Electronic Supplementary Information

A molecular switch with varying gated photochromism

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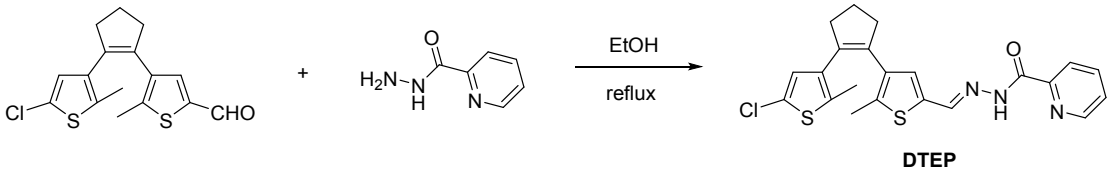
Supplementary scheme and figures



Scheme S1. Synthesis route of compound **DTEP**.

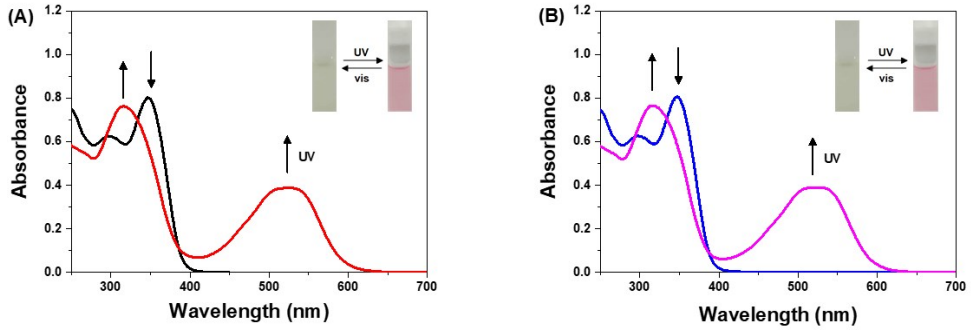


Figure S1. The UV-vis absorption spectral changes of compound **DTEP** (10 μM) upon alternative irradiation with UV and visible light in MeOH solution at 25° C: **(A)** the original solution; **(B)** the solution heated at 338 K for 48 h.

The irradiated solution still exhibited the similar photochromic behaviors in comparison with the original solution, indicating that compound **DTEP** possessed the good thermal stability.

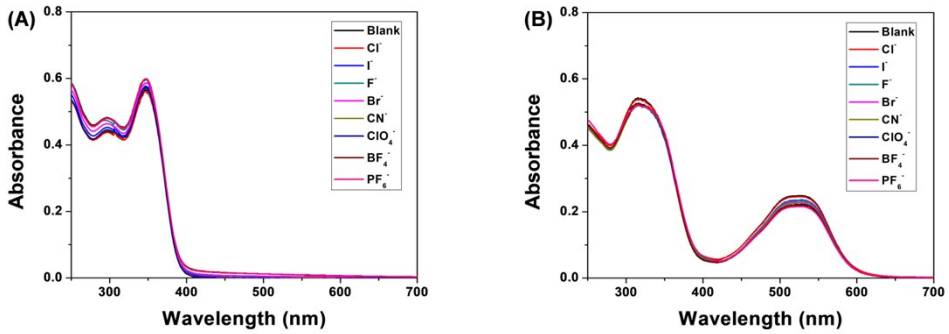


Figure S2. The UV-vis absorption changes of **(A)** compound **DTEP** (10 μM) and **(B)** its photostationary state with various anions (40 μM) in MeOH solution at 25 °C.

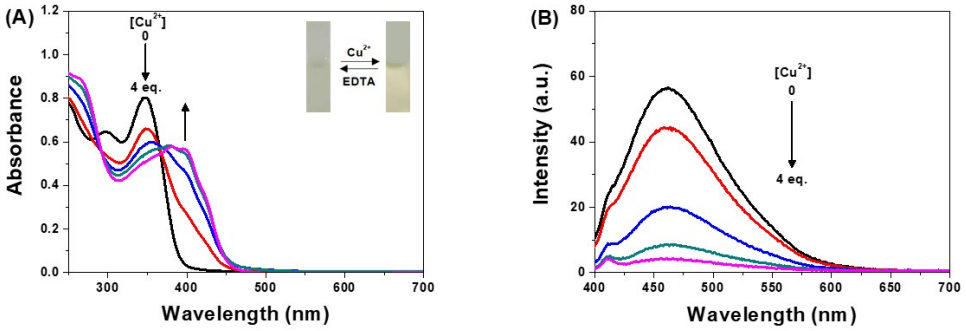


Figure S3. UV-vis absorption **(A)** and fluorescence changes **(B)** of compound **DTEP** (10 μM) with the addition of Cu^{2+} (0-40 μM) in MeOH solution at 25° C. λ_{ex} = 365 nm, slits: 5 nm/ 5 nm. Inset: the corresponding photographic images upon irradiation with UV and visible light.

