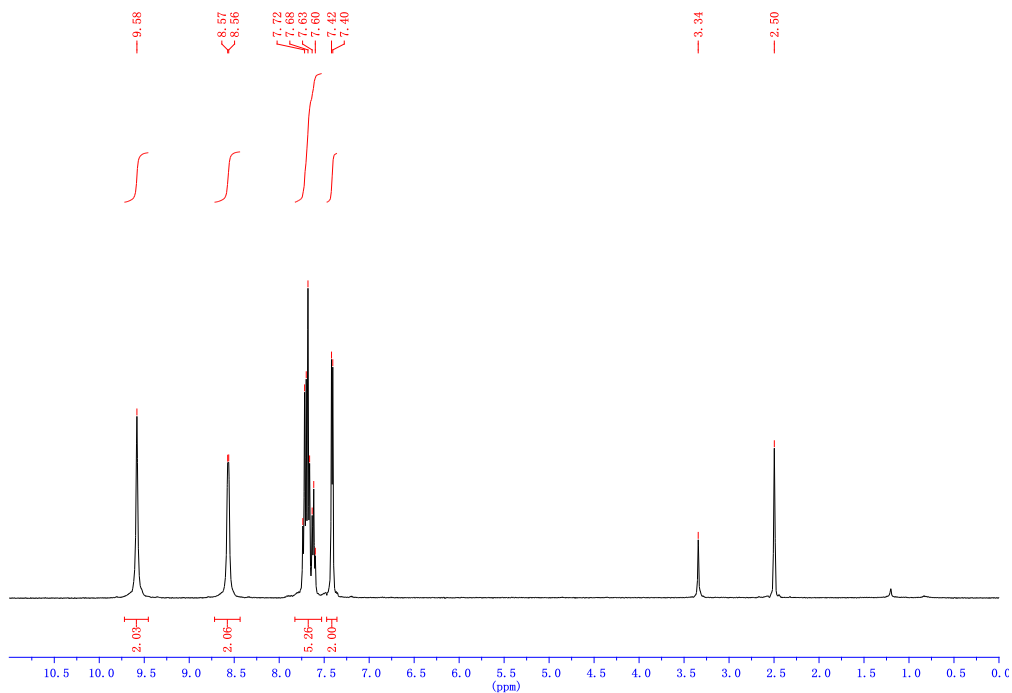


Fig. S4. ¹H NMR of 5-phenyl-5H-pyrrolo[3,2-c:4,5-c']dipyridine

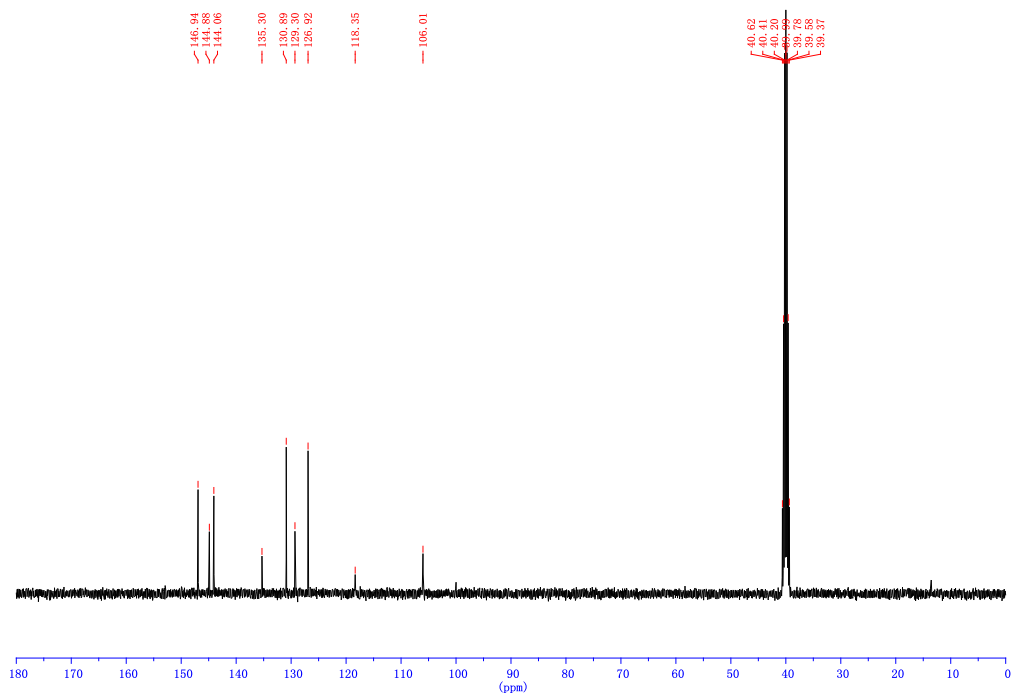


Fig. S5. ¹³C NMR of 5-phenyl-5H-pyrrolo[3,2-c:4,5-c']dipyridine

