

Supporting Information

Transition-metal-free Radical Difluorobenzylation/Cyclization of Unactivated Alkenes: Access to ArCF₂-Substituted Ring-Fused Quinazolinones

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1. Screening the reaction conditions

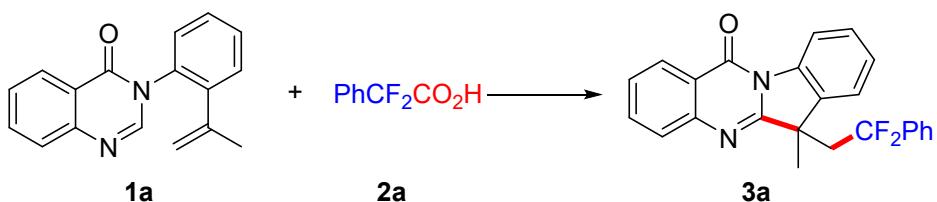


Table S1 Screening the molar ratio of **1a** with **2a**^a

Entry	The molar ratio of 1a and 2a	Yields (%) ^b
1	1:0.8	42
2	1:1.0	68
3	1:1.2	85
4	1:1.5	85
5	1:2.0	85

^a Reaction conditions: 3-(2-(prop-1-en-2-yl)phenyl)quinazolin-4(3*H*)-one **1a** (0.2 mmol, 52.4 mg), 2,2-difluoro-2-phenylacetic acid **2a**, and (NH₄)₂S₂O₈ (0.4 mmol, 91.2 mg) in DMSO (2.0 mL) at 60 °C for 2 h. ^b Isolated yield.