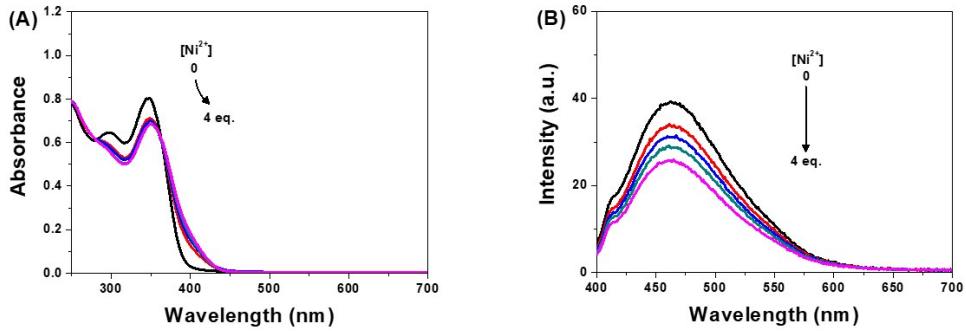


Figure S4. UV-vis absorption **(A)** and fluorescence changes **(B)** of compound **DTEP** (10 μM) with the addition of Ni^{2+} (0-40 μM) in MeOH solution at 25° C. λ_{ex} = 365 nm, slits: 5 nm/ 5 nm.