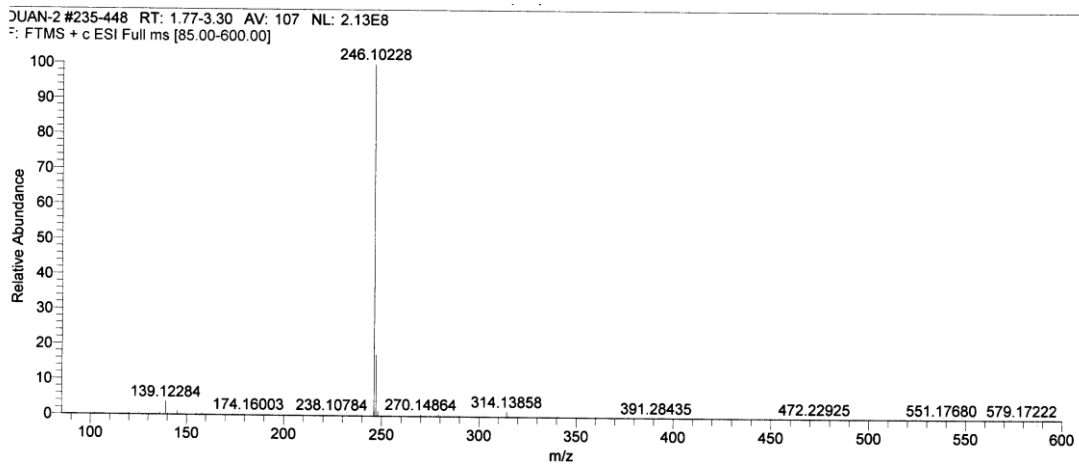


Fig. S6. HRMS of 5-phenyl-5H-pyrrolo[3,2-c:4,5-c']dipyridine

2. 2,8-Dimethyl-5H-pyrrolo[3,2-c:4,5-c']dipyridinium diiodide (DPDI) (Fig. S7-10)