2. Copies of spectra of products

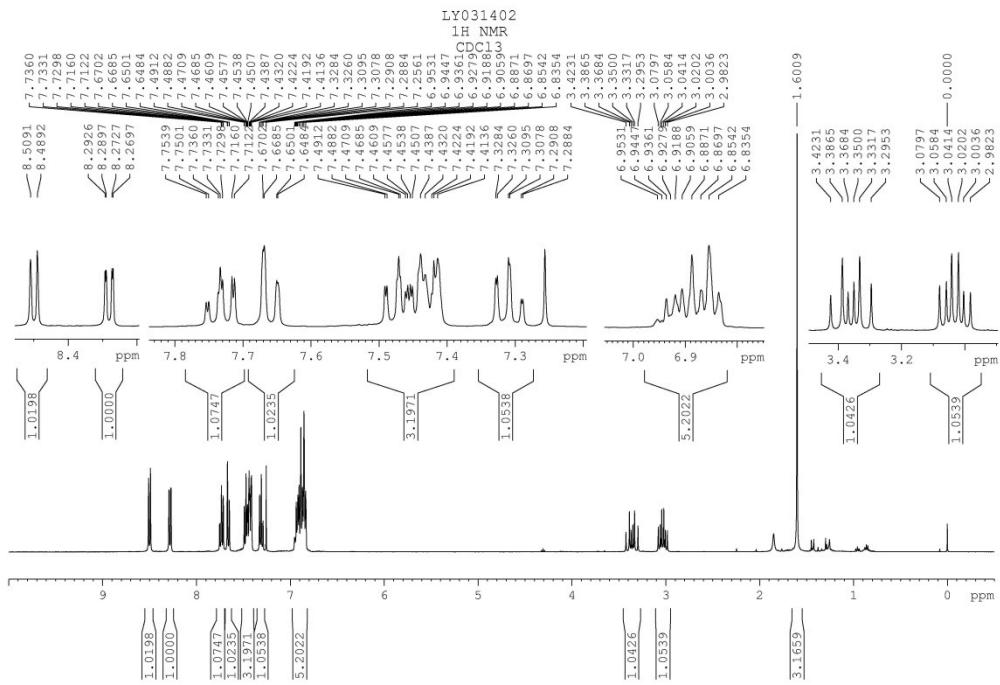


Fig. S1 ^1H NMR spectrum of compound **3a**

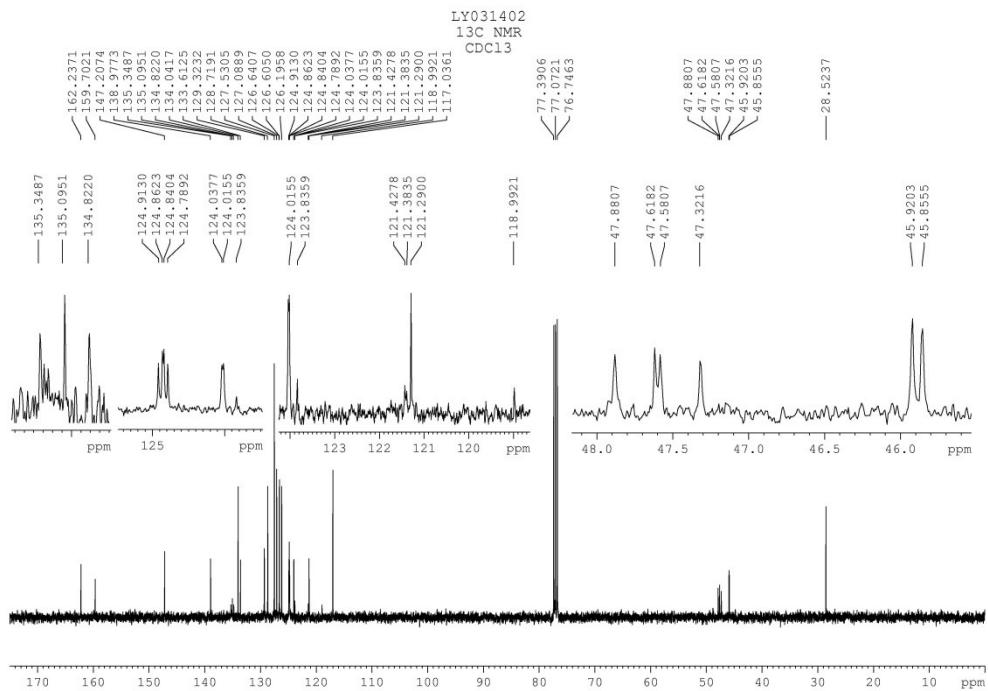


Fig. S2 ^{13}C NMR spectrum of compound **3a**

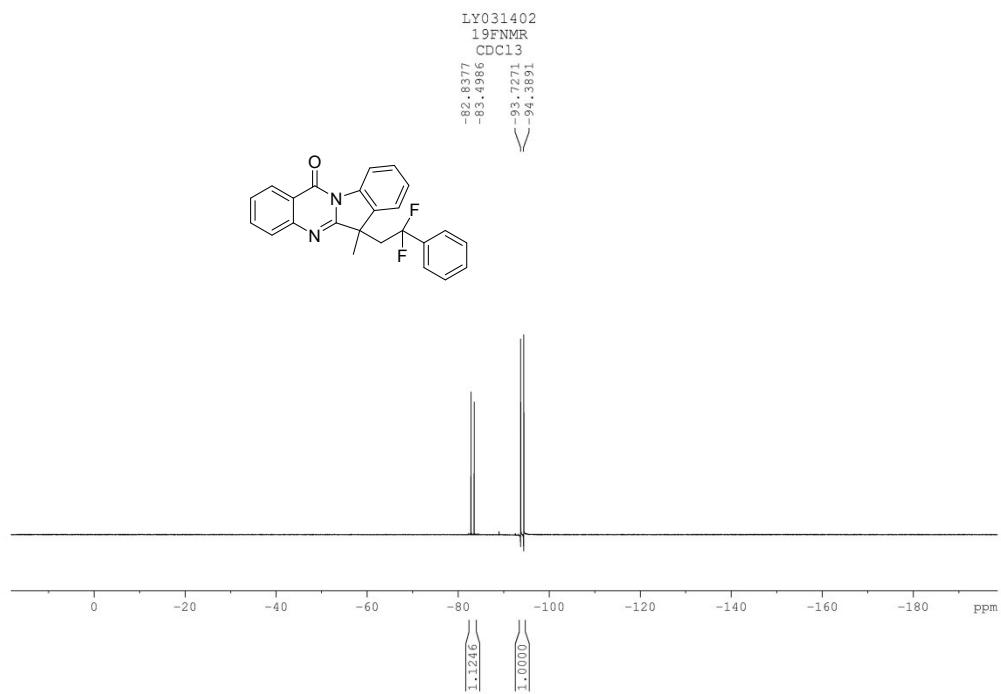


Fig. S3 ¹⁹F NMR spectrum of compound **3a**

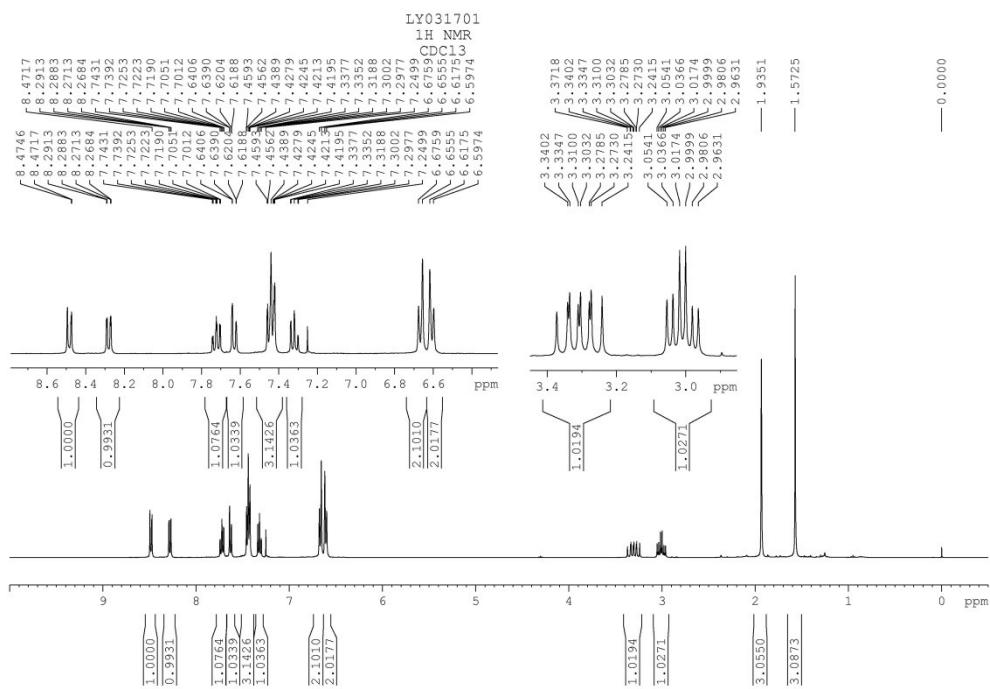


Fig. S4 ¹H NMR spectrum of compound **3b**

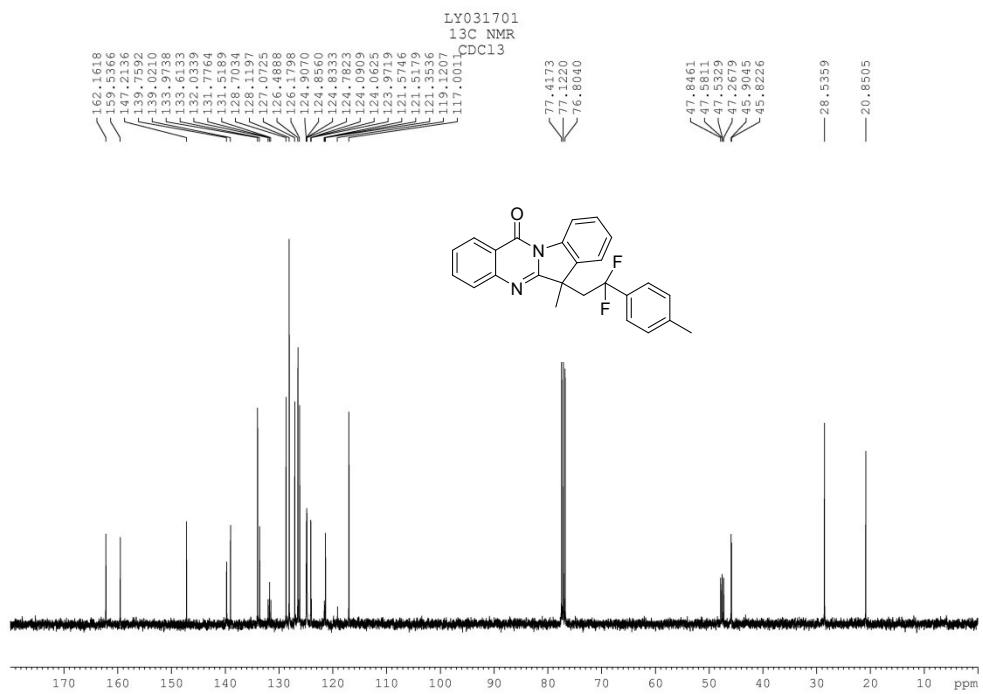


Fig. S5 ^{13}C NMR spectrum of compound **3b**

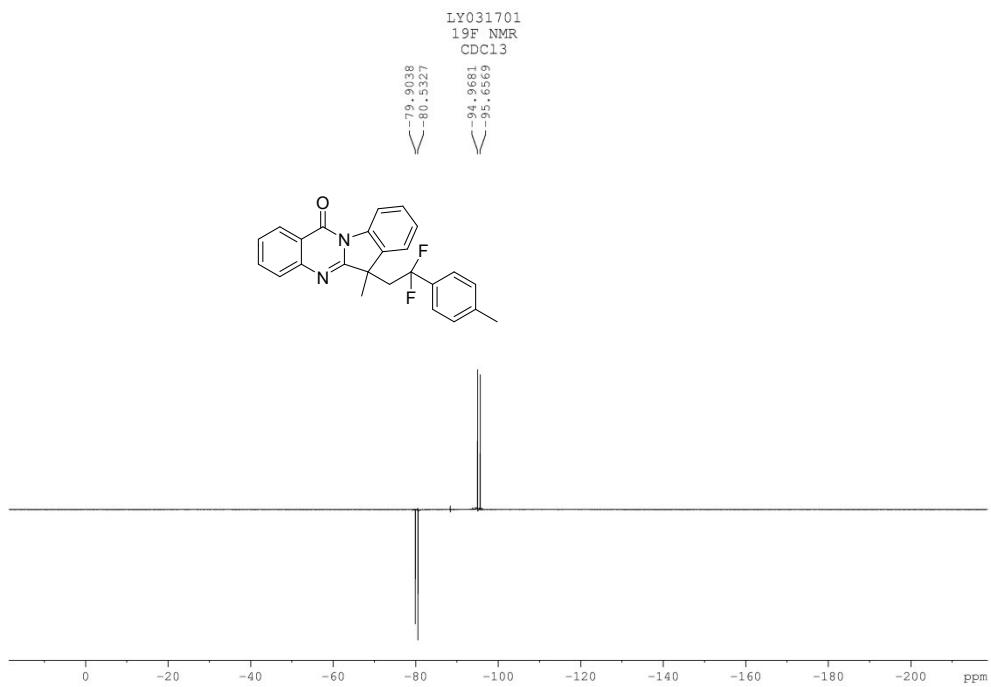


Fig. S6 ^{19}F NMR spectrum of compound **3b**

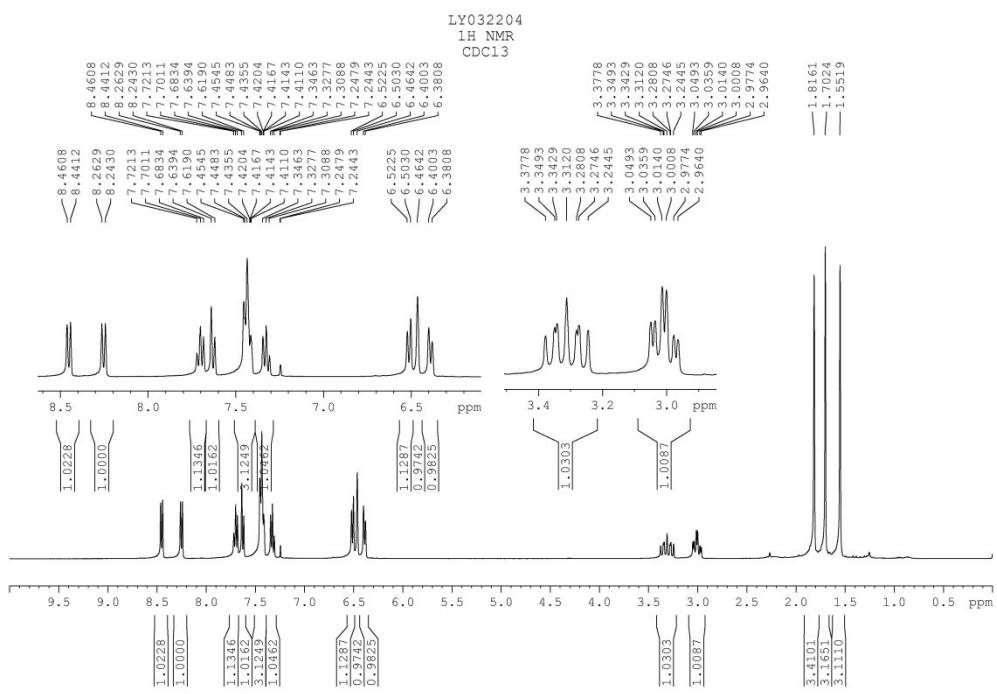


Fig. S7 ¹H NMR spectrum of compound 3c

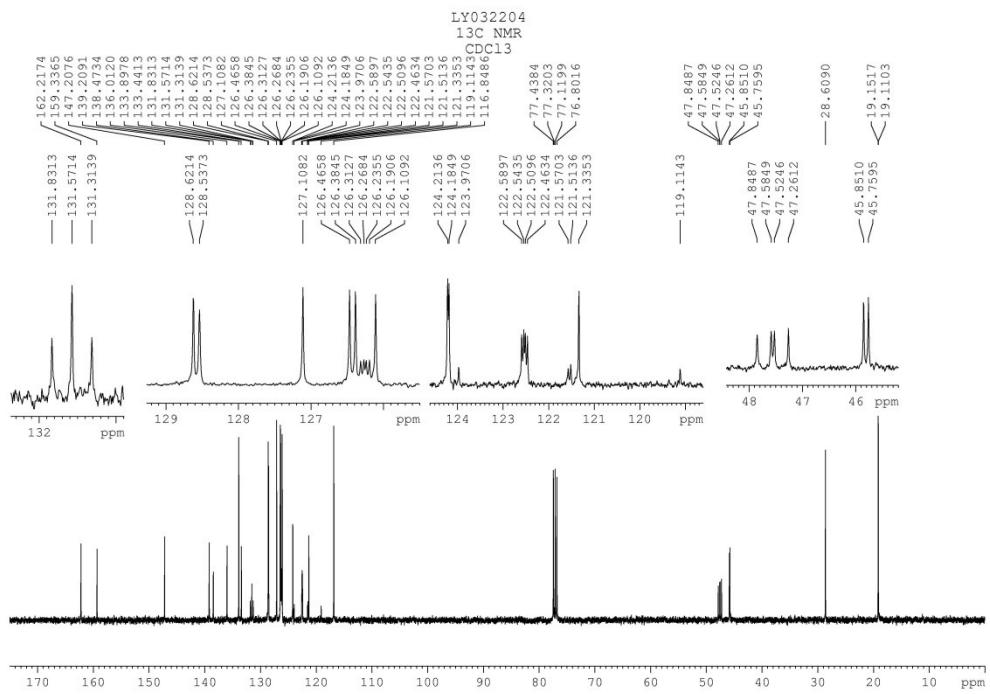


Fig. S8 ¹³C NMR spectrum of compound 3c

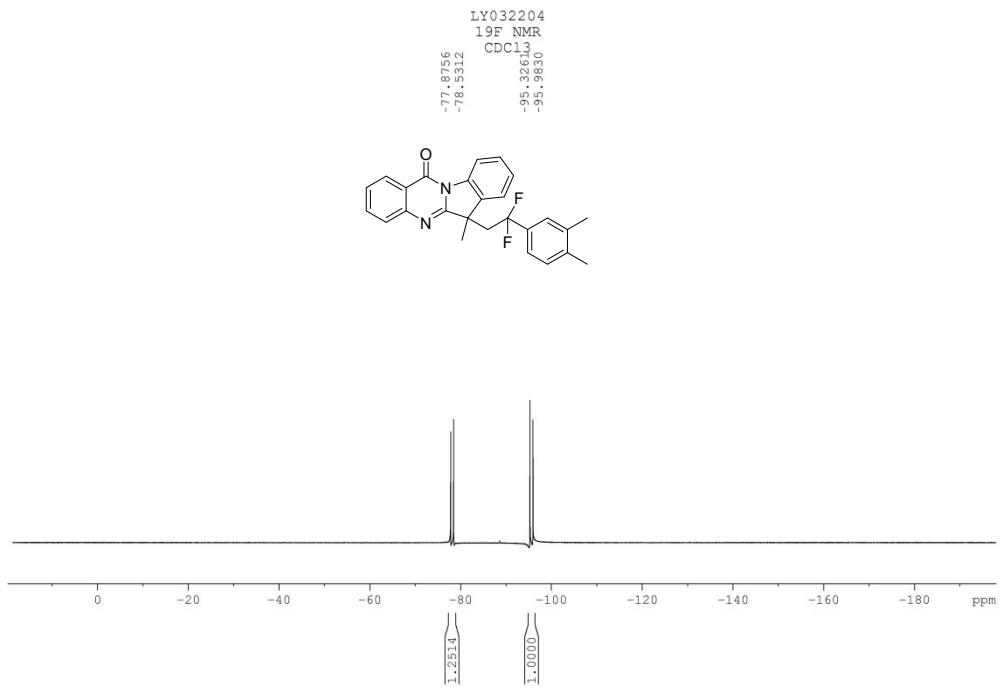


Fig. S9 ¹⁹F NMR spectrum of compound **3c**

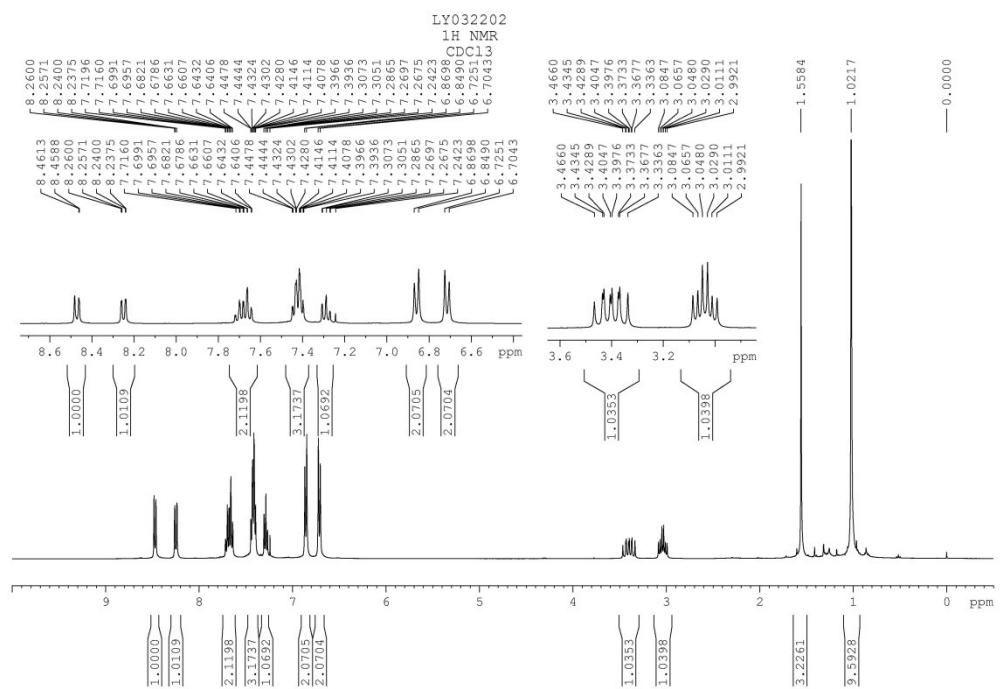


Fig. S10 ¹H NMR spectrum of compound **3d**

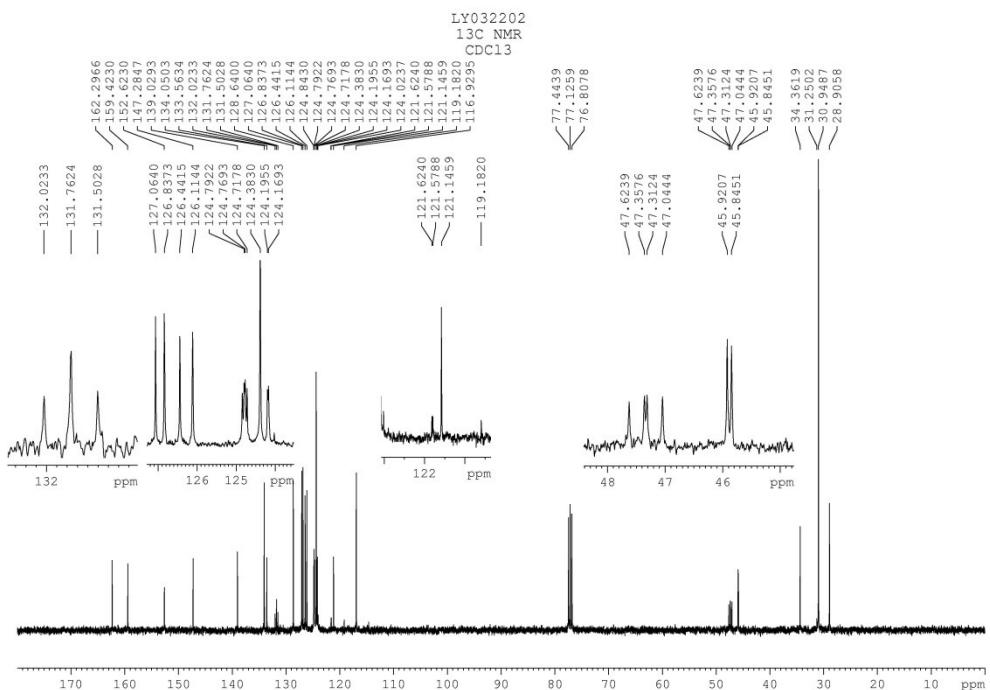


Fig. S11 ^{13}C NMR spectrum of compound **3d**

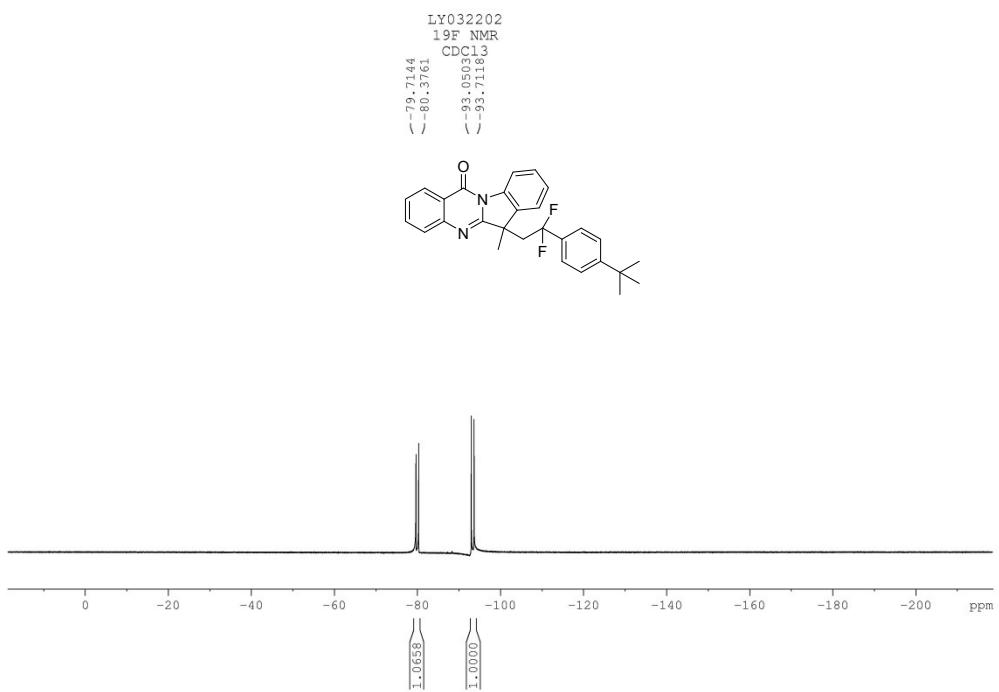
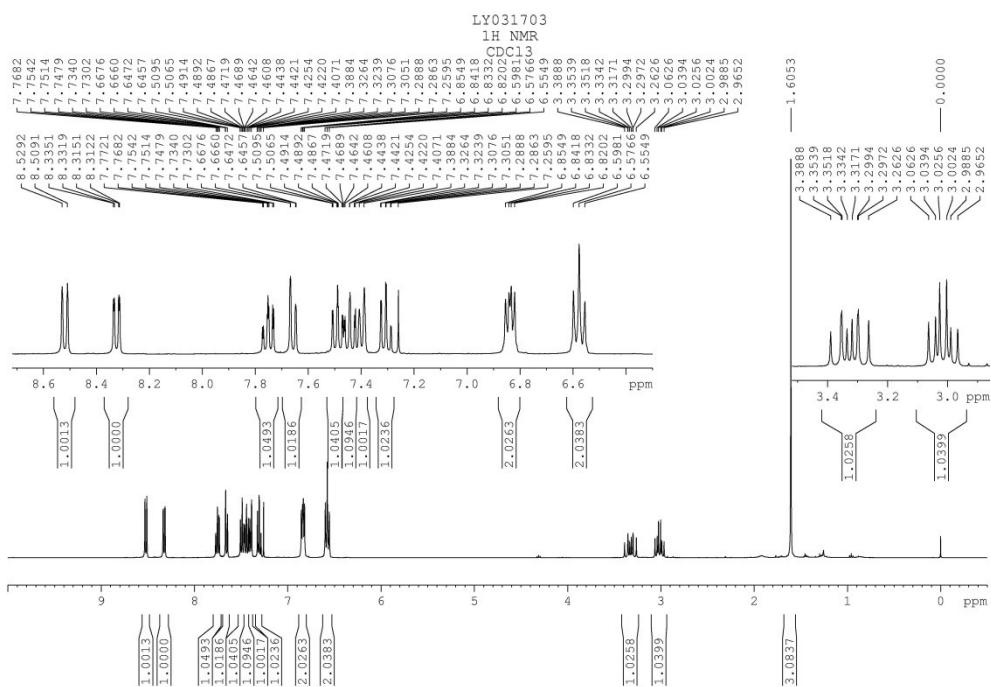