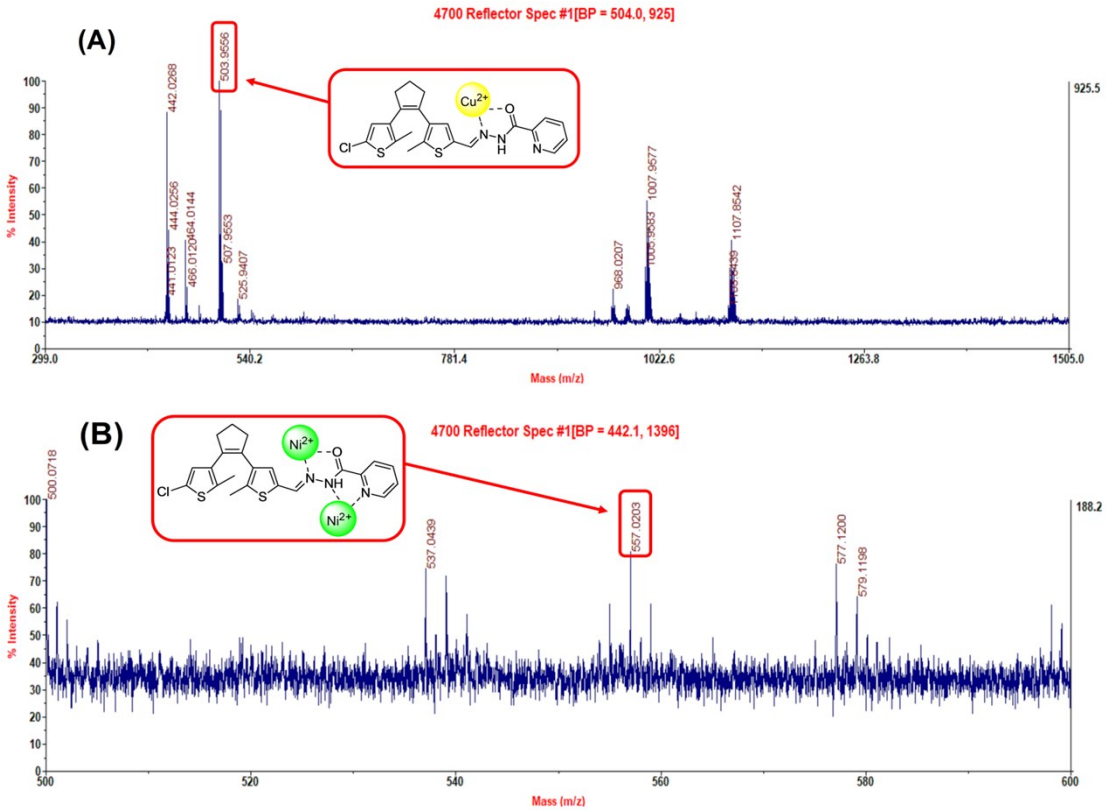


Figure S5. MS (MALDI-TOF) of compound **DTEP** (10 μM) with Cu^{2+} **(A)** and Ni^{2+} **(B)** ions (40 μM) in MeOH solution at 25 ℃.

When 4.0 equiv. of Cu^{2+} ions was added to the **DTEP** solution, a new peak appeared at *m/z* 503.9556 (Figure S4A) that was attributed to the [**DTEP**+Cu^{2+}] adduct (the calculated value was 504.0121), suggesting the complex of **DTEP** and Cu^{2+} ions with a binding stoichiometry of 1:1.

When 4.0 equiv. of Ni^{2+} ions was added to the **DTEP** solution, a new peak appeared at *m/z* 557.0203 (Figure S4B) that was attributed to the [Ni^{2+}+**DTEP**+Ni^{2+}] adduct (the calculated value was 556.9421), suggesting the complex of **DTEP** and Ni^{2+} ions with a binding stoichiometry of 1:2.

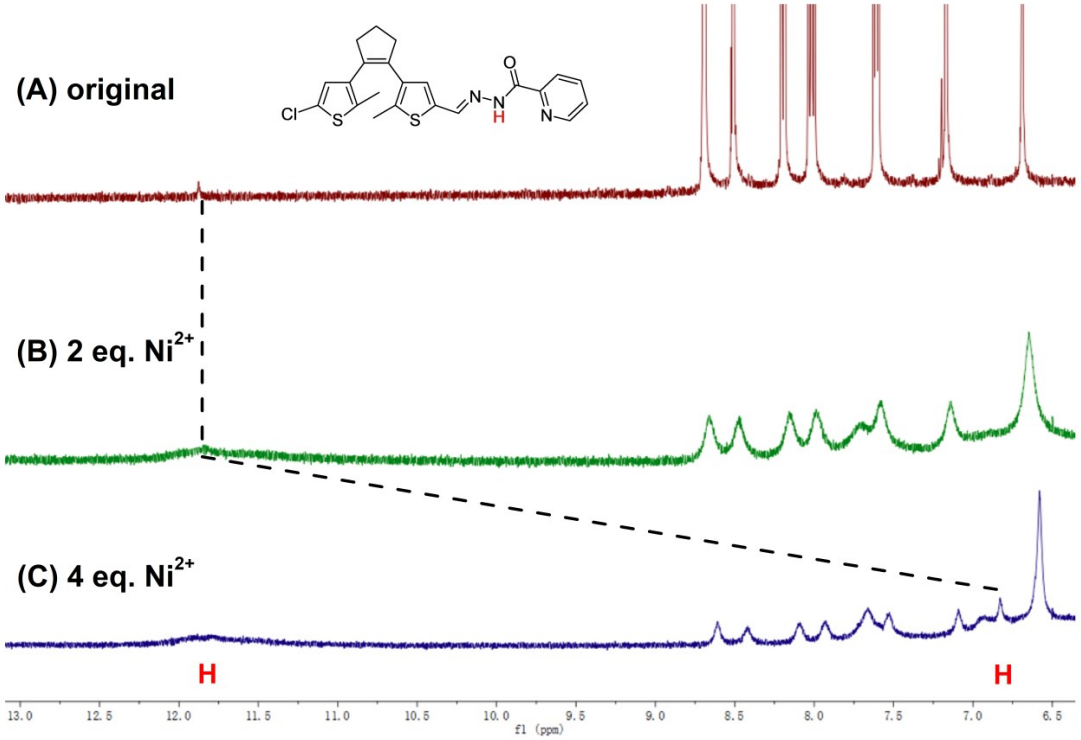


Figure S6. ^{1}H NMR titration of compound **DTEP** (10 μM) with Ni^{2+} ions (0-40 μM) in CD_3OD solution at 25 ℃.