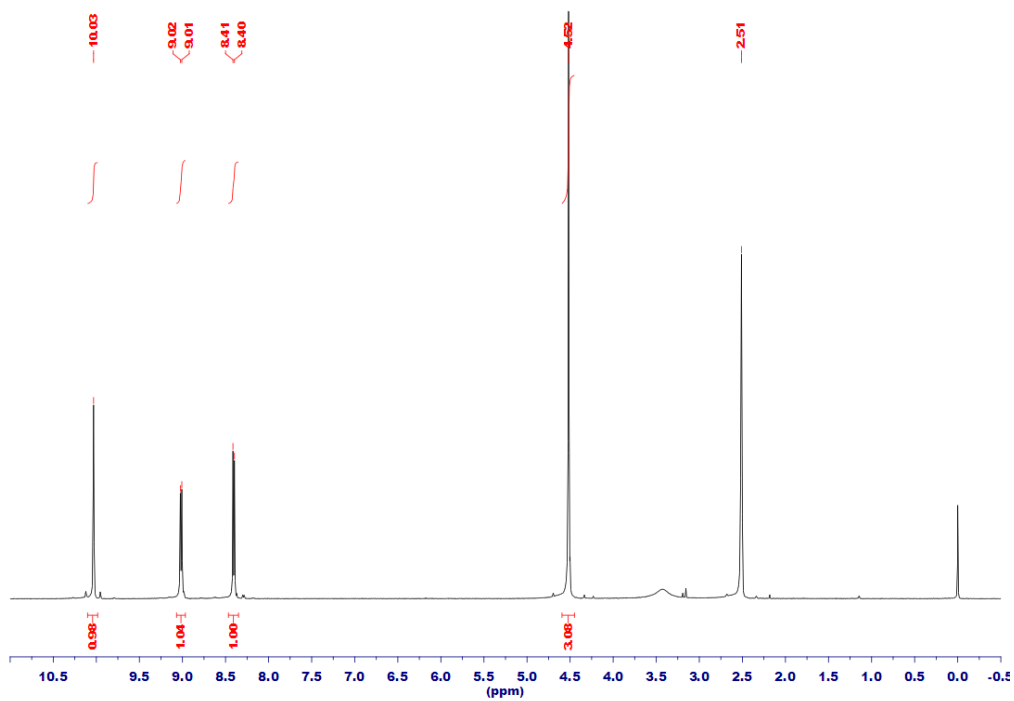


Fig. S7. ^1H NMR of DPDI

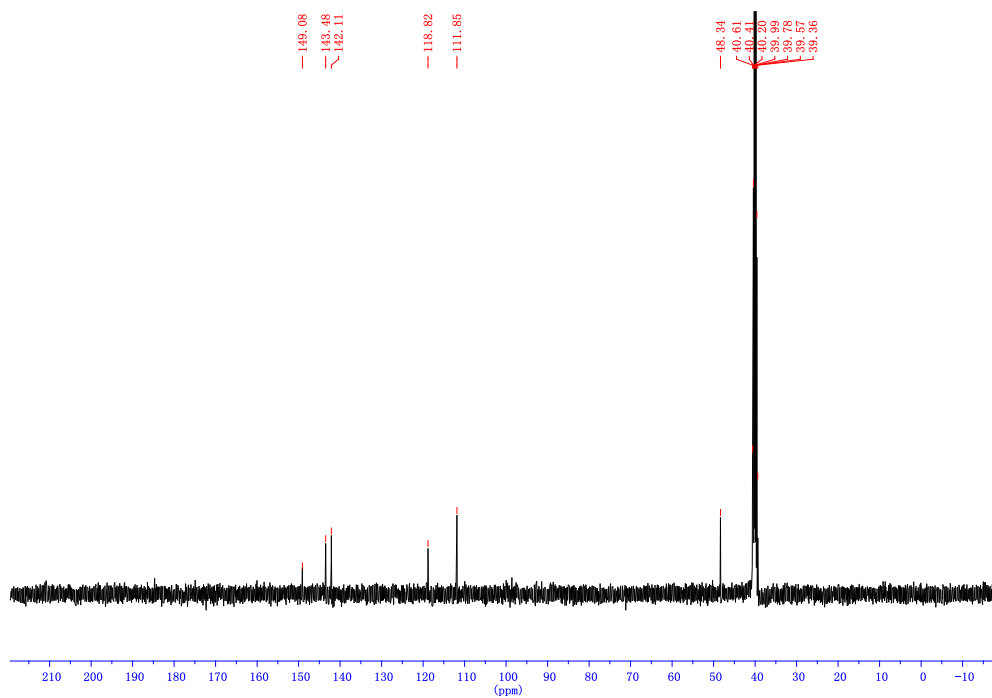


Fig. S8. ^{13}C NMR of DPDI

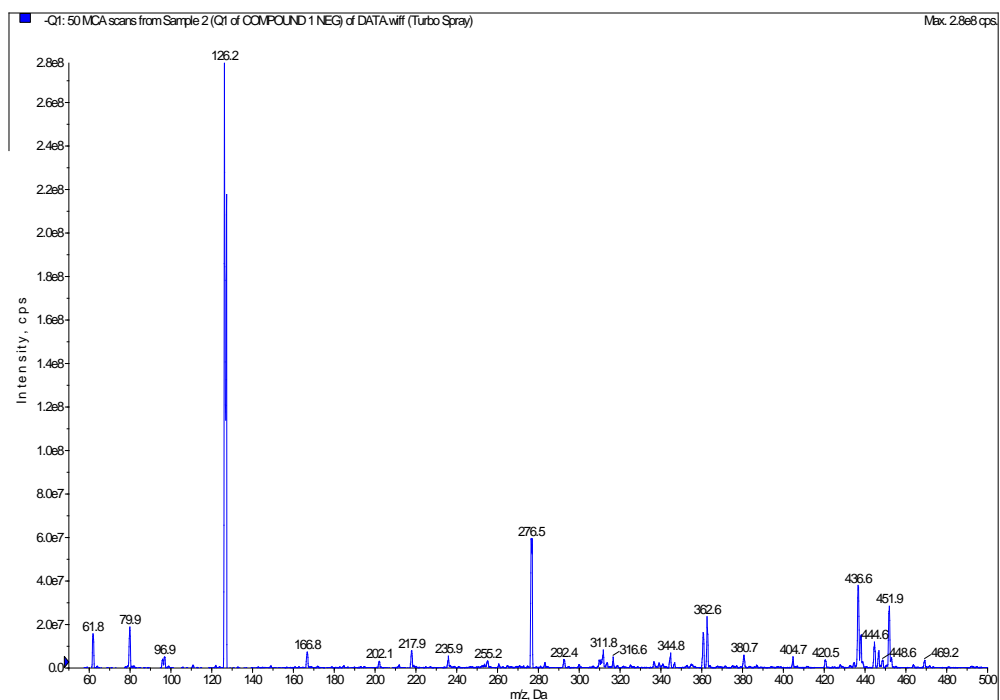