Fig. S12 ^{19}F NMR spectrum of compound **3d**



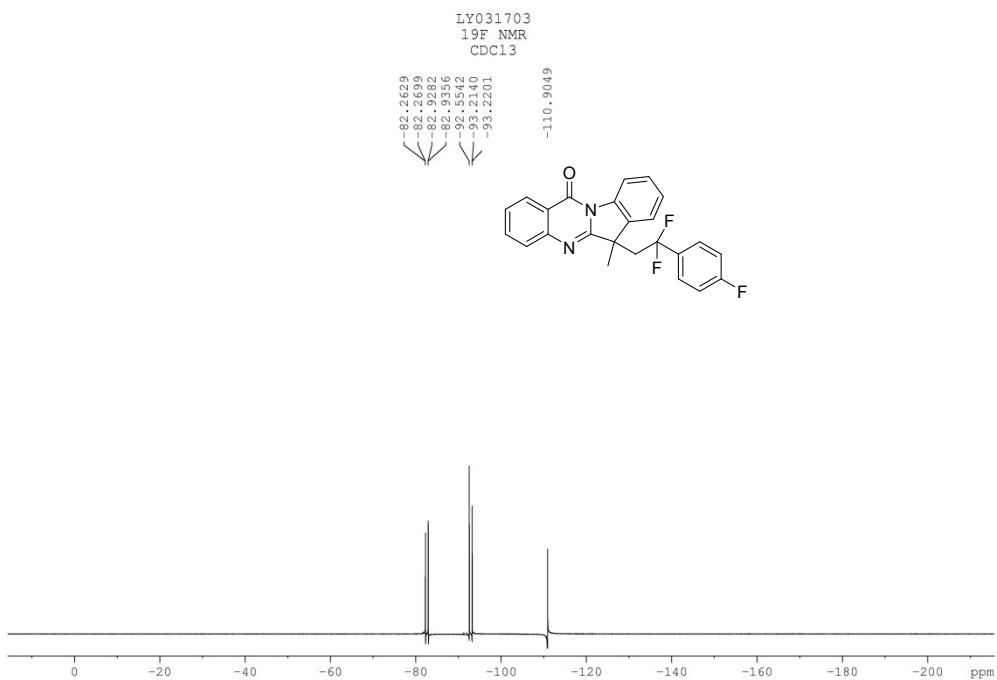


Fig. S15 ¹⁹F NMR spectrum of compound 3e

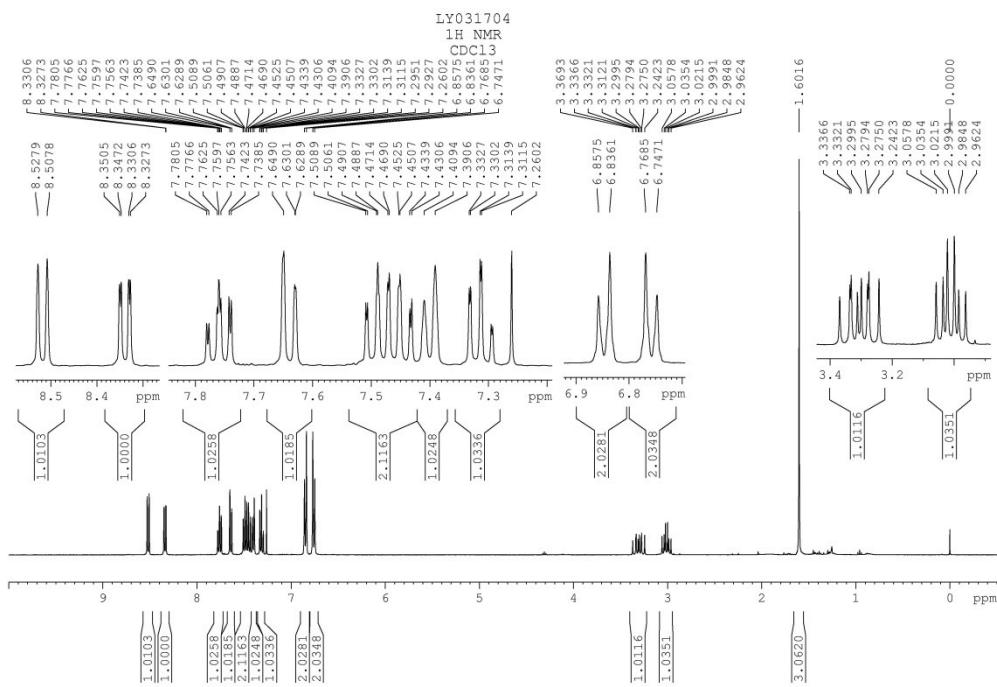


Fig. S16 ¹H NMR spectrum of compound 3f

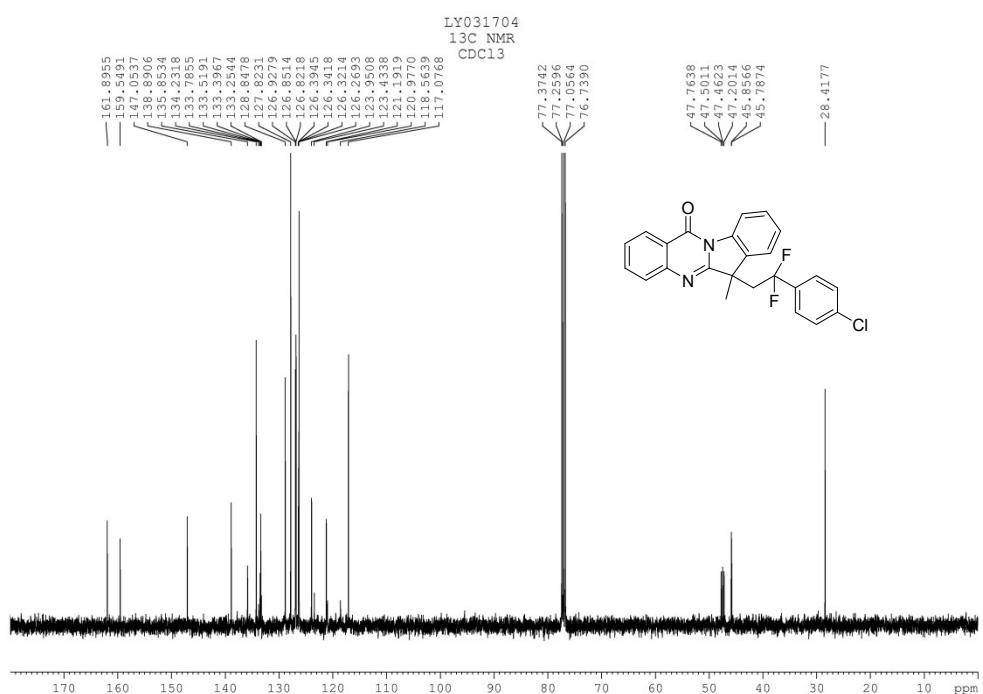


Fig. S17 ¹³C NMR spectrum of compound **3f**

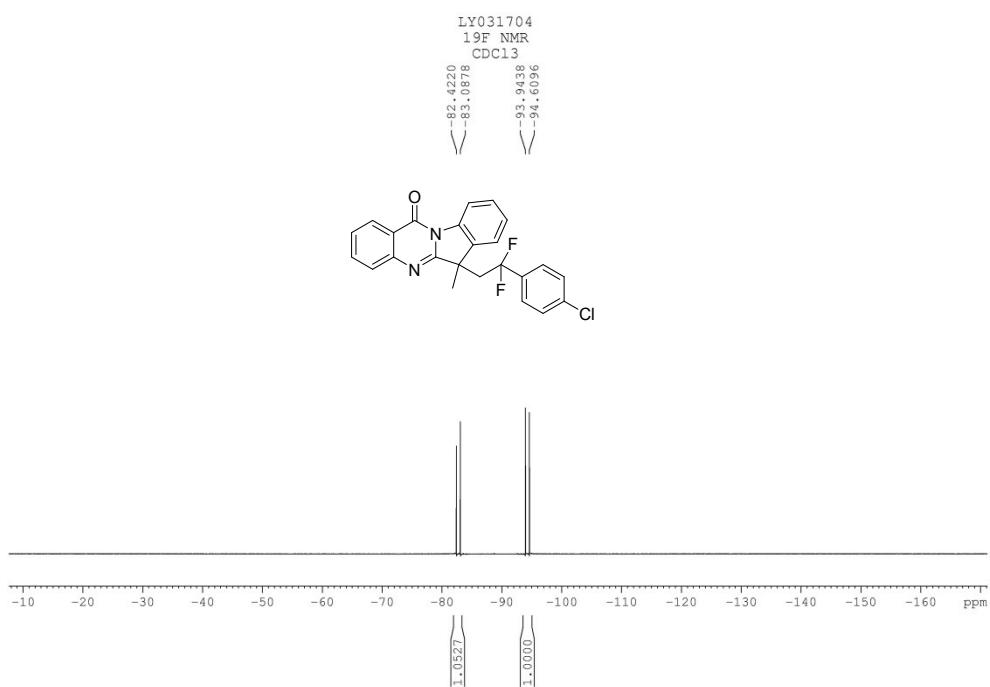


Fig. S18 ¹⁹F NMR spectrum of compound **3f**

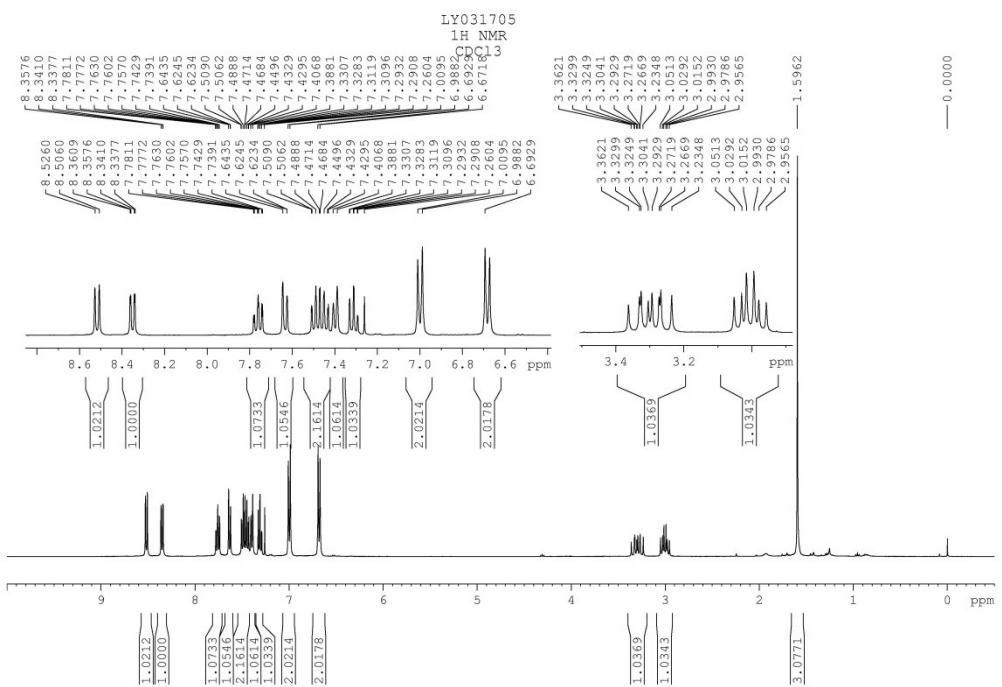


Fig. S19 ¹H NMR spectrum of compound **3g**

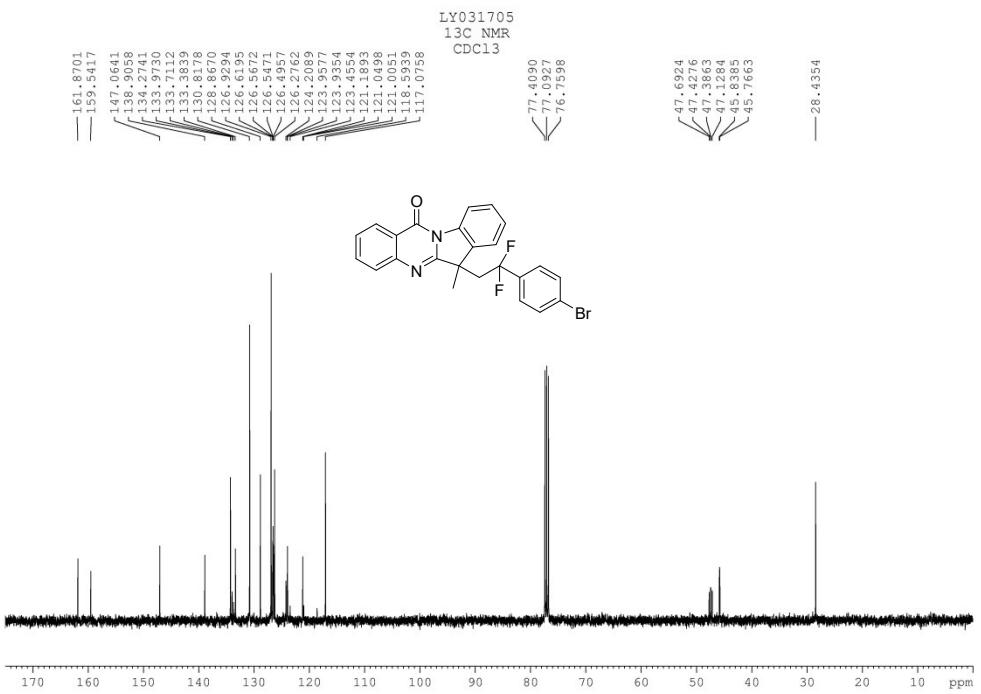


Fig. S20 ¹³C NMR spectrum of compound **3g**

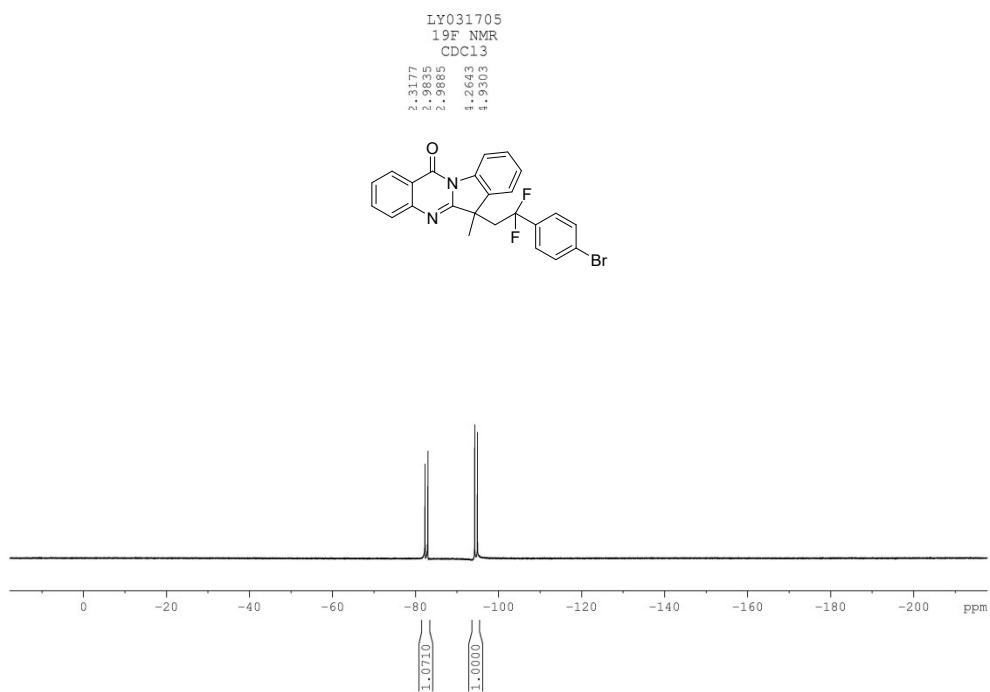


Fig. S21 ¹⁹F NMR spectrum of compound **3g**

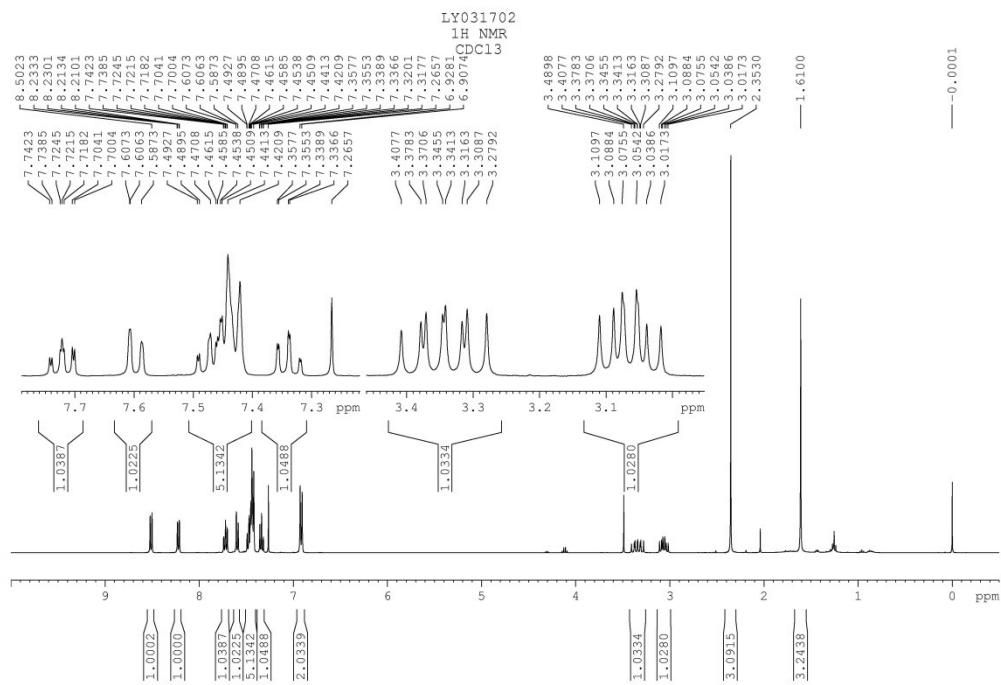


Fig. S22 ¹H NMR spectrum of compound **3h**

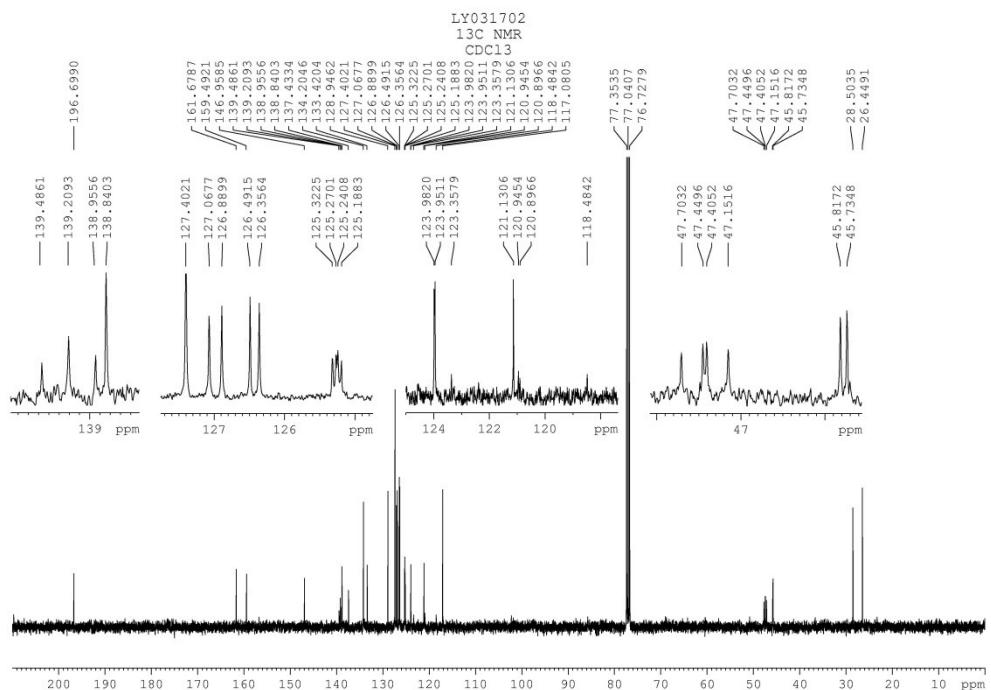


Fig. S23 ¹³C NMR spectrum of compound **3h**

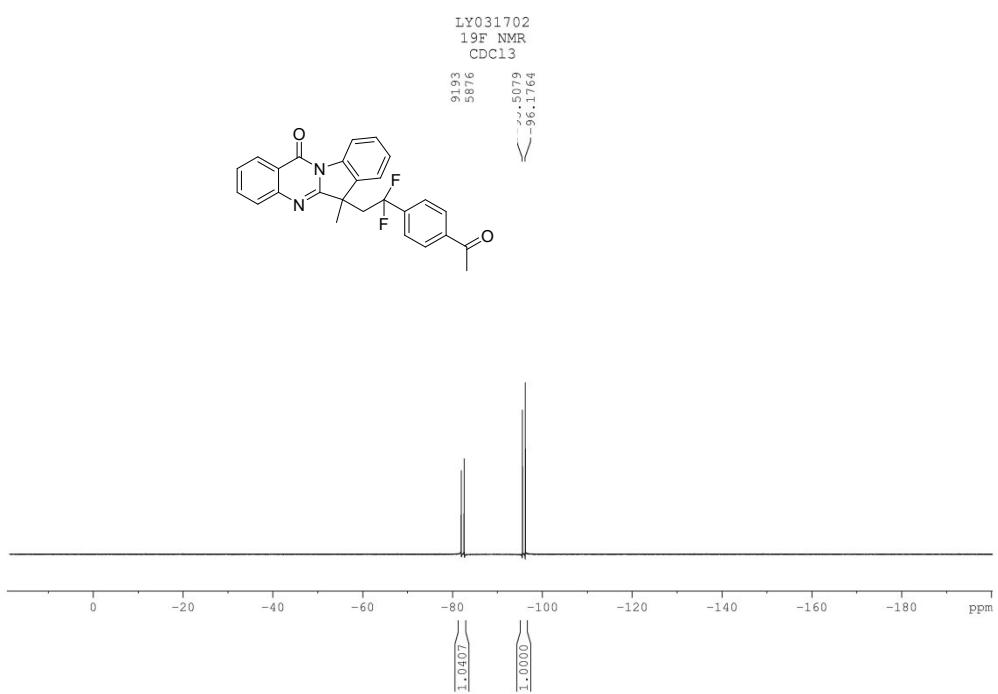


Fig. S24 ¹⁹F NMR spectrum of compound **3h**

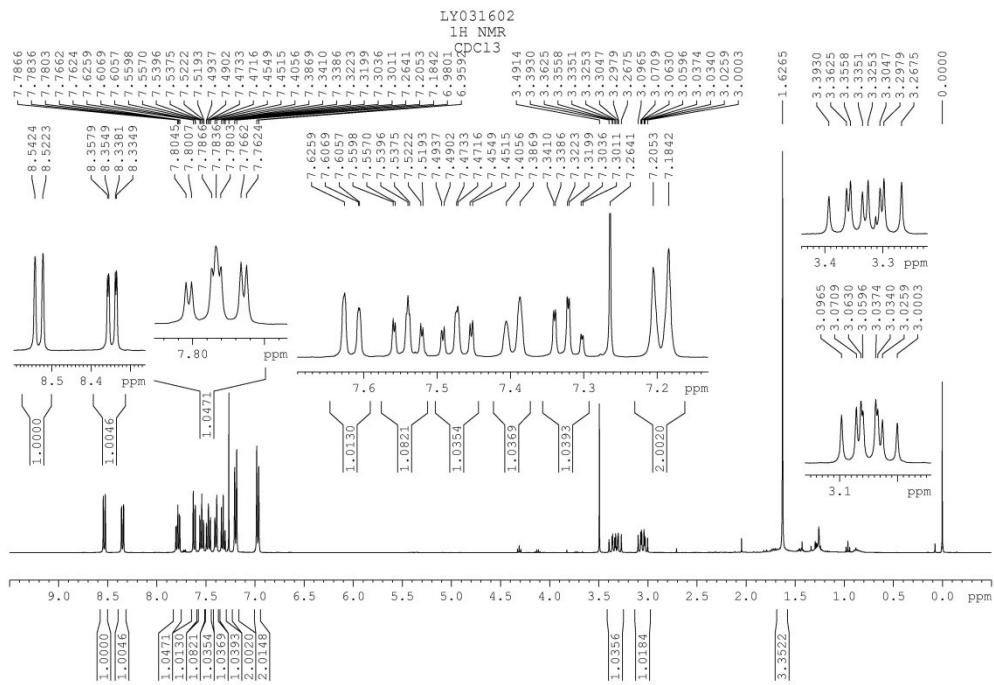