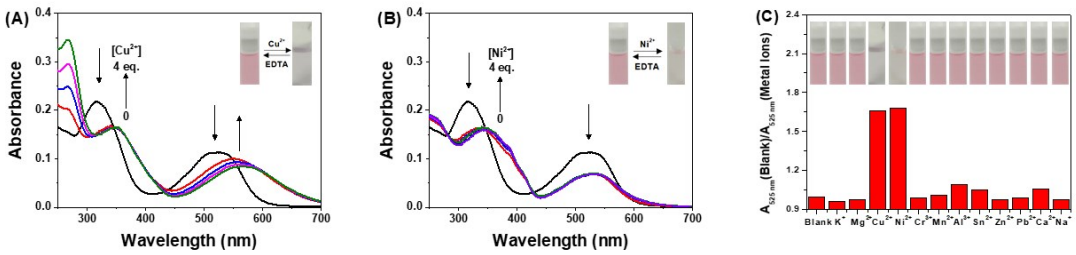


Figure S7. The UV-vis absorption changes of compound **DTEP** (10 μM) in the photostationary state upon the titration of **(A)** Cu^{2+} (0-40 μM) and **(B)** Ni^{2+} (0-40 μM) in MeOH solution at 25 ℃. **(C)** The ratio of absorbance at 525 nm of compound **DTEP** (10 μM) at photostationary state without and with various metal ions (40 μM) in MeOH solution at 25 ℃. Inset: the corresponding photographic images of compound **DTEP** in the photostationary state with various metal ions.

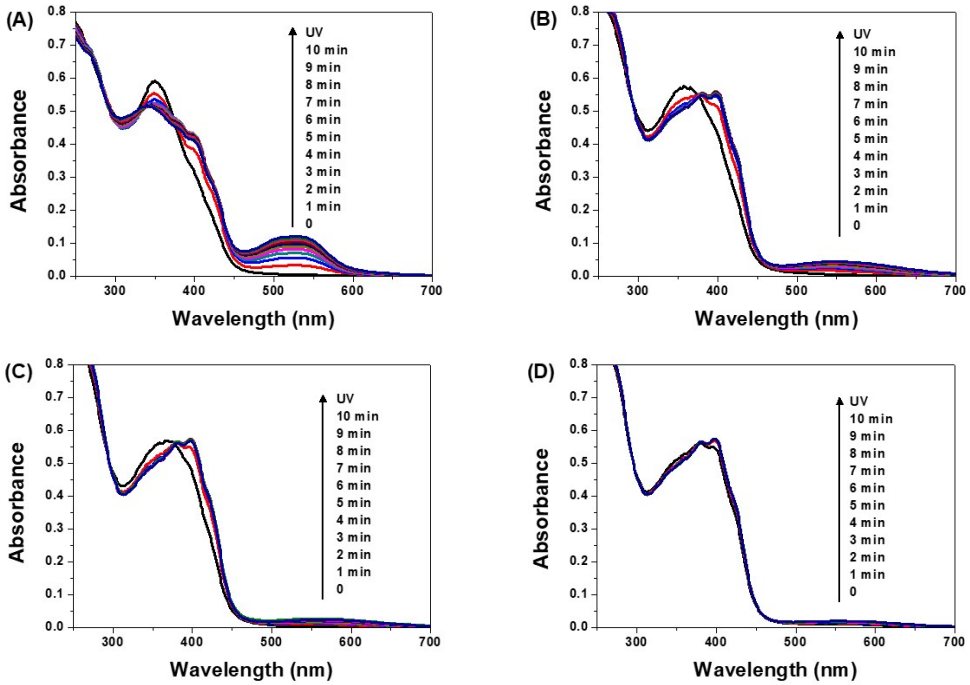


Figure S8. UV-vis absorption spectral changes of compound **DTEP** (10 μM) with different amounts of Cu^{2+} upon irradiation with 365 nm light in MeOH solution at 25 ℃: **(A)** 1 equiv.; **(B)** 2 equiv.; **(C)** 3 equiv. and **(D)** 4 equiv.