Fig. S9. MS of DPDI

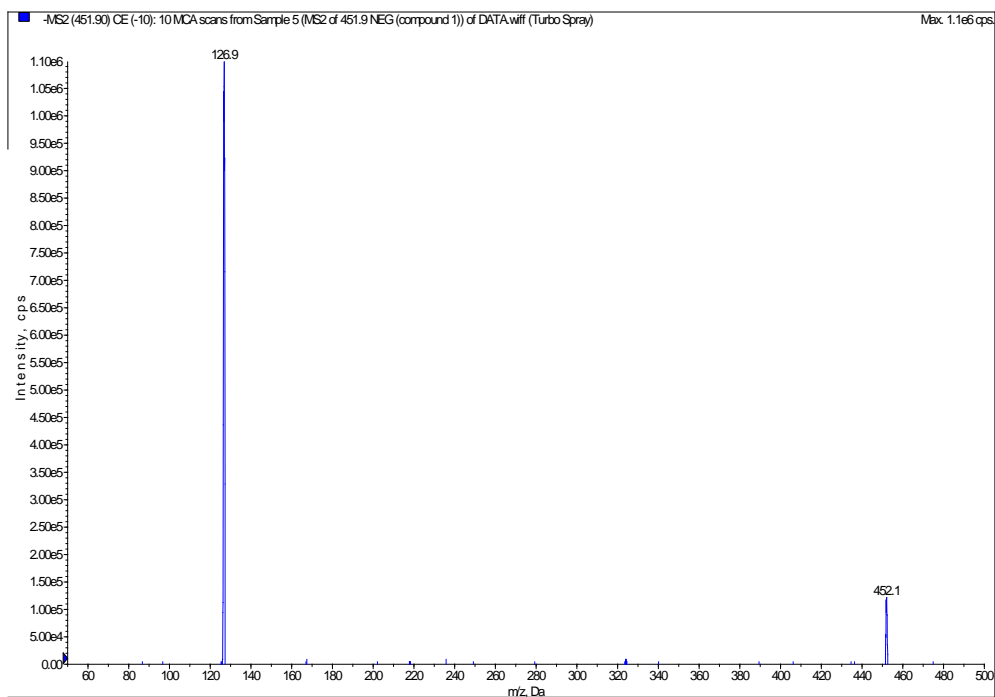


Fig. S10. MS2 of 451.9

3. 2,8-Dimethyl-5-phenyl-5H-pyrrolo[3,2-c:4,5-c']dipyridinium diiodide (DPDI) (Fig. S11-13)