Fig. S25 ¹H NMR spectrum of compound 3i

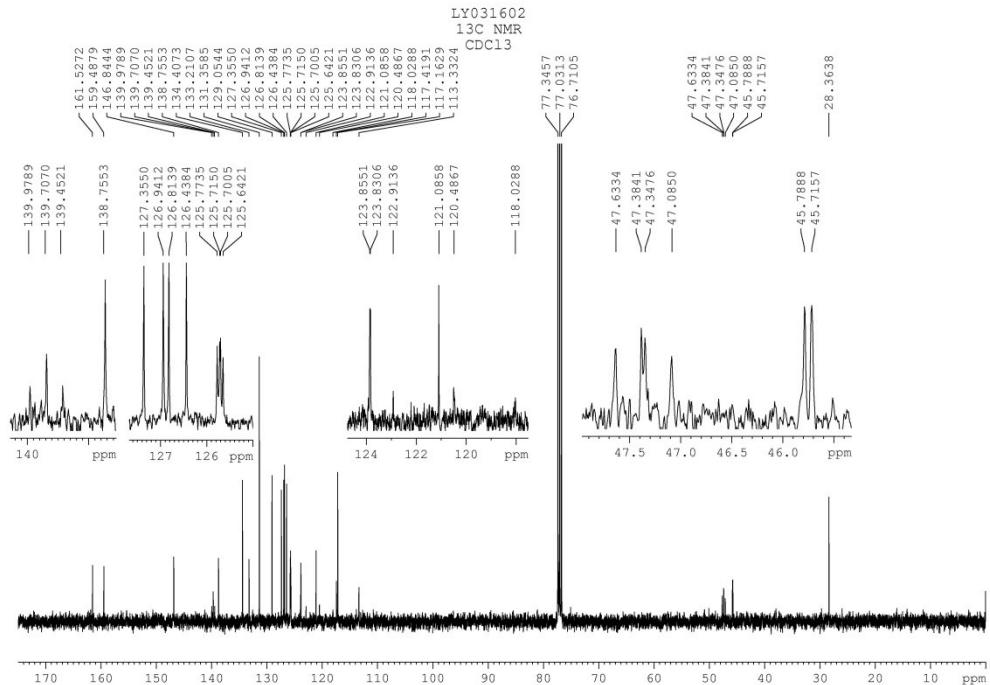


Fig. S26 ¹³C NMR spectrum of compound 3i

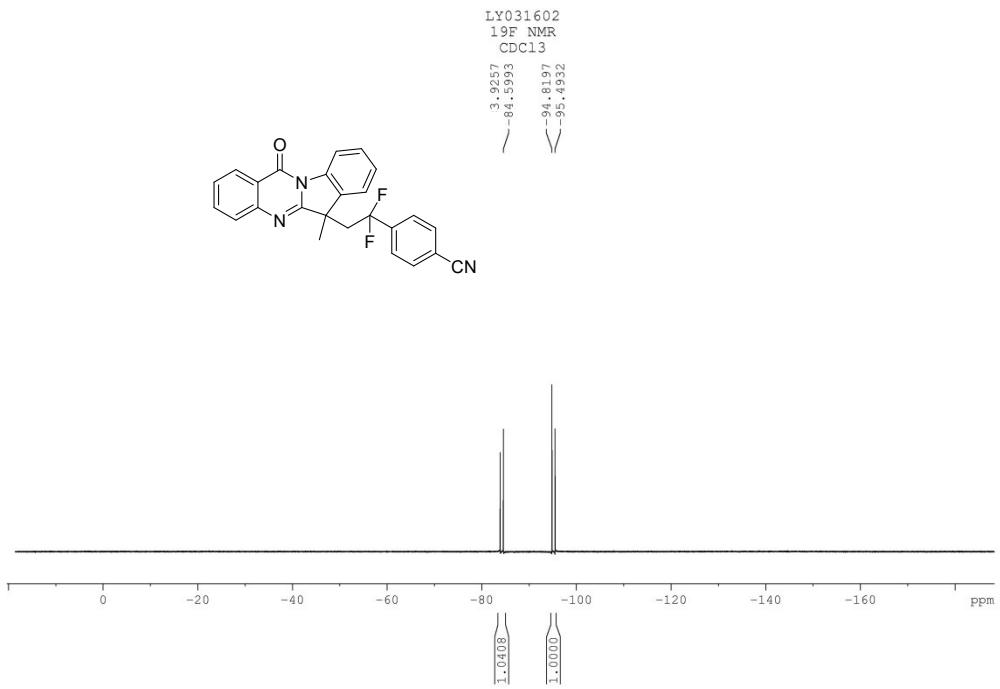


Fig. S27 ¹⁹F NMR spectrum of compound **3i**

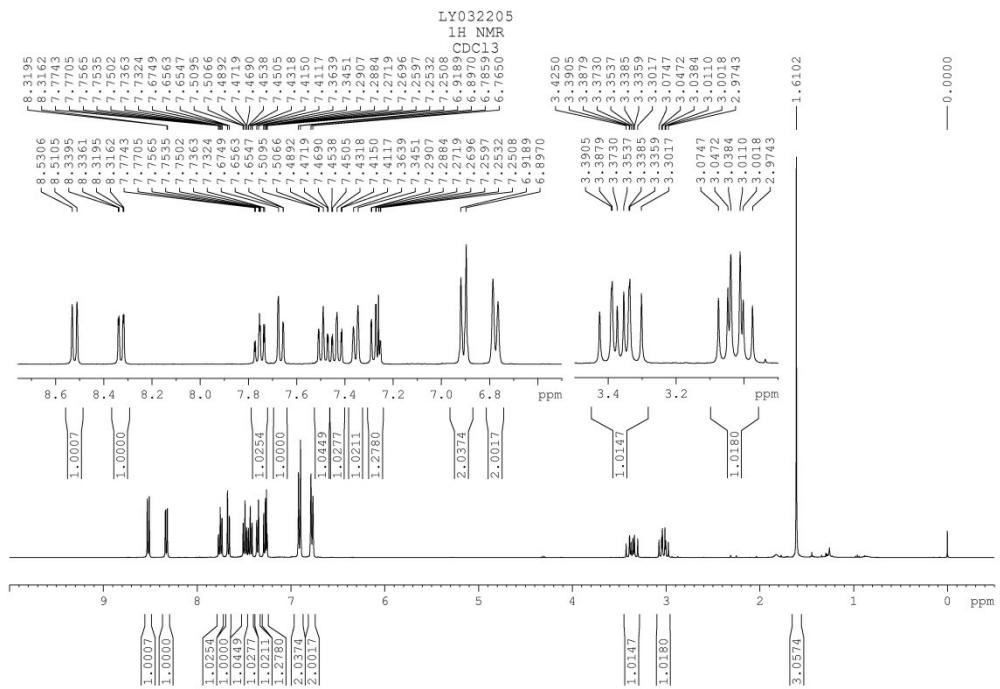


Fig. S28 ¹H NMR spectrum of compound **3j**

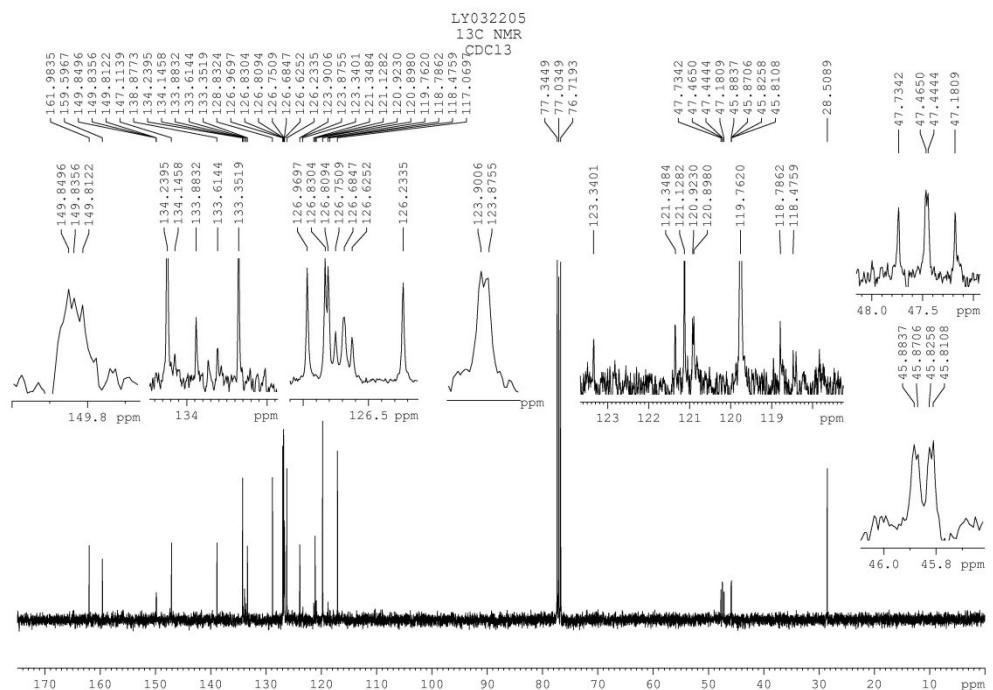


Fig. S29 ^{13}C NMR spectrum of compound **3j**

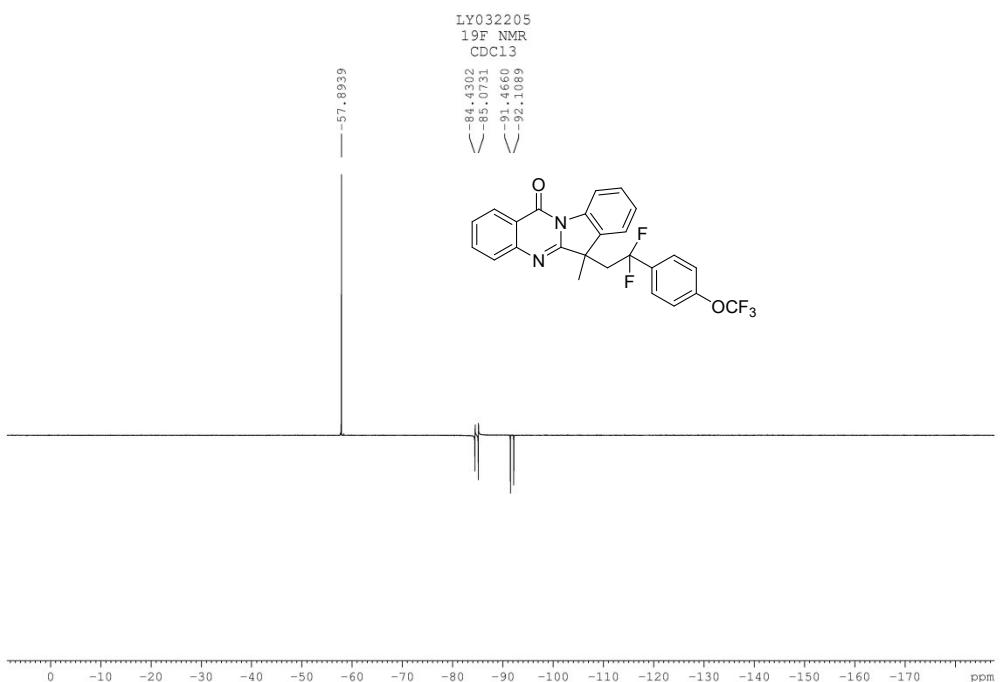


Fig. S30 ^{19}F NMR spectrum of compound **3j**

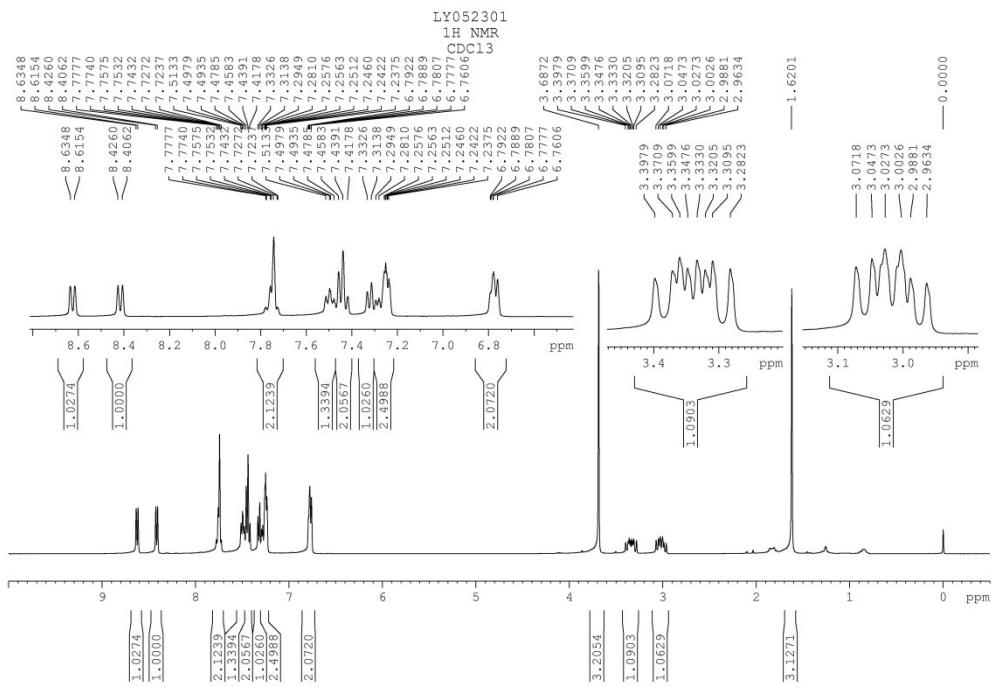


Fig. S31 ¹H NMR spectrum of compound 3k

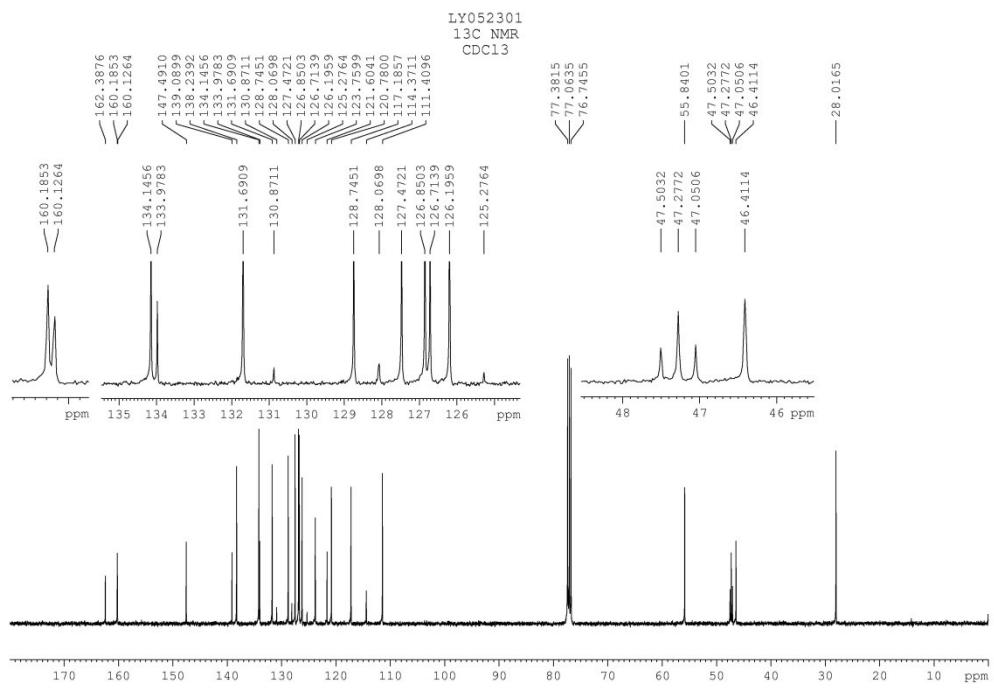


Fig. S32 ¹³C NMR spectrum of compound 3k

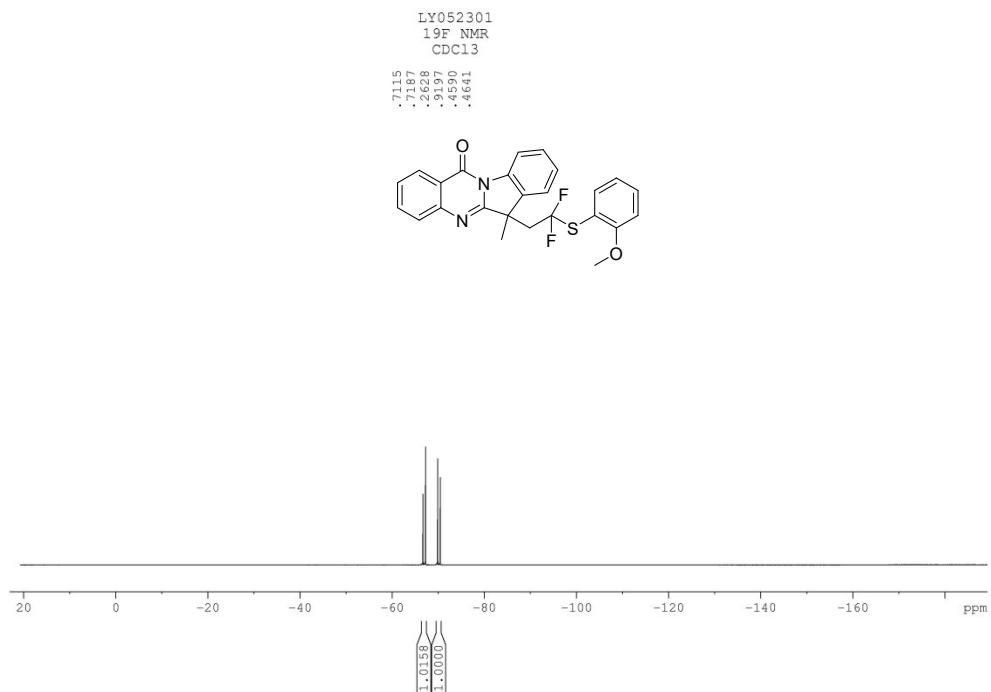


Fig. S33 ¹⁹F NMR spectrum of compound **3k**

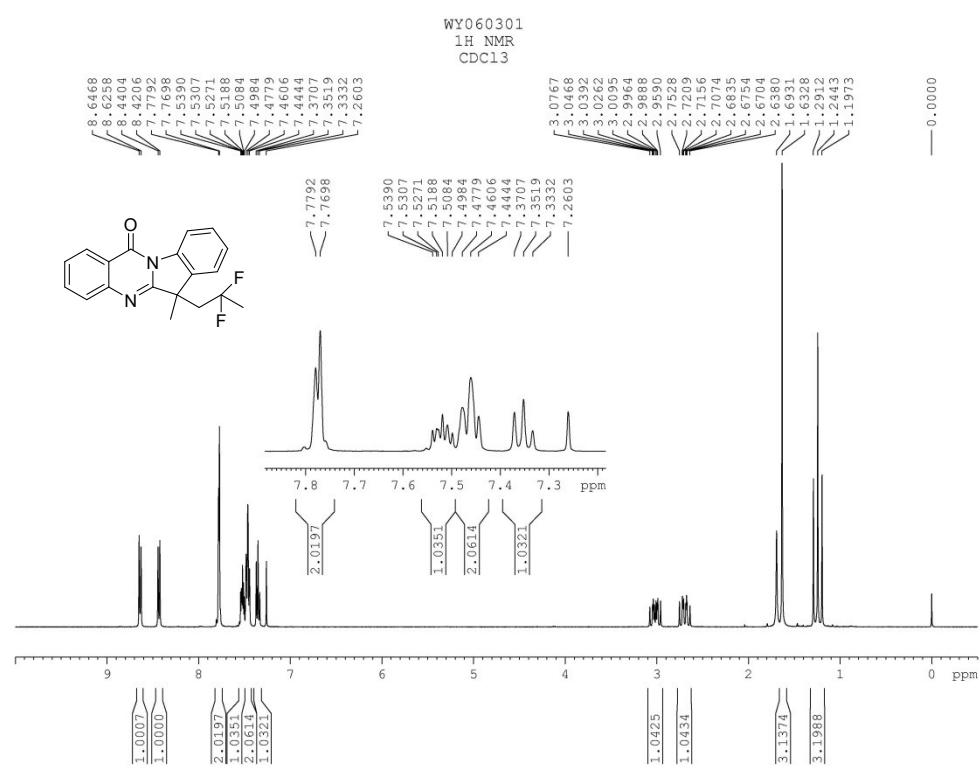


Fig. S34 ^1H NMR spectrum of compound **3I**

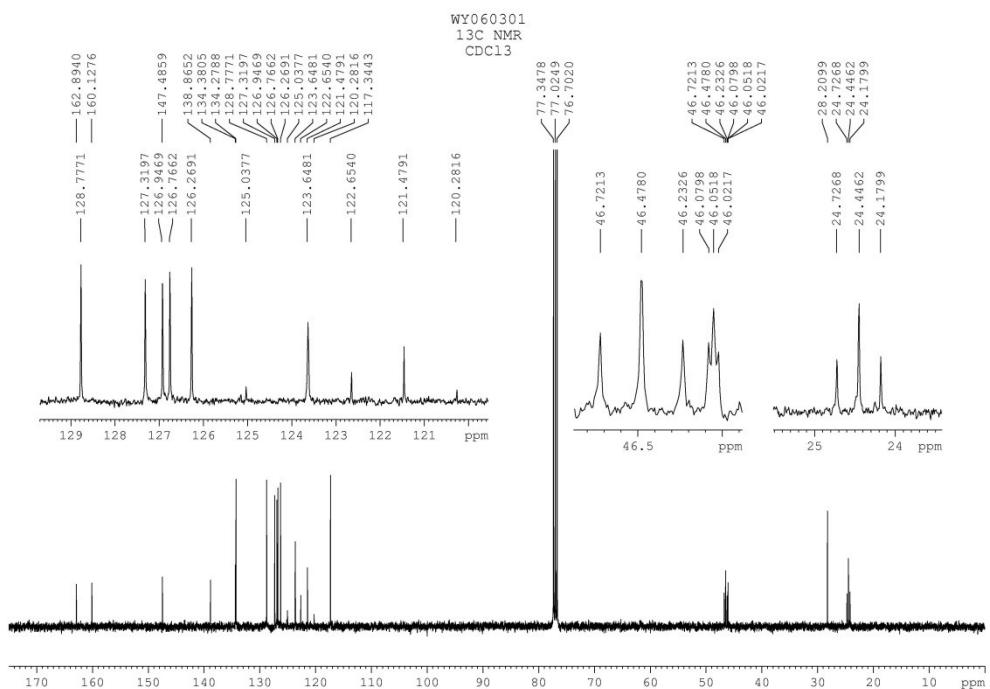


Fig. S35 ^{13}C NMR spectrum of compound **3I**

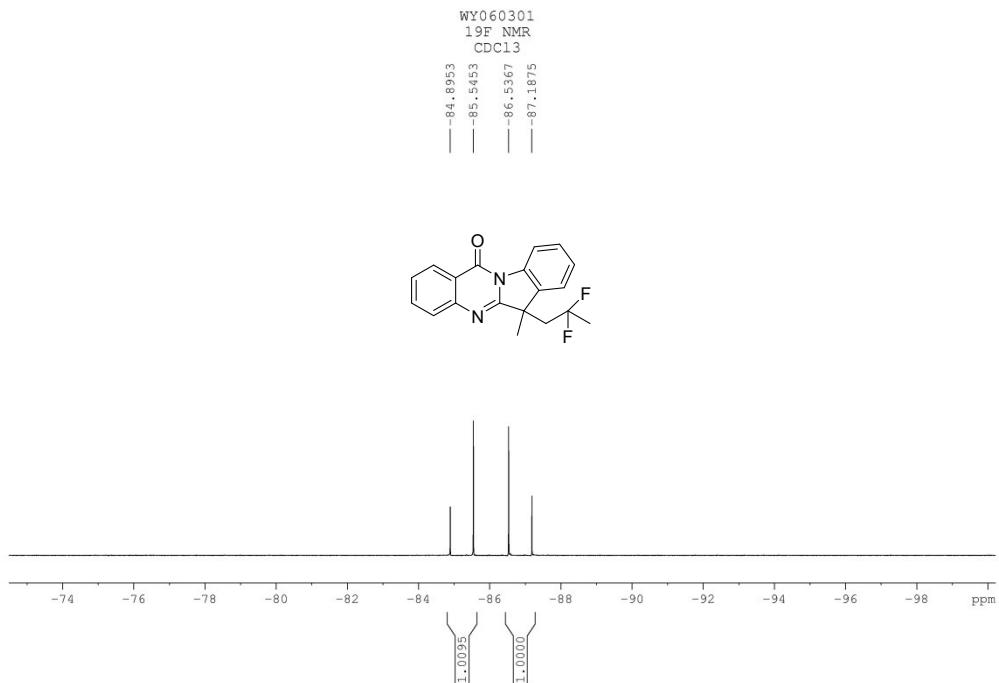
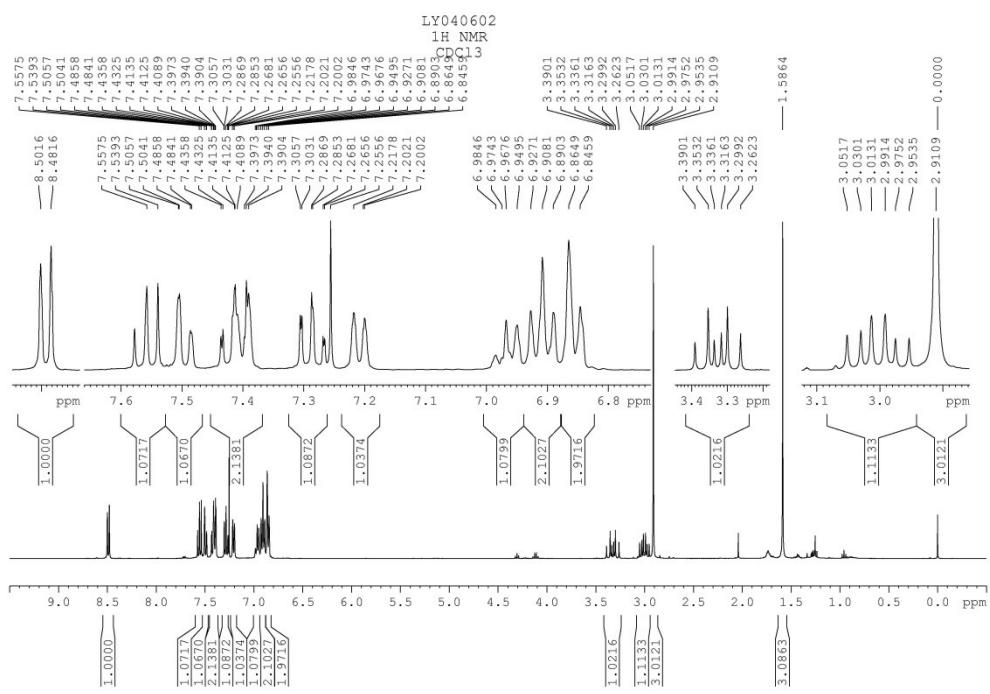