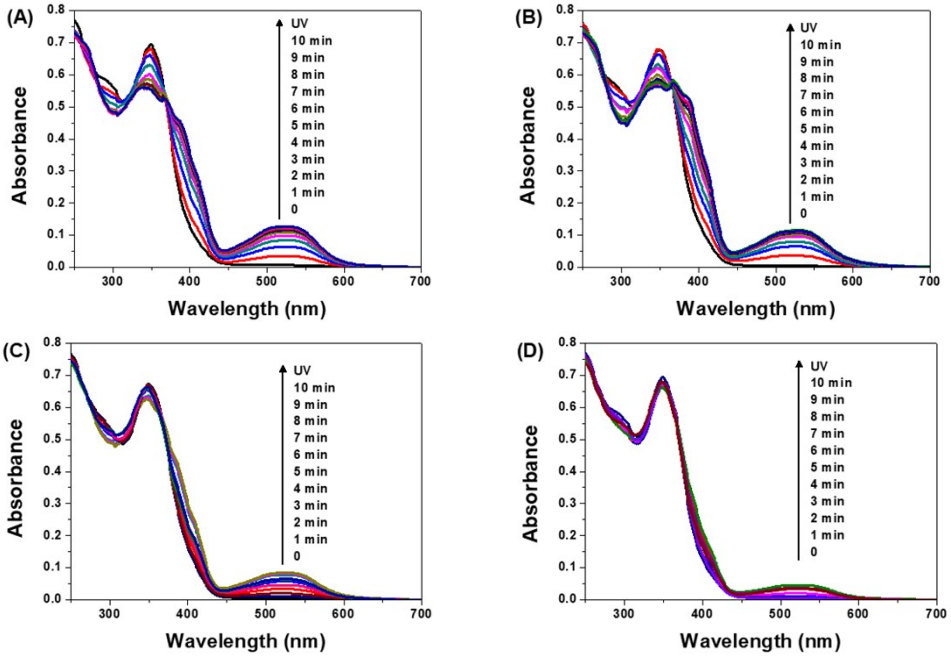


Figure S9. UV-vis absorption spectral changes of compound **DTEP** (10 μM) with different amounts of Ni^{2+} upon irradiation with 365 nm light in MeOH solution at 25 ℃: **(A)** 1 equiv.; **(B)** 2 equiv.; **(C)** 3 equiv. and **(D)** 4 equiv.

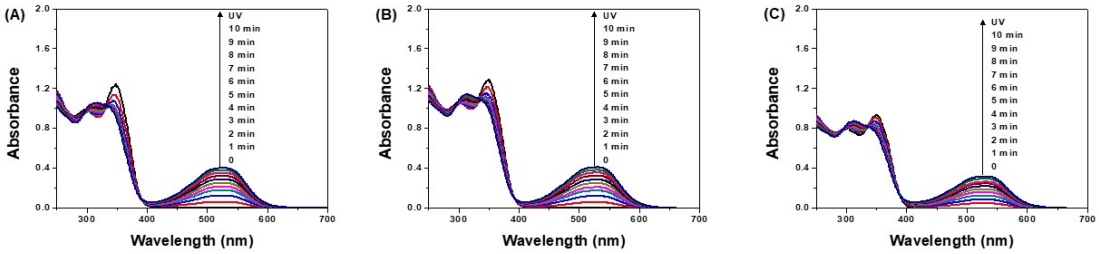


Figure S10. UV-vis absorption spectral changes of compound **DTEP** (10 μM) with different proportion of water upon irradiation with 365 nm light in MeOH-H_2O solution at 25 ℃: **(A)** 9: 1, v/v.; **(B)** 7: 3, v/v and **(C)** 5: 5, v/v.

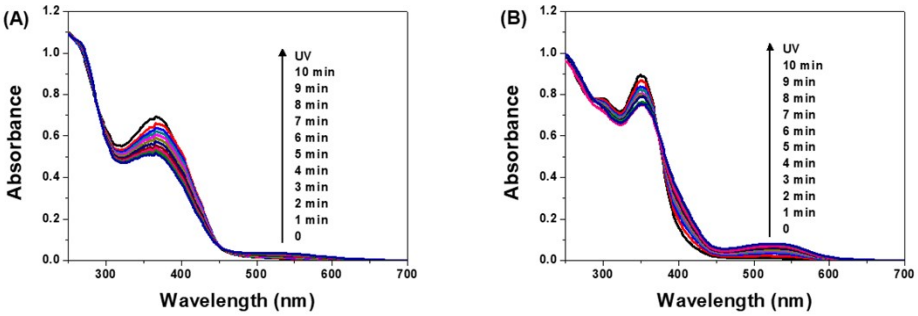


Figure S11. UV-vis absorption spectral changes of compound **DTEP** (10 μM) with **(A)** Cu^{2+} (40 μM) and **(B)** Ni^{2+} (40 μM) upon irradiation with 365 nm light in MeOH-H_2O (5: 5, v/v) solution at 25 ℃.