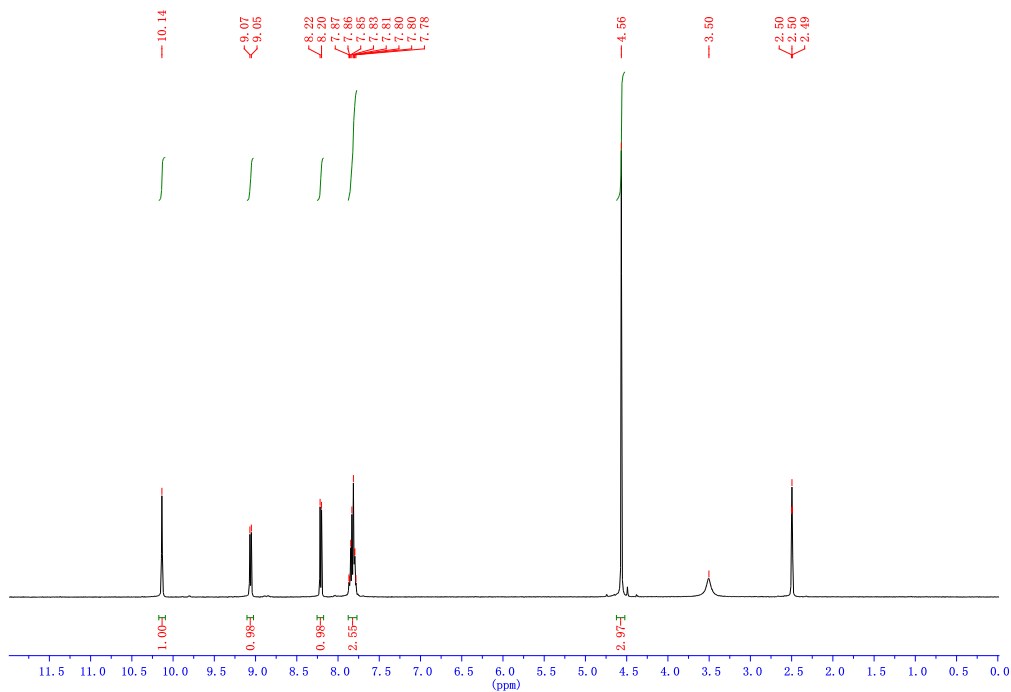


Fig. S11. ¹H NMR of DPDI

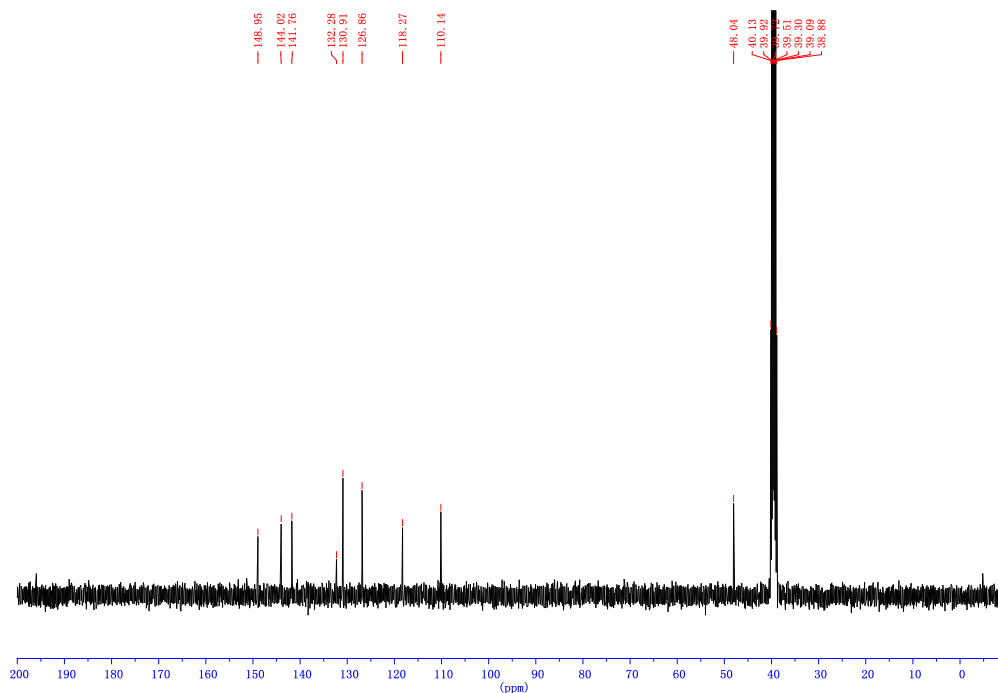


Fig. S12. ¹³C NMR of DPPDI

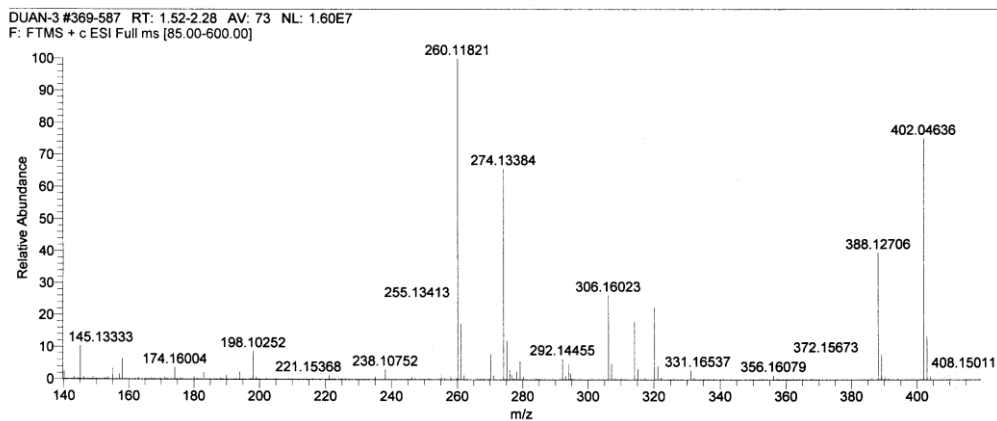


Fig. S13. HRMS of DPPDI