Fig. S36 ^{19}F NMR spectrum of compound **3I**



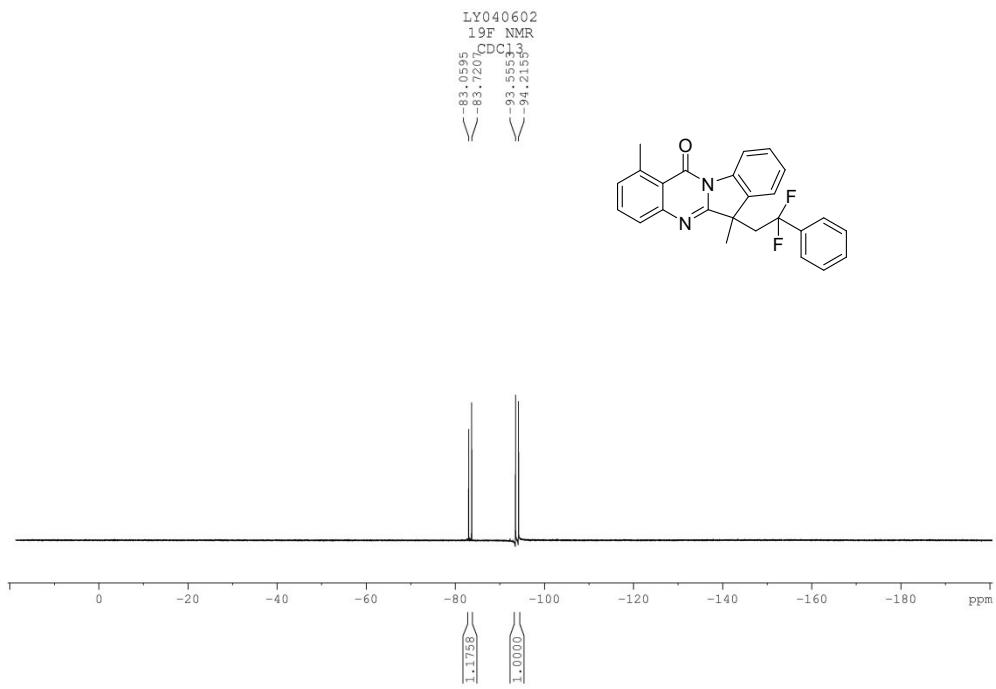


Fig. S39 ^{19}F NMR spectrum of compound **3m**

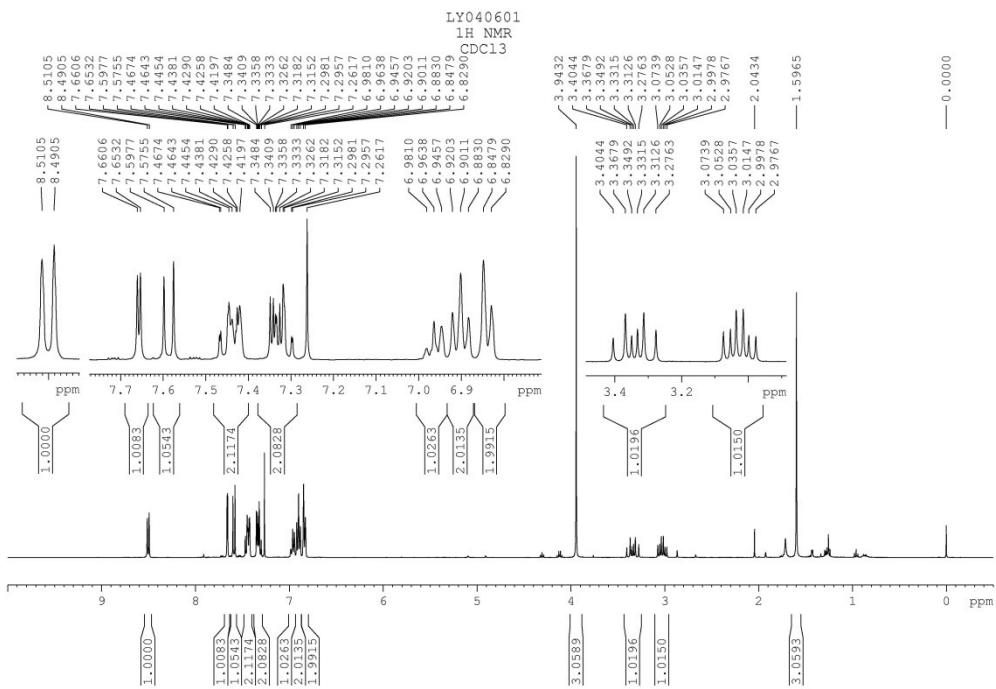


Fig. S40 ^1H NMR spectrum of compound **3n**

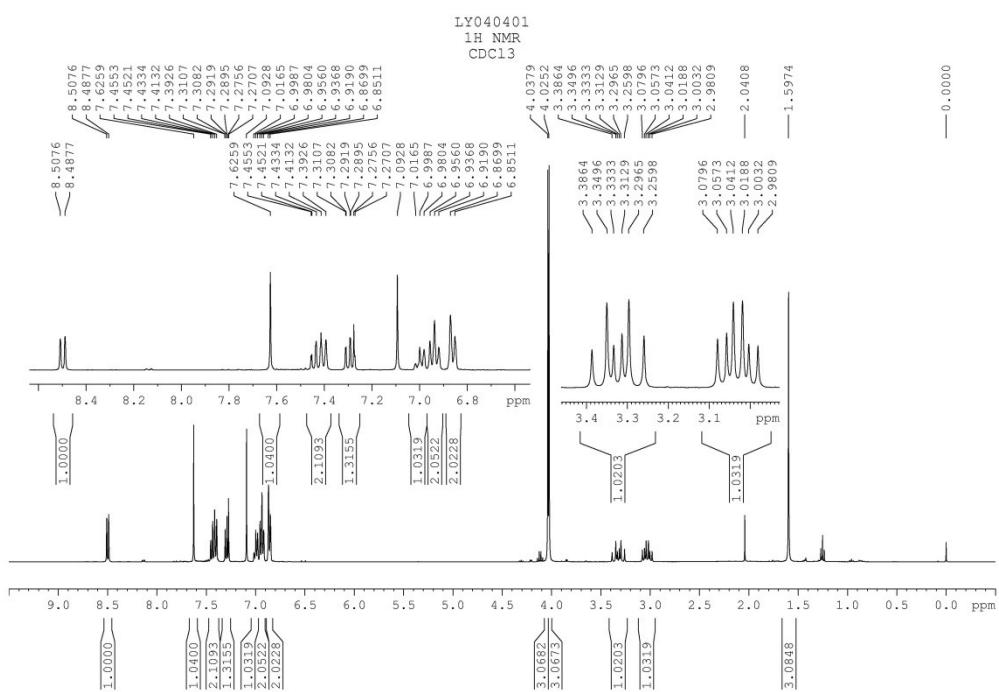


Fig. S43 ¹H NMR spectrum of compound 3o

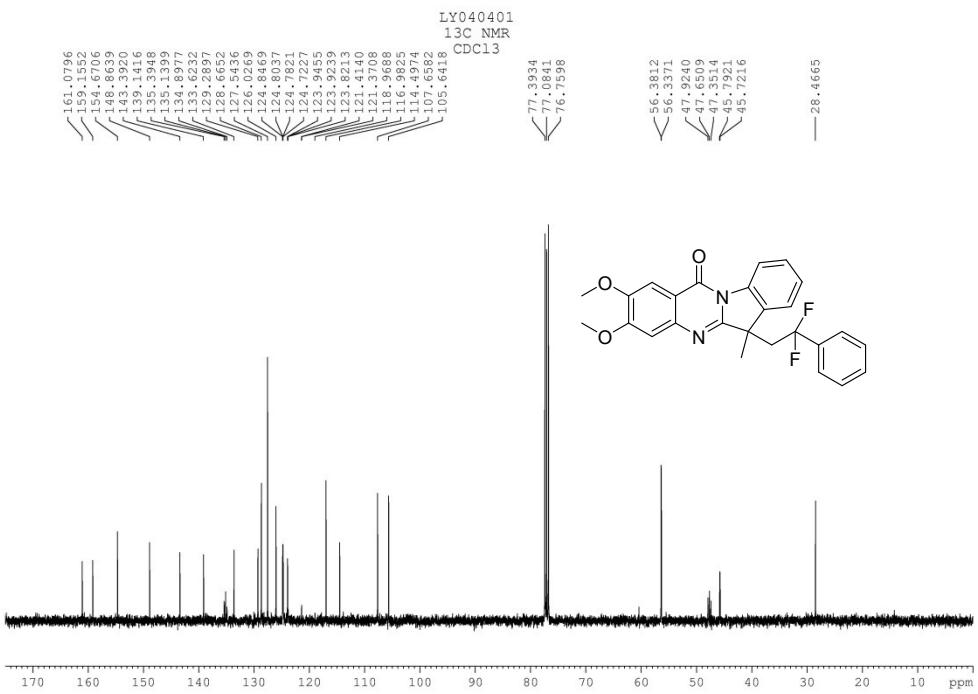


Fig. S44 ¹³C NMR spectrum of compound 3o

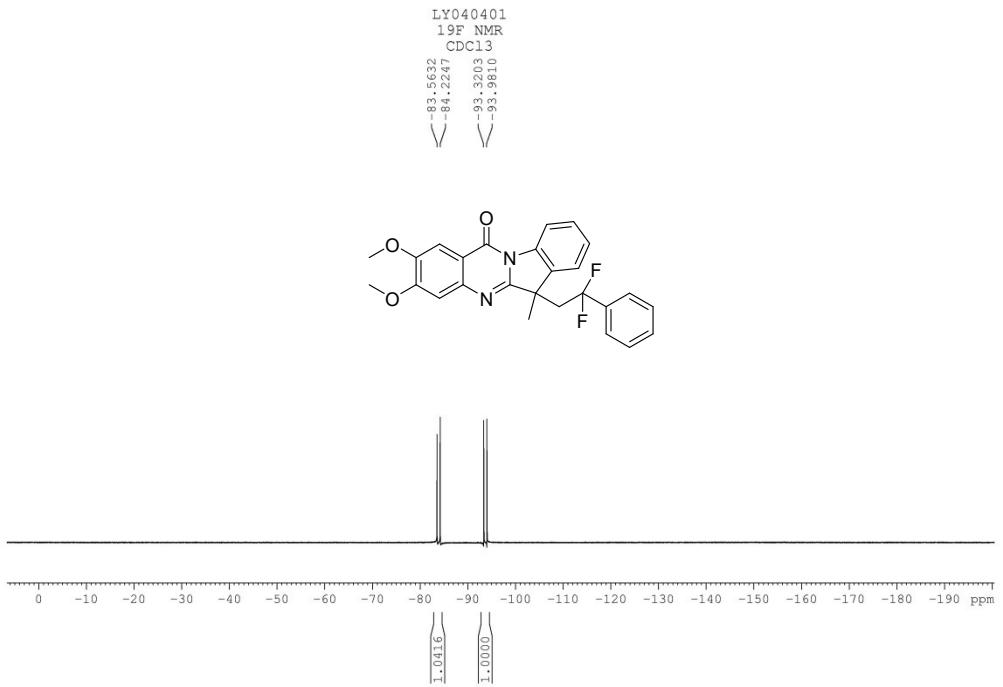


Fig. S45 ¹⁹F NMR spectrum of compound 3o

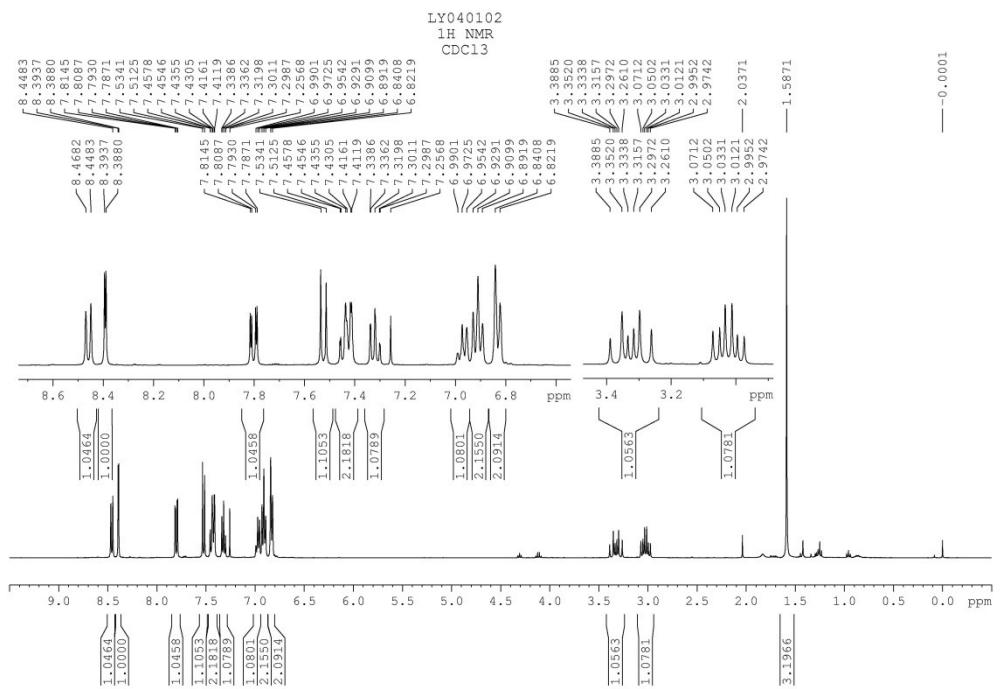


Fig. S46 ¹H NMR spectrum of compound 3p

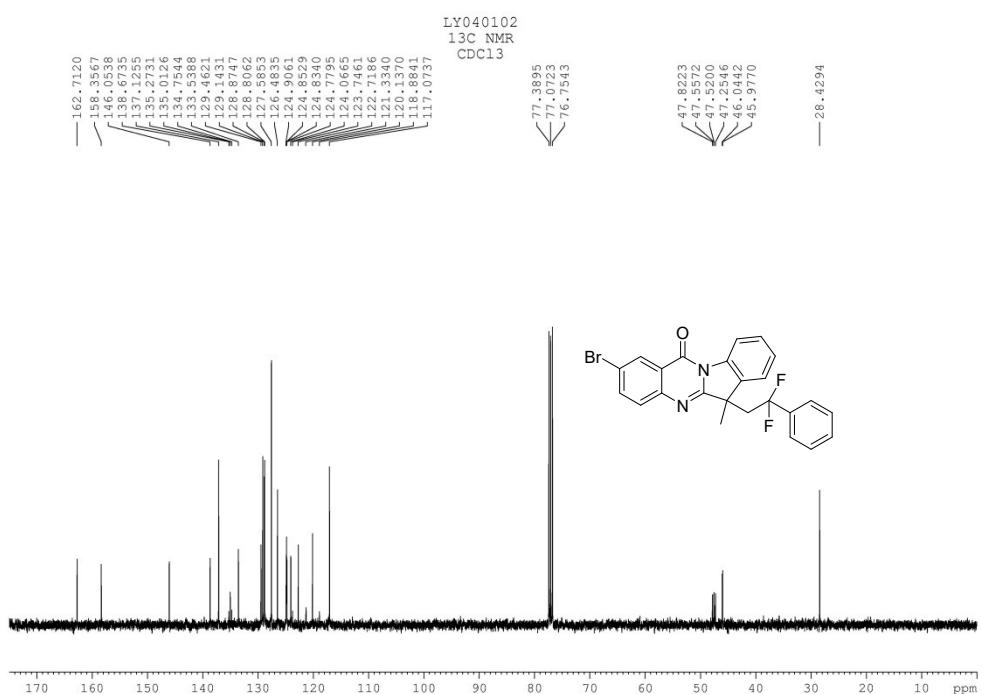


Fig. S47 ^{13}C NMR spectrum of compound **3p**

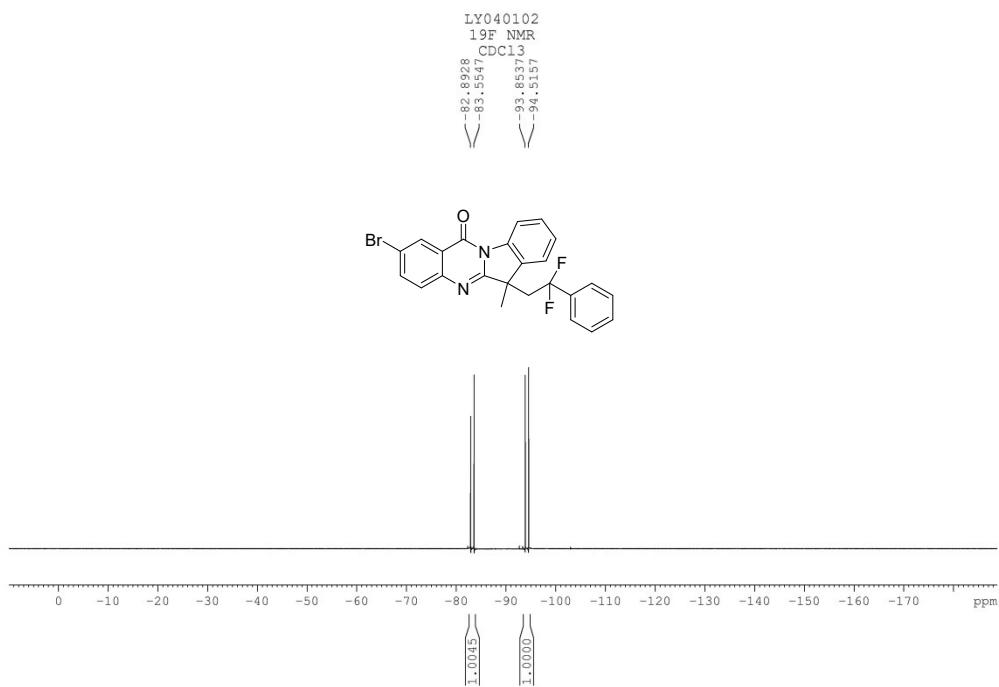


Fig. S48 ^{19}F NMR spectrum of compound **3p**

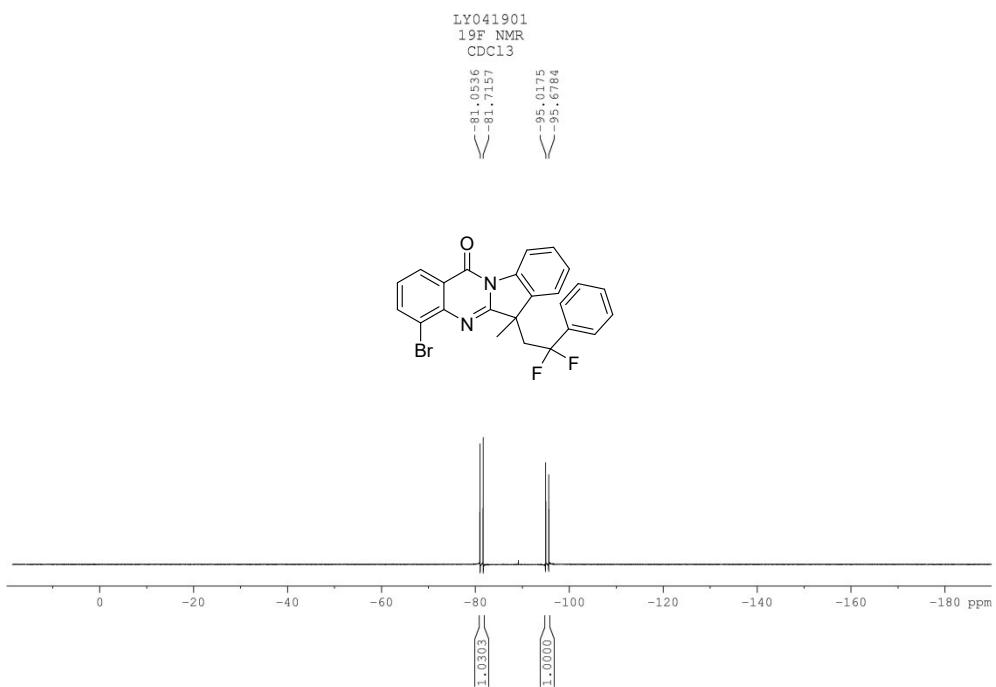


Fig. S51 ¹⁹F NMR spectrum of compound 3q

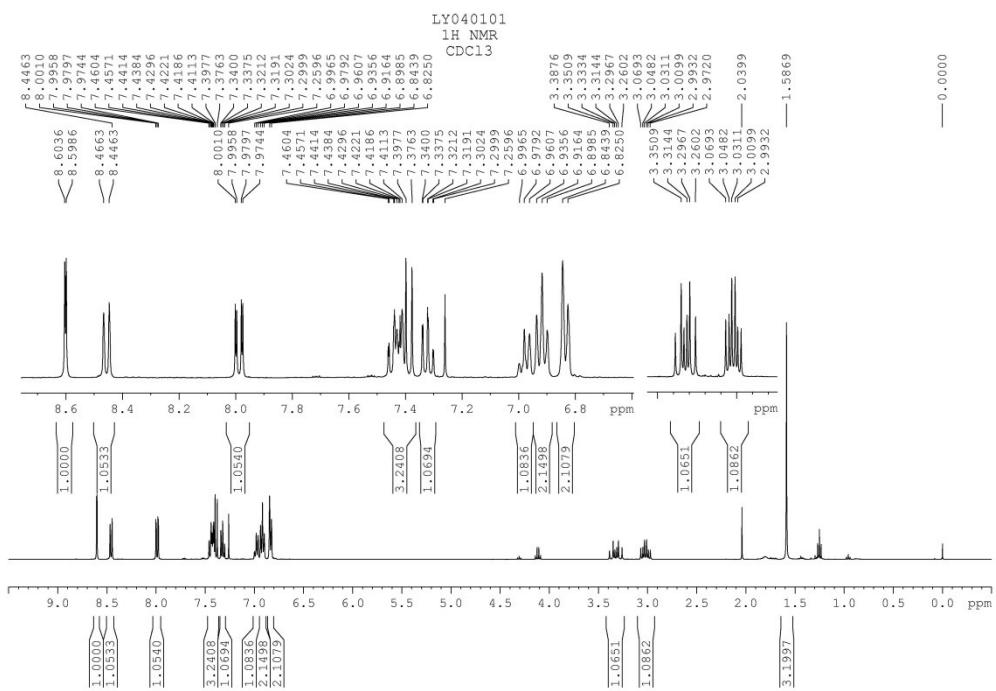


Fig. S52 ¹H NMR spectrum of compound 3r

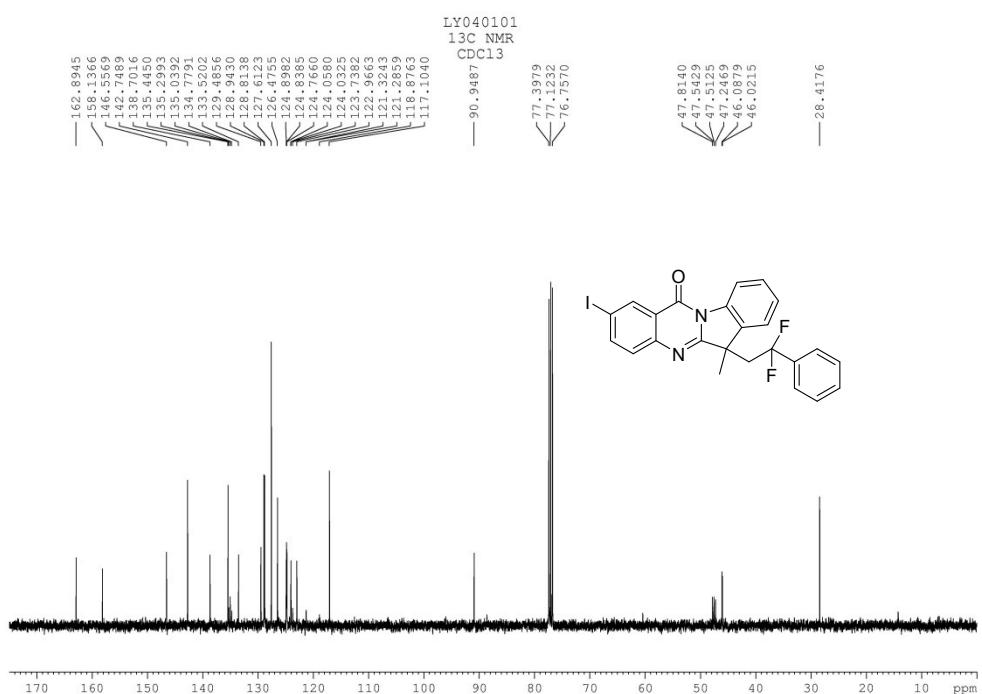


Fig. S53 ¹³C NMR spectrum of compound 3r

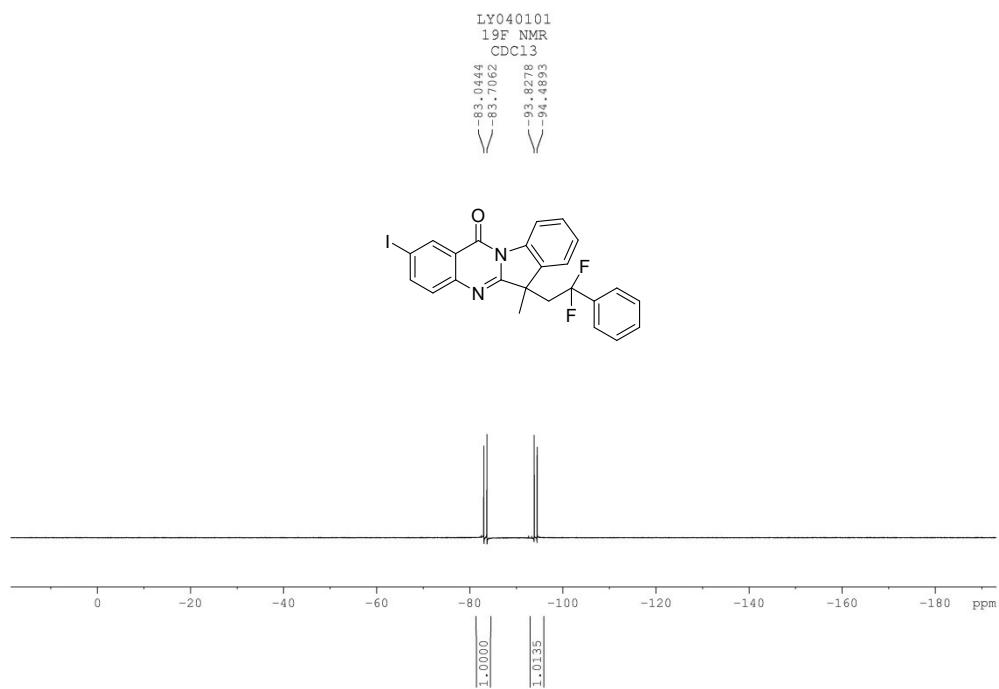


Fig. S54 ¹⁹F NMR spectrum of compound 3r

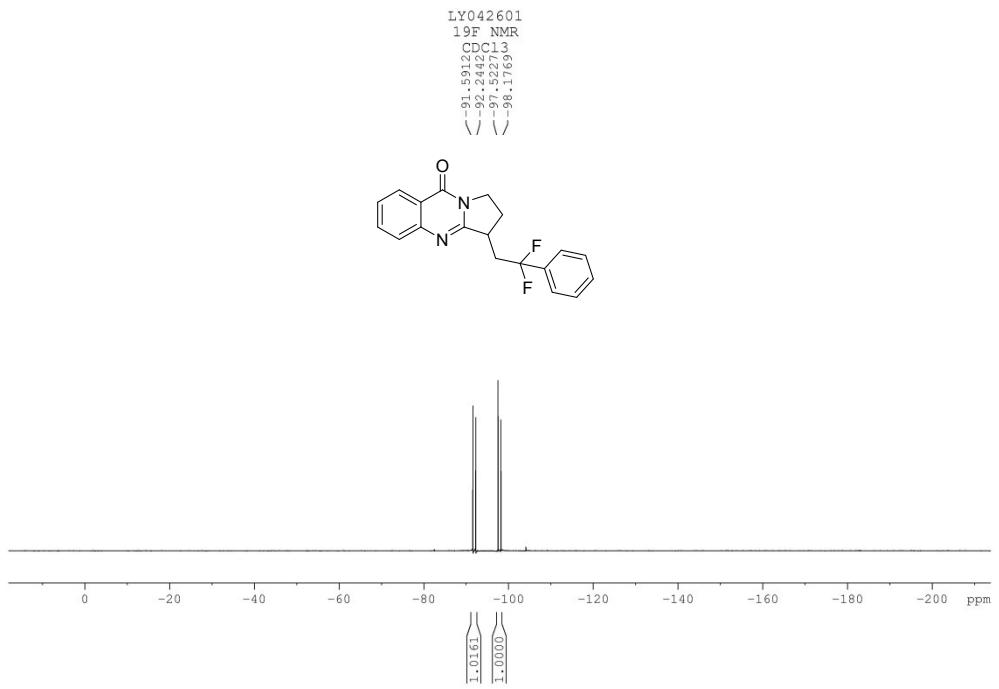


Fig. S57 ¹⁹F NMR spectrum of compound 5a

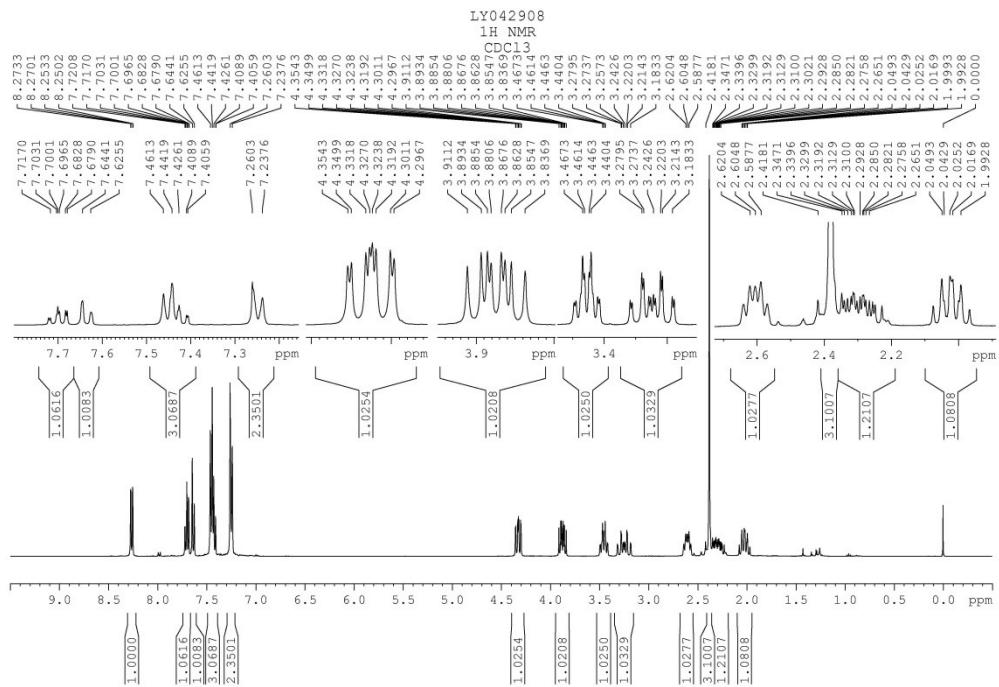


Fig. S58 ¹H NMR spectrum of compound 5b

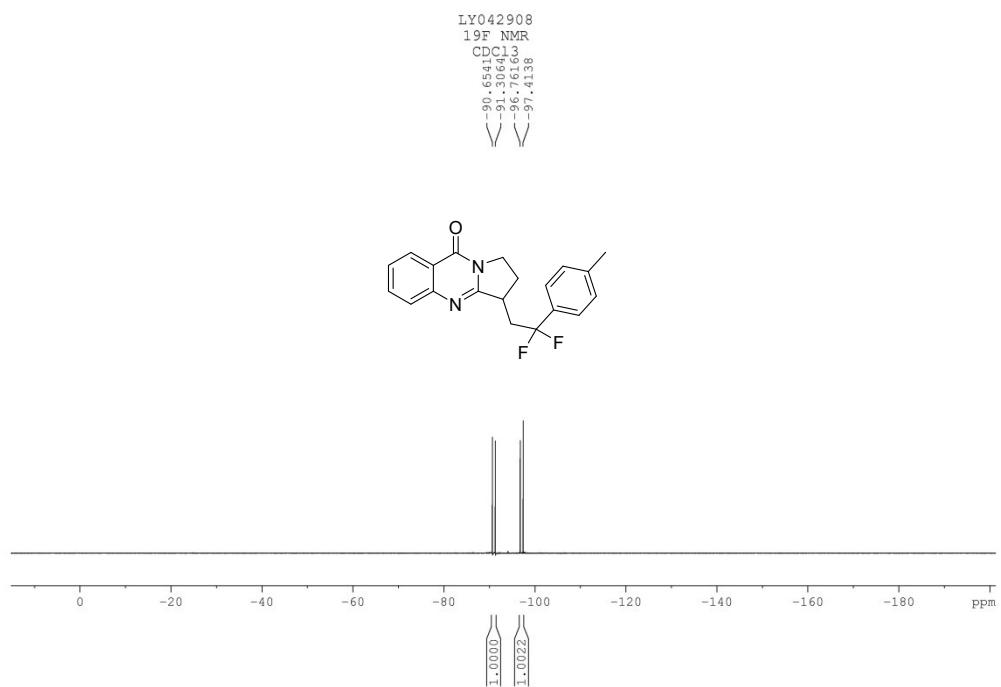
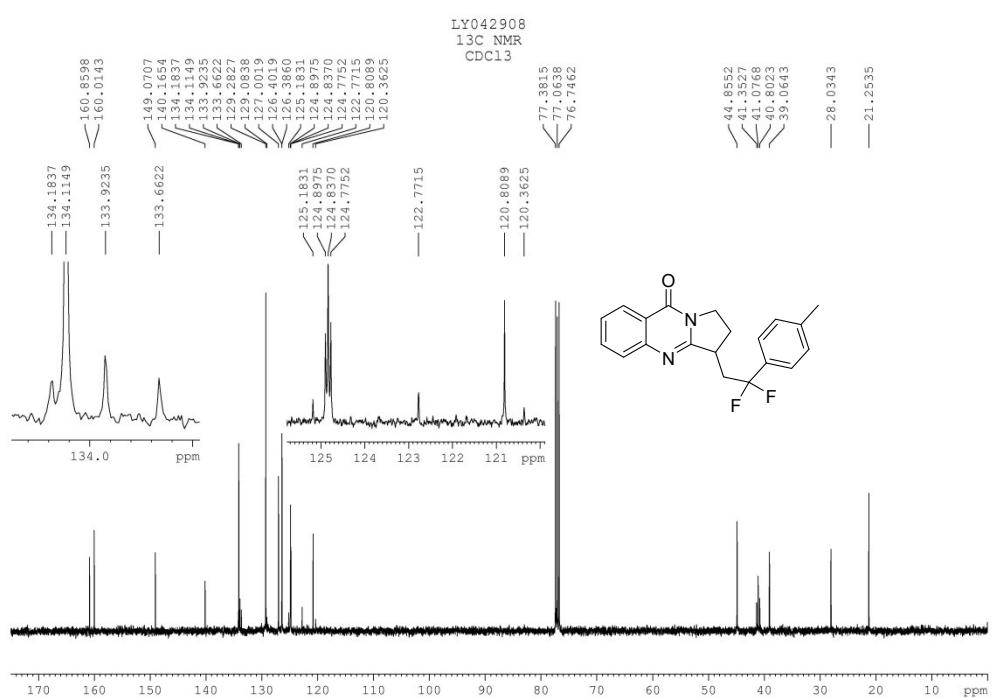