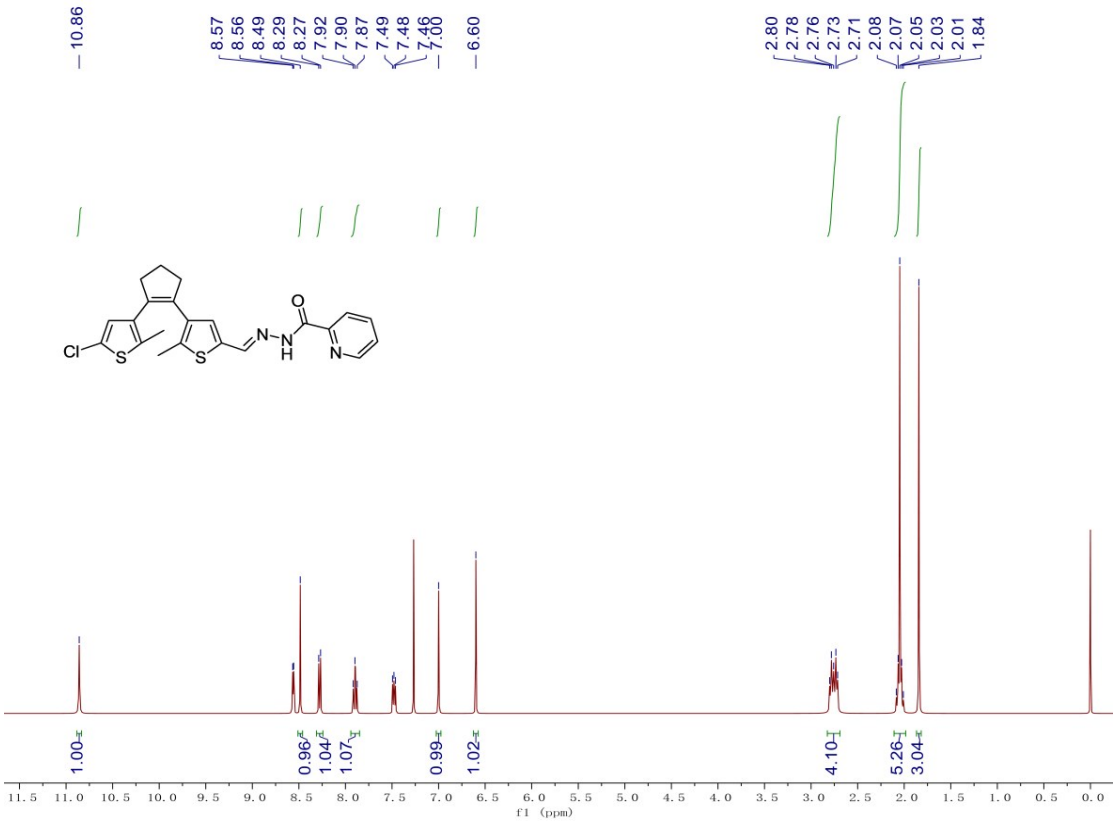


Figure S12. ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of compound **DTEP**.