Fig. S60 ¹⁹F NMR spectrum of compound 5b

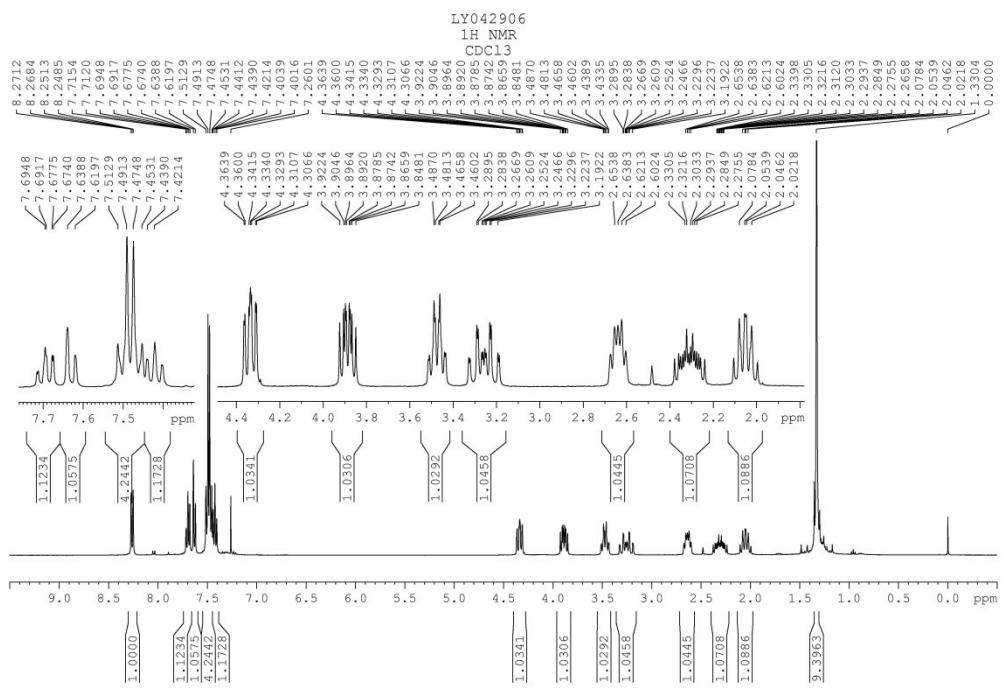


Fig. S61 ¹H NMR spectrum of compound 5c

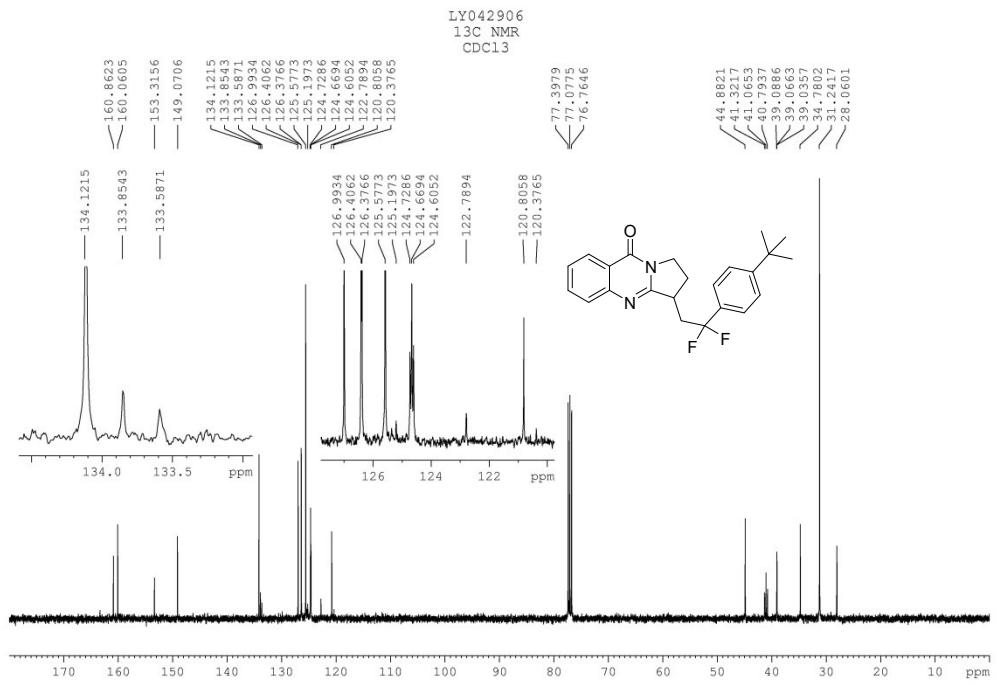


Fig. S62 ¹³C NMR spectrum of compound 5c

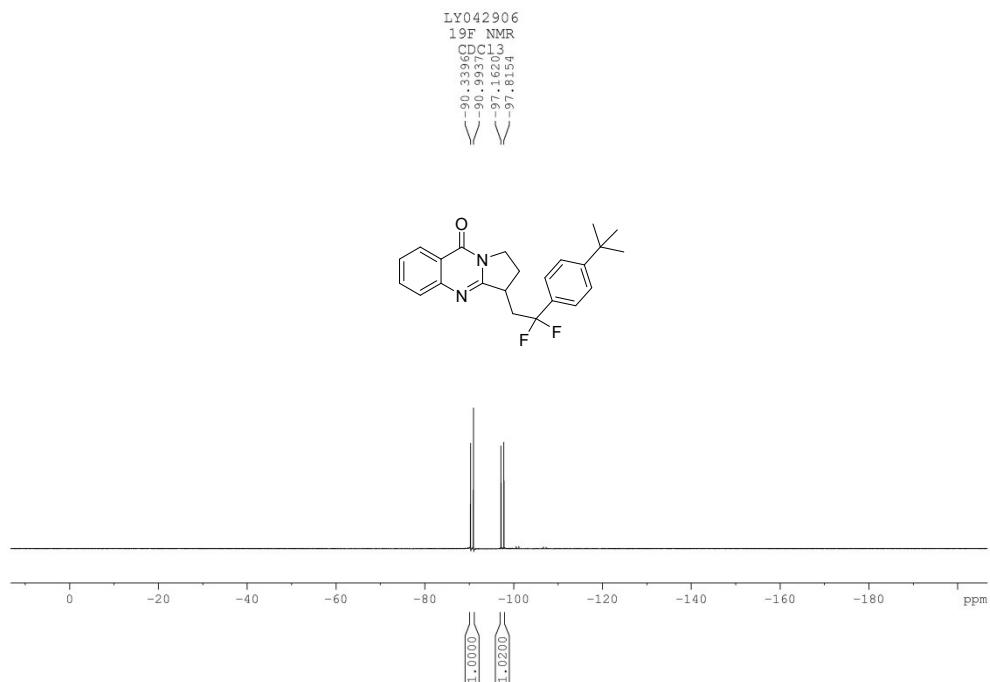


Fig. S63 ¹⁹F NMR spectrum of compound 5c

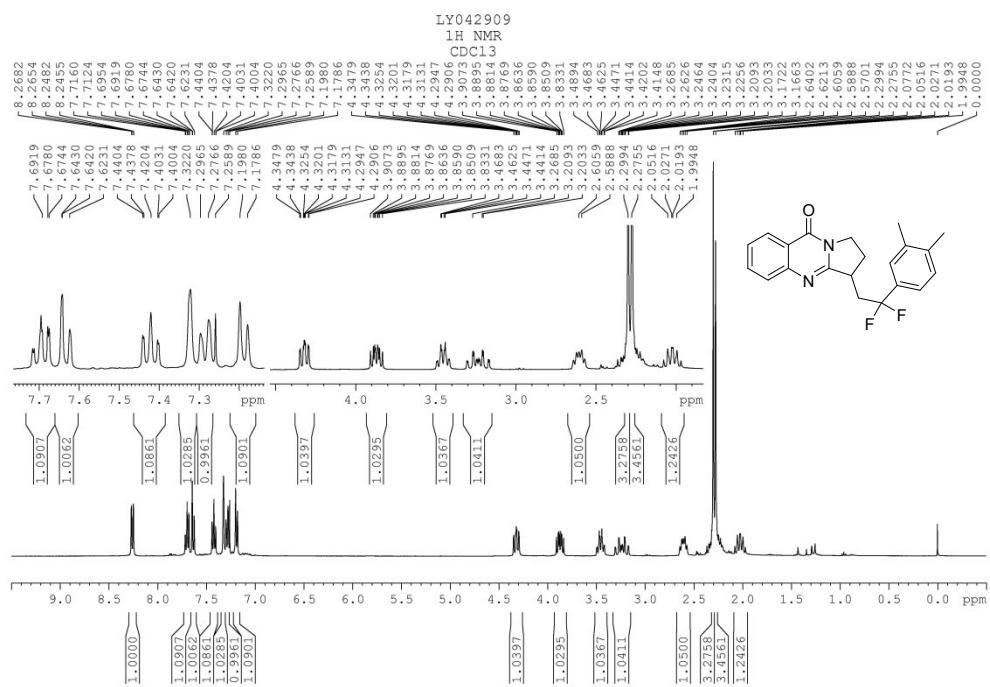


Fig. S64 ¹H NMR spectrum of compound 5d

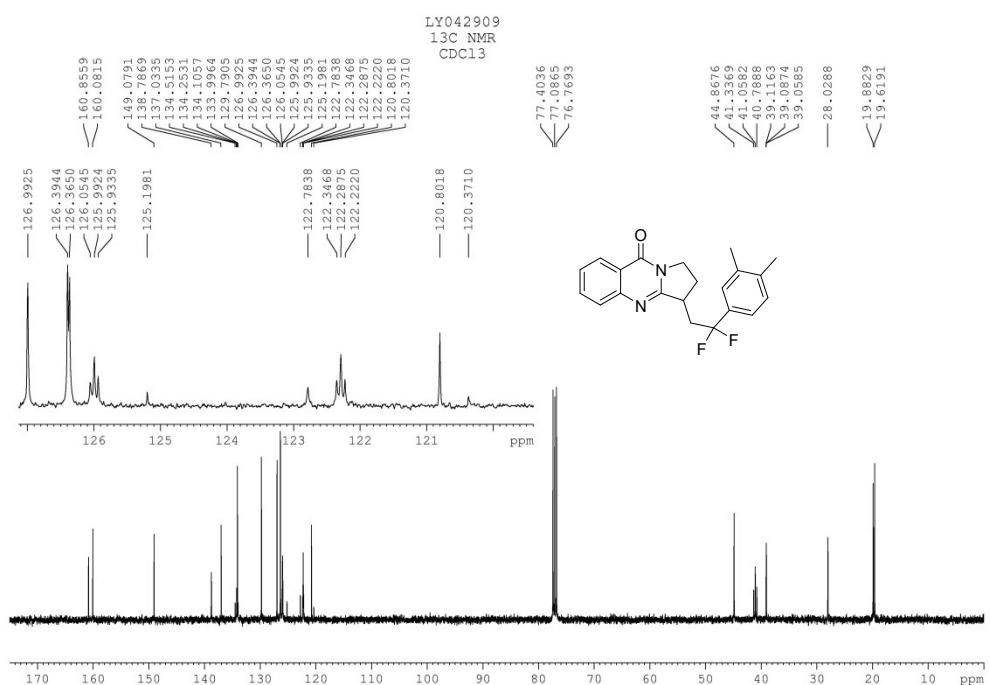


Fig. S65 ¹³C NMR spectrum of compound 5d

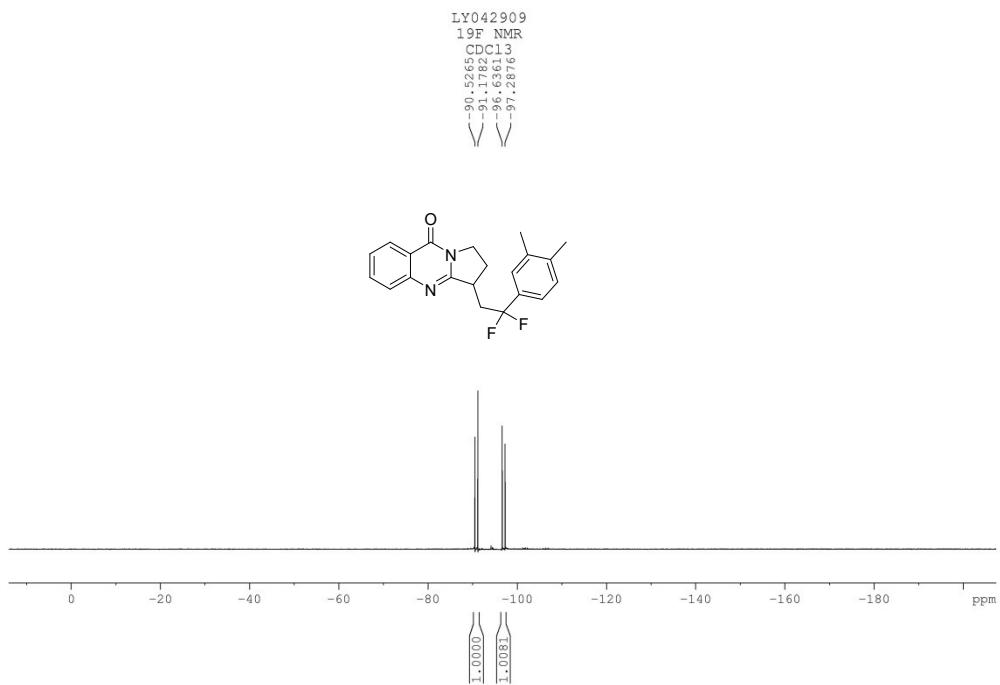


Fig. S66 ¹⁹F NMR spectrum of compound 5d

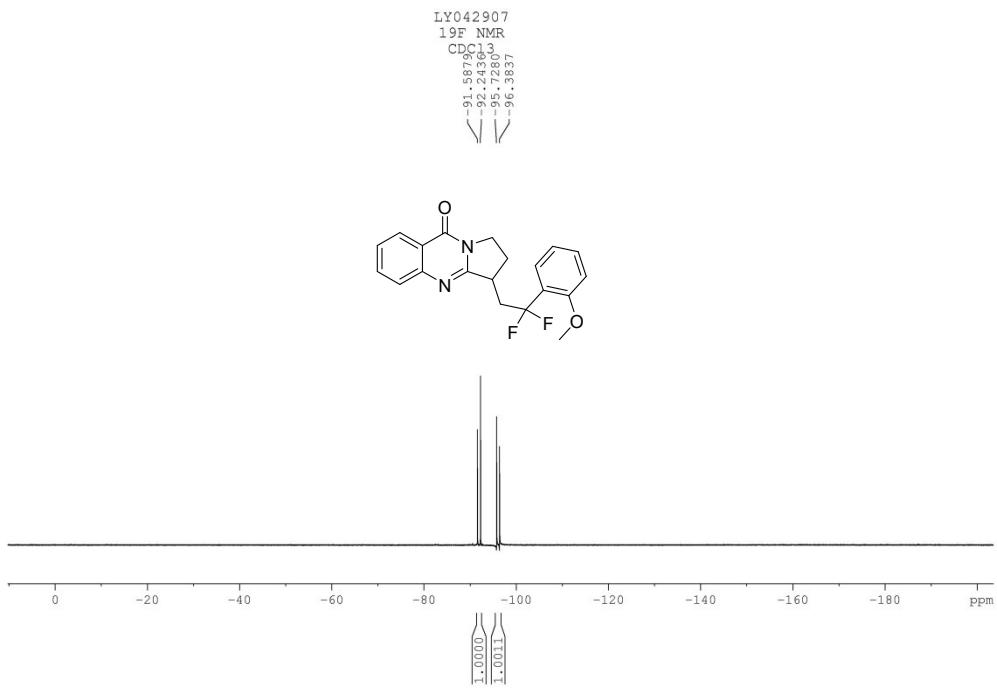


Fig. S69 ¹⁹F NMR spectrum of compound 5e

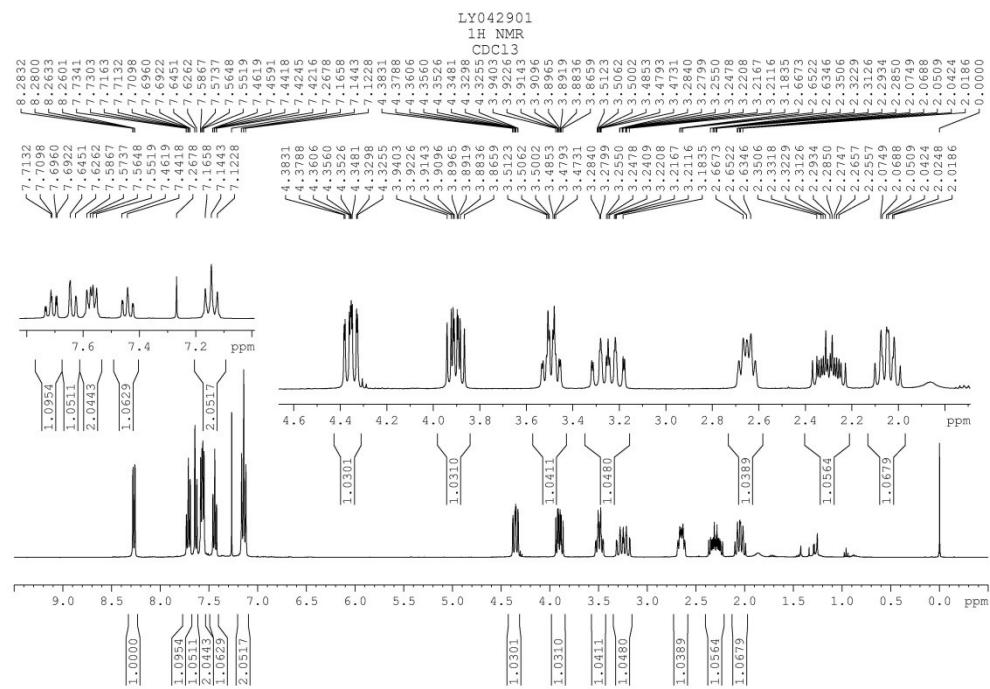


Fig. S70 ¹H NMR spectrum of compound 5f