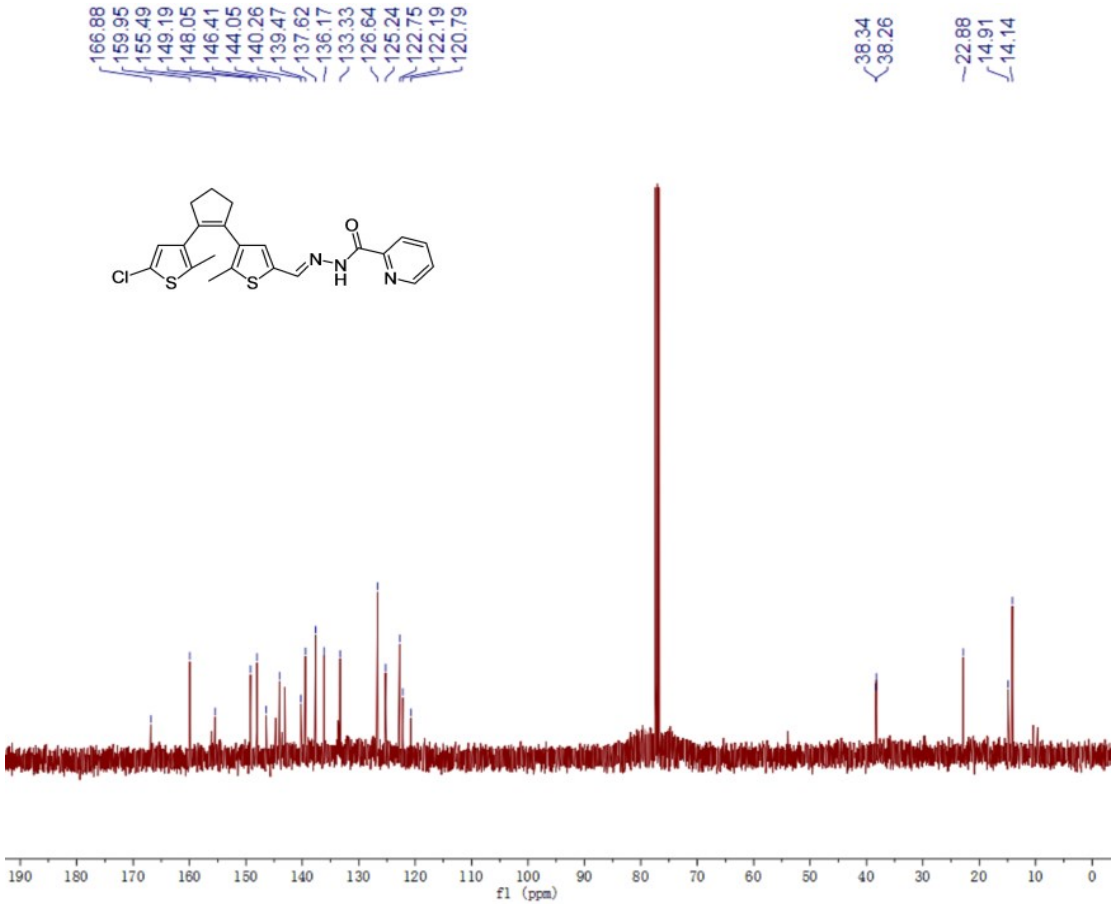


Figure S13. ^{13}C NMR ($CDCl_3$, 100 MHz) spectrum of compound **DTEP**.

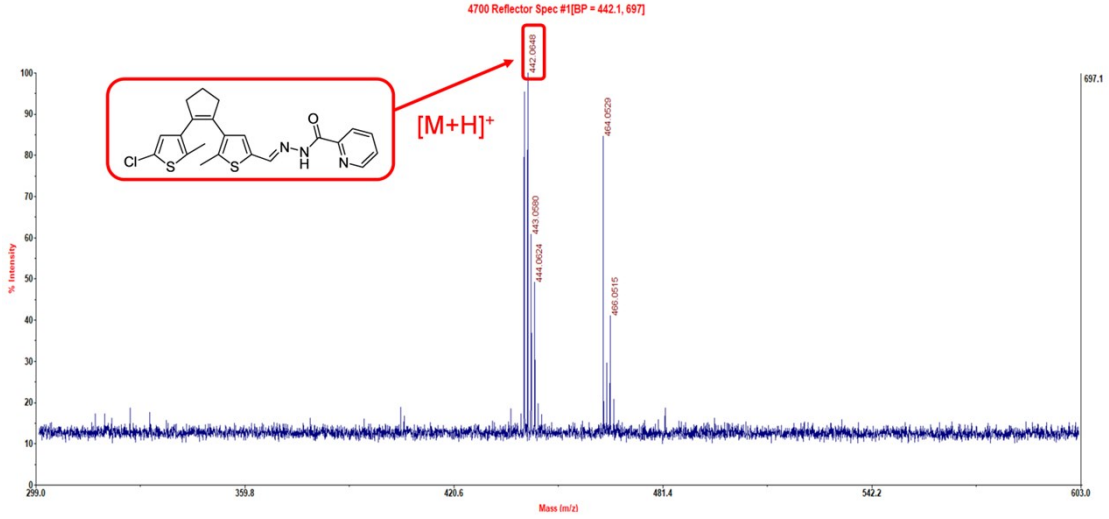


Figure S14. MS (MALDI-TOF) of compound **DTEP**.