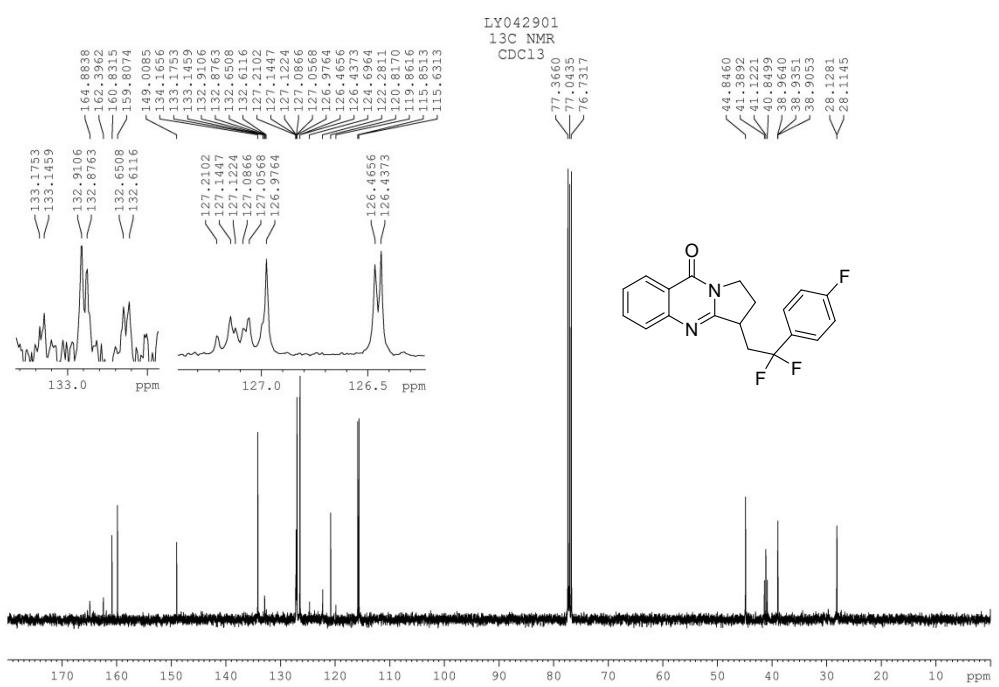


Fig. S71 ¹³C NMR spectrum of compound 5f

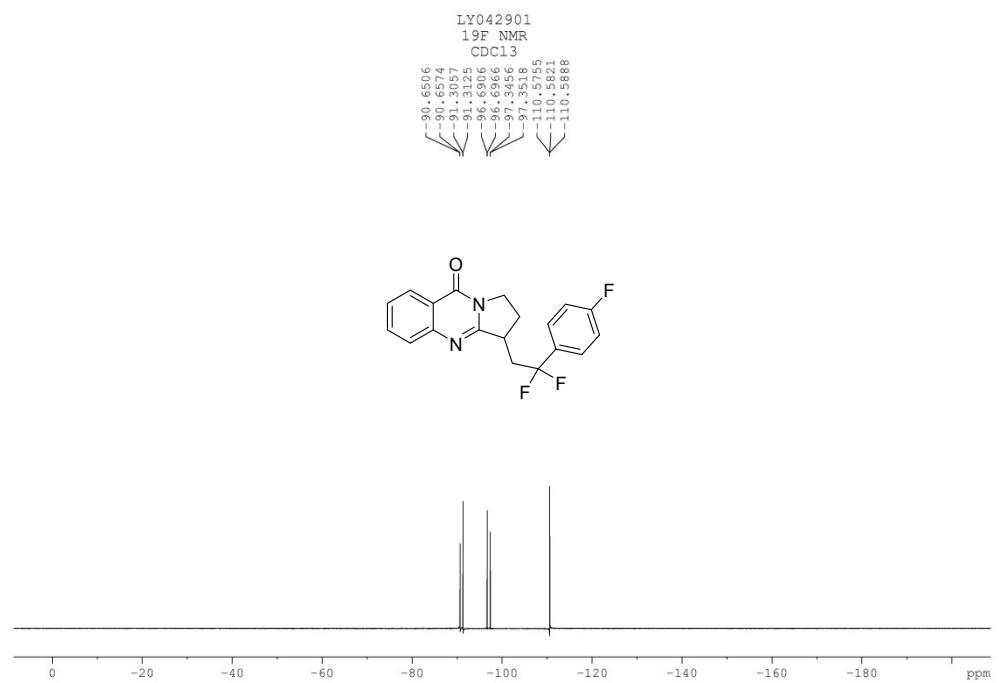


Fig. S72 ¹⁹F NMR spectrum of compound 5f

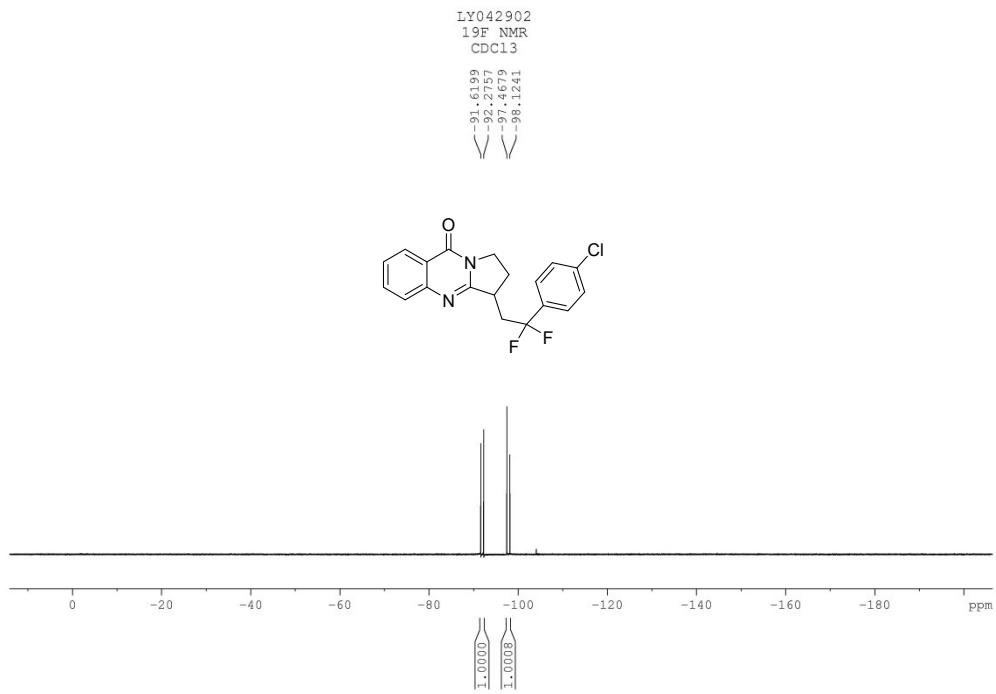


Fig. S75 ¹⁹F NMR spectrum of compound 5g

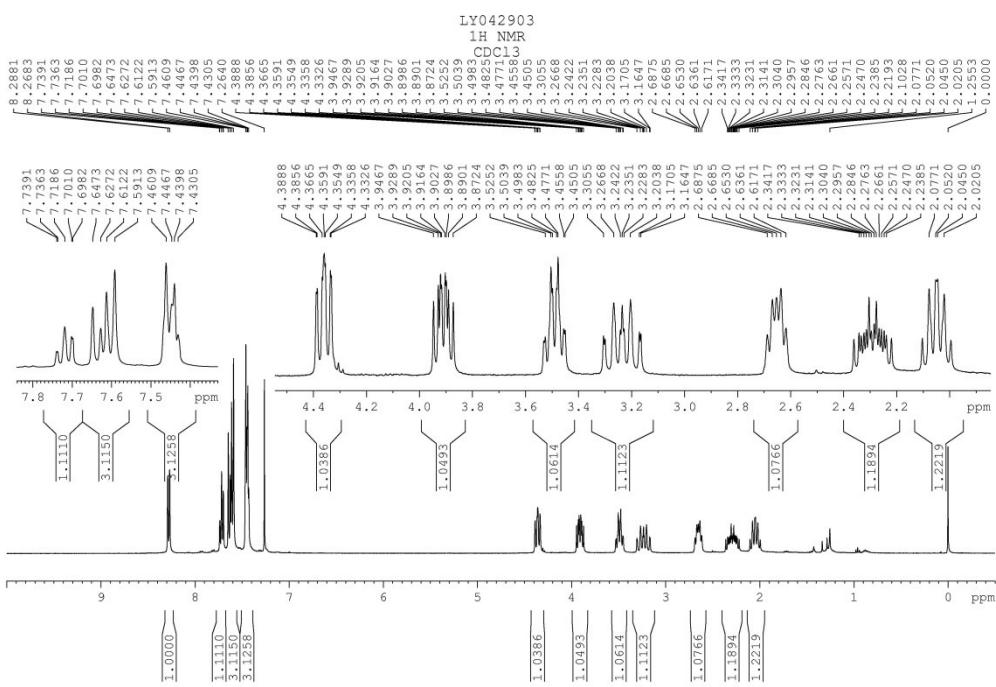


Fig. S76 ¹H NMR spectrum of compound 5h

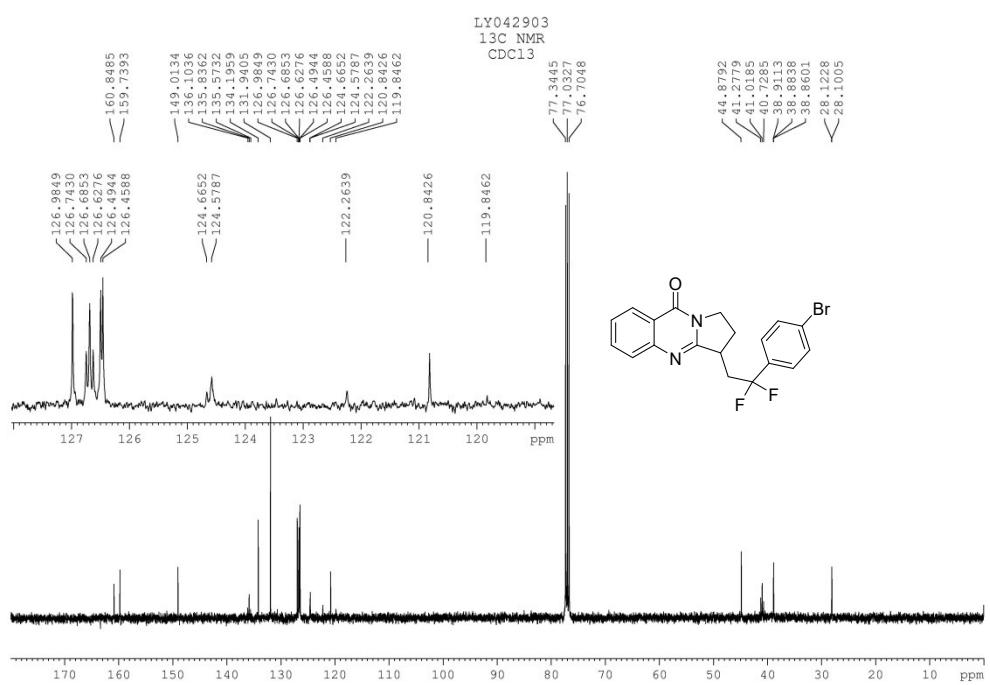


Fig. S77 ¹³C NMR spectrum of compound 5h

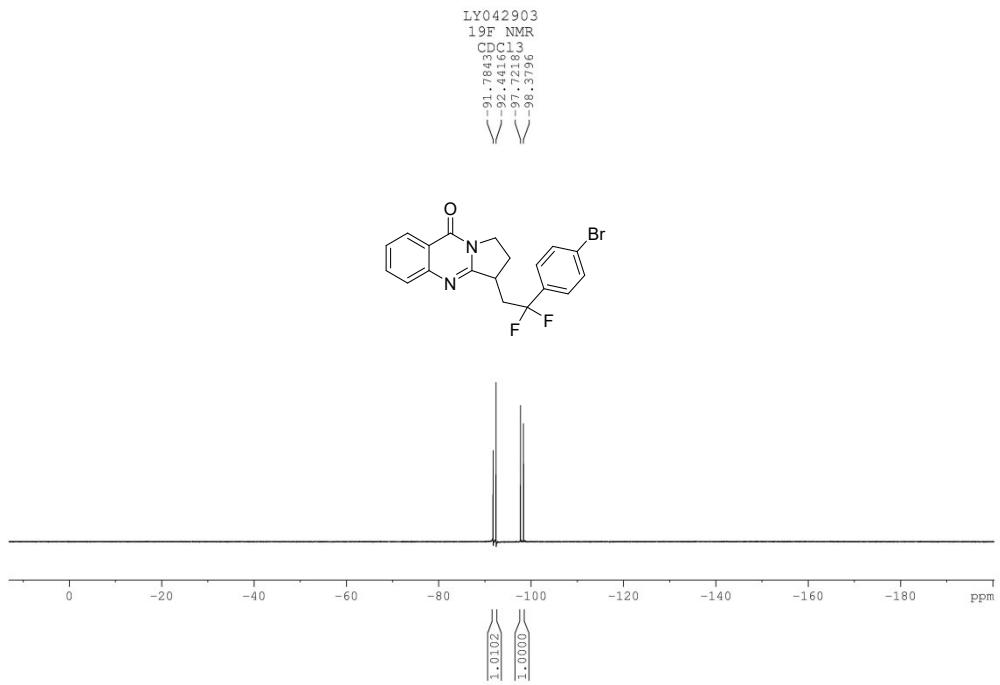


Fig. S78 ¹⁹F NMR spectrum of compound 5h

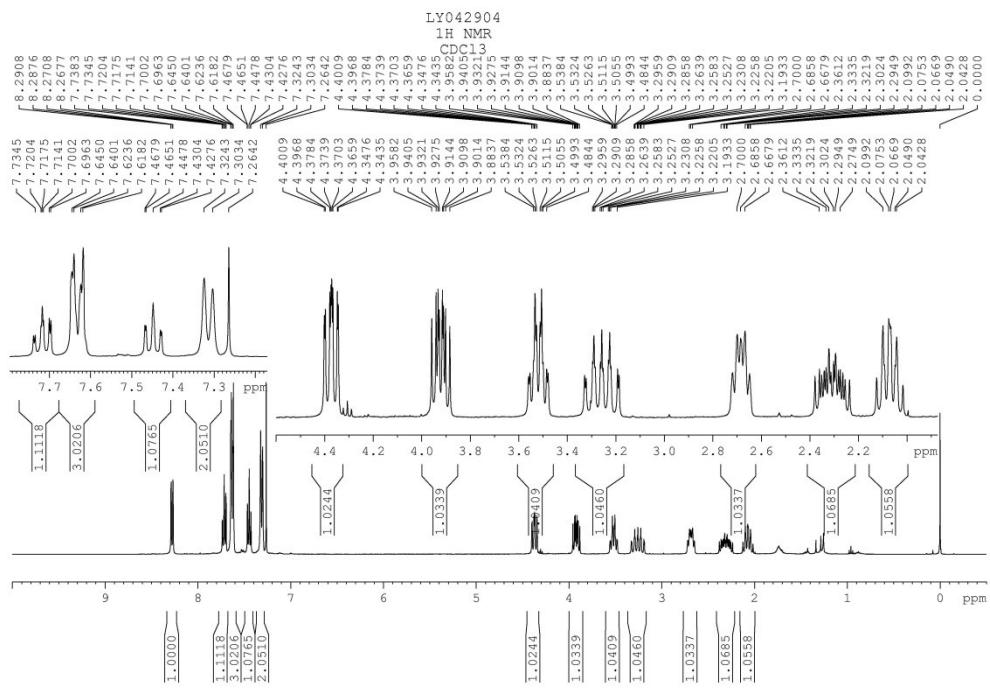


Fig. S79 ^1H NMR spectrum of compound **5i**

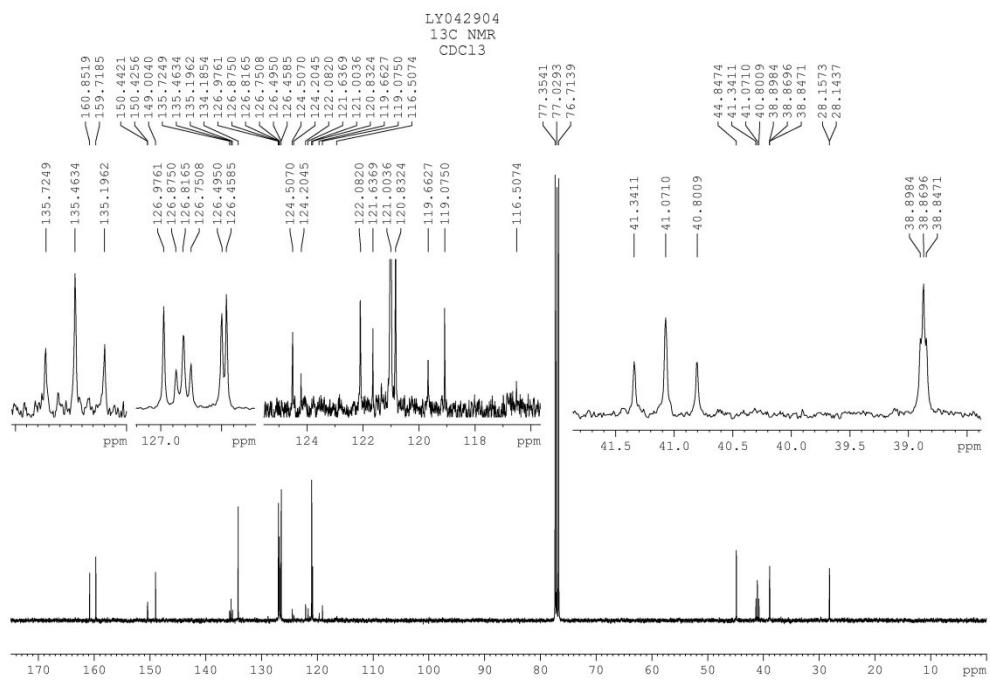


Fig. S80 ^{13}C NMR spectrum of compound 5i

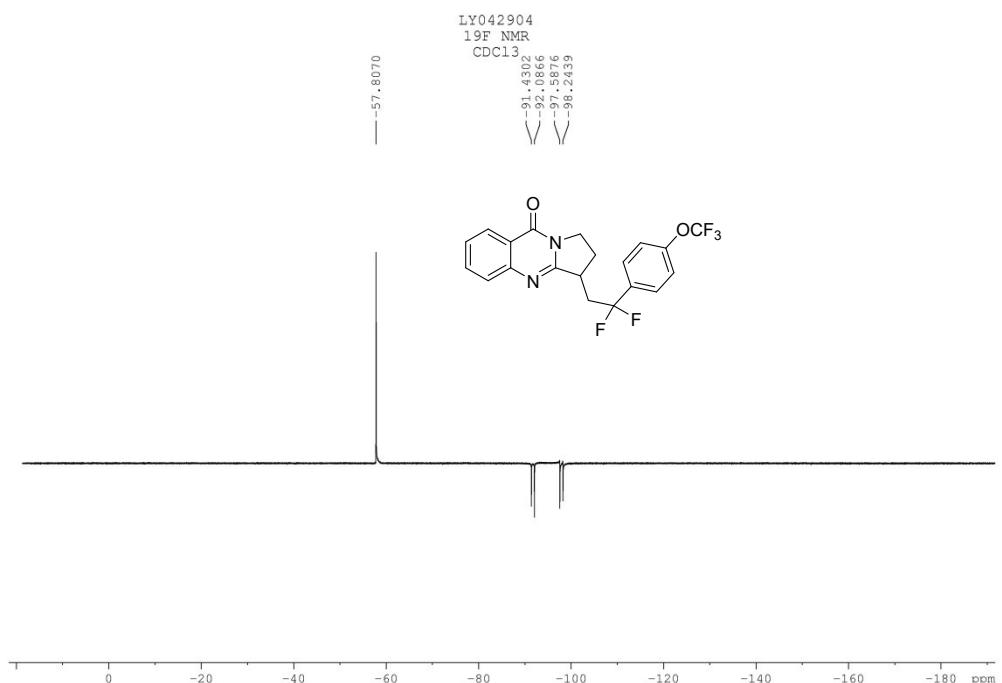


Fig. S81 ¹⁹F NMR spectrum of compound 5i

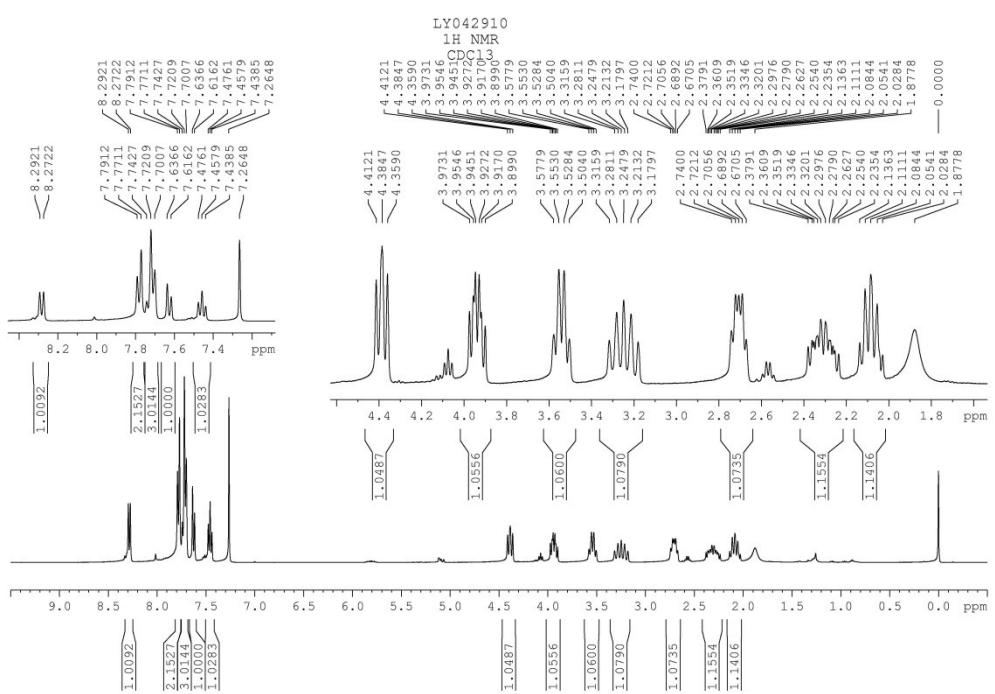


Fig. S82 ¹H NMR spectrum of compound 5j

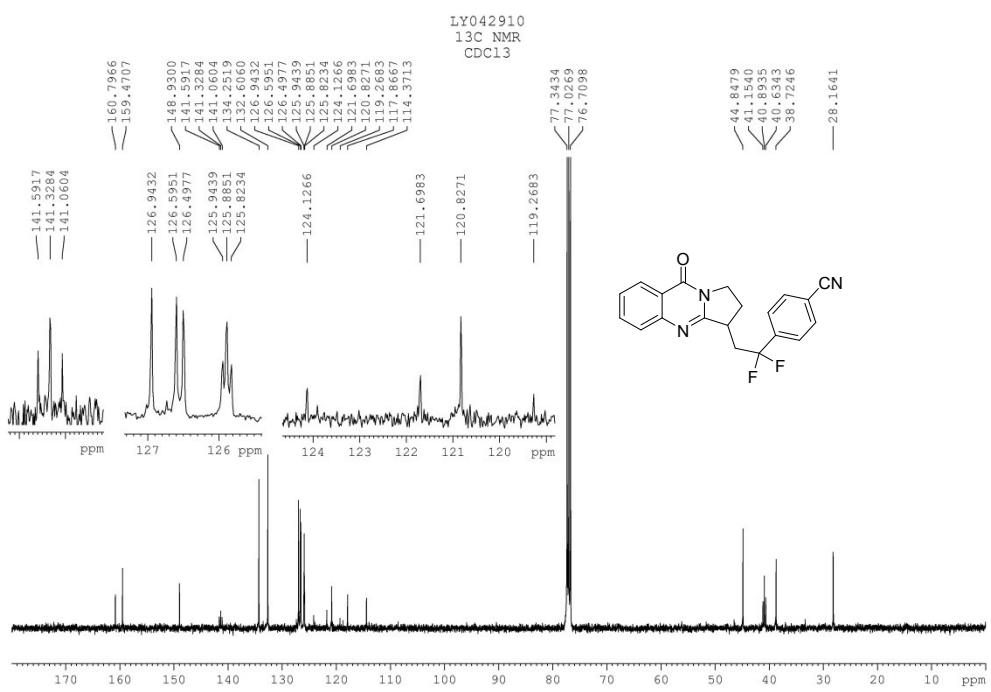


Fig. S83 ¹³C NMR spectrum of compound 5j

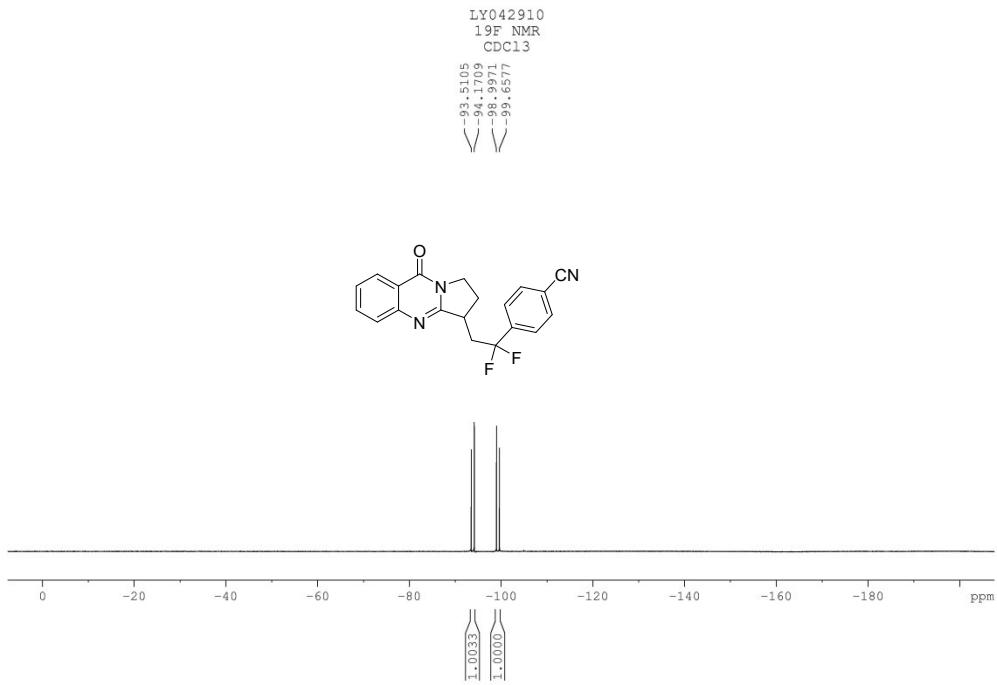
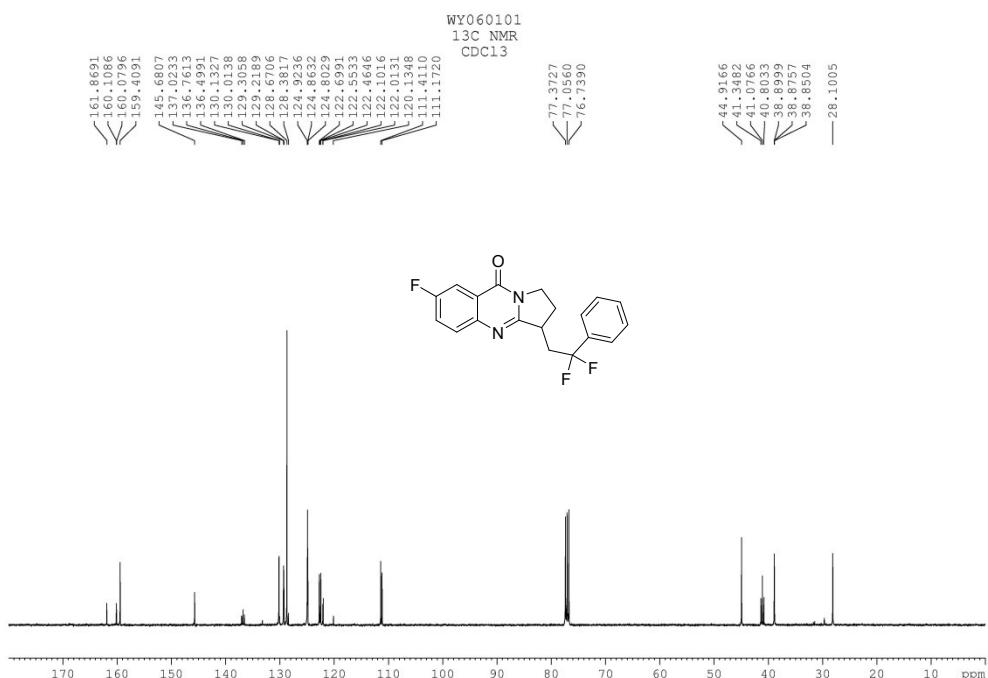
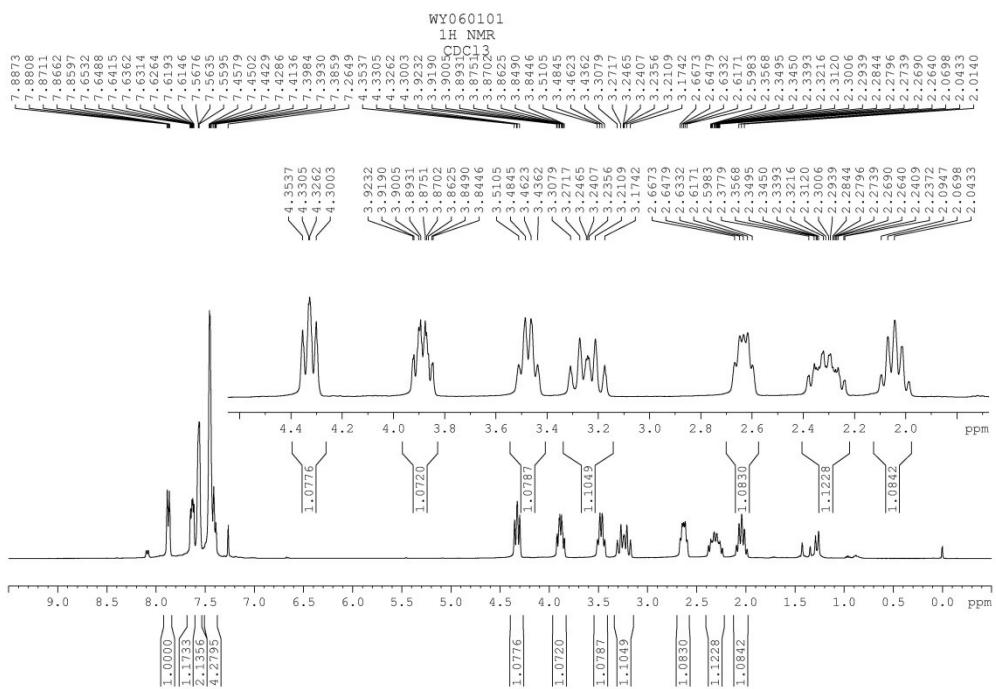


Fig. S84 ¹⁹F NMR spectrum of compound 5j



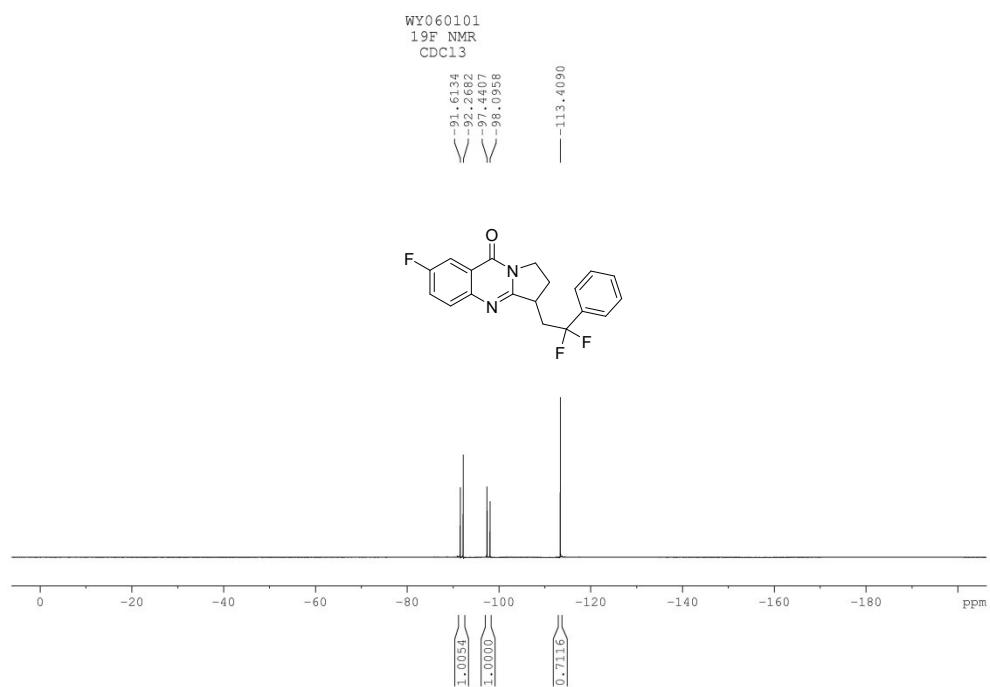


Fig. S87 ¹⁹F NMR spectrum of compound 5k

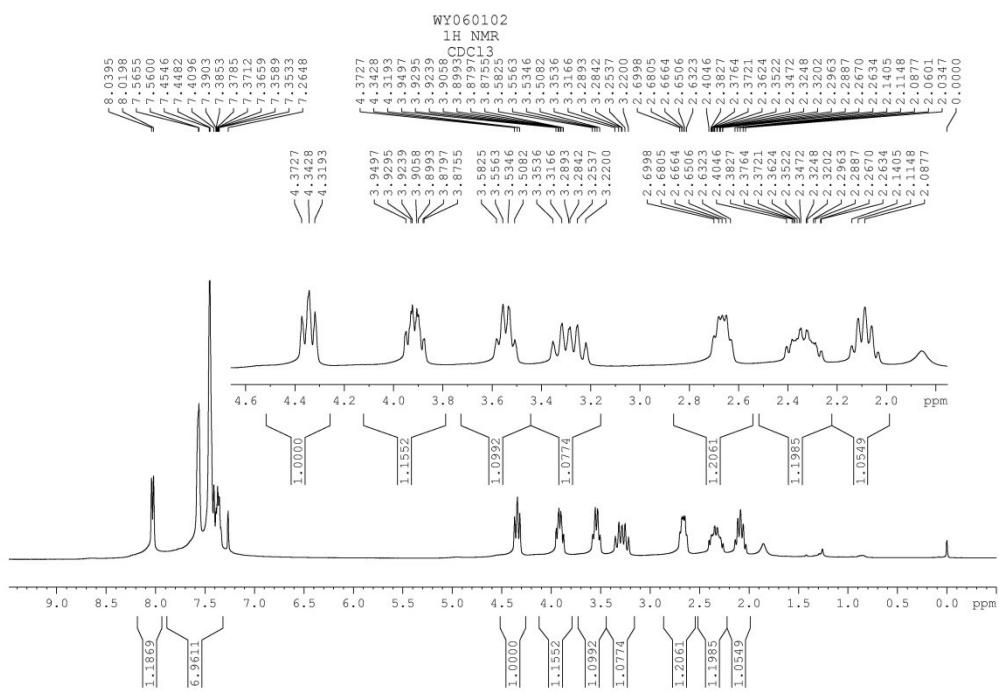


Fig. S88 ¹H NMR spectrum of compound 5l

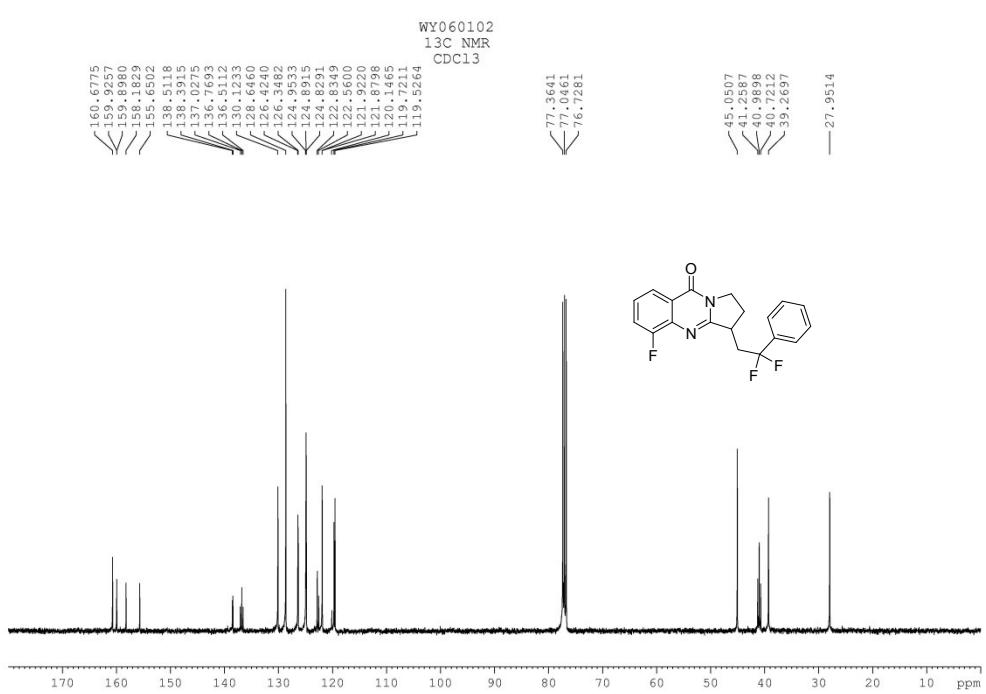


Fig. S89 ¹³C NMR spectrum of compound 5I

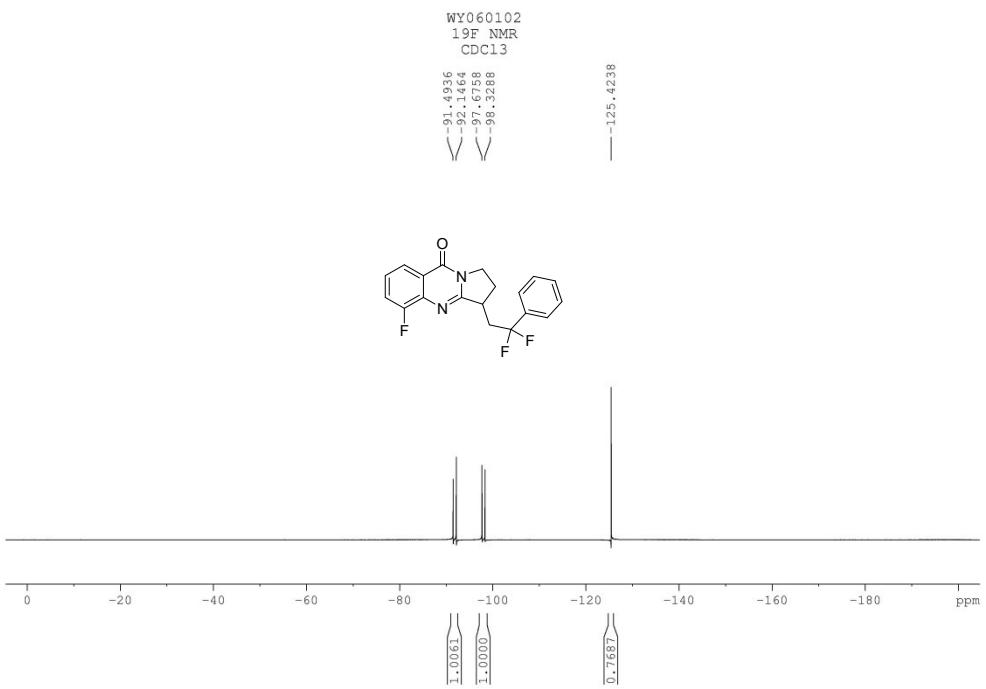


Fig. S90 ¹⁹F NMR spectrum of compound 5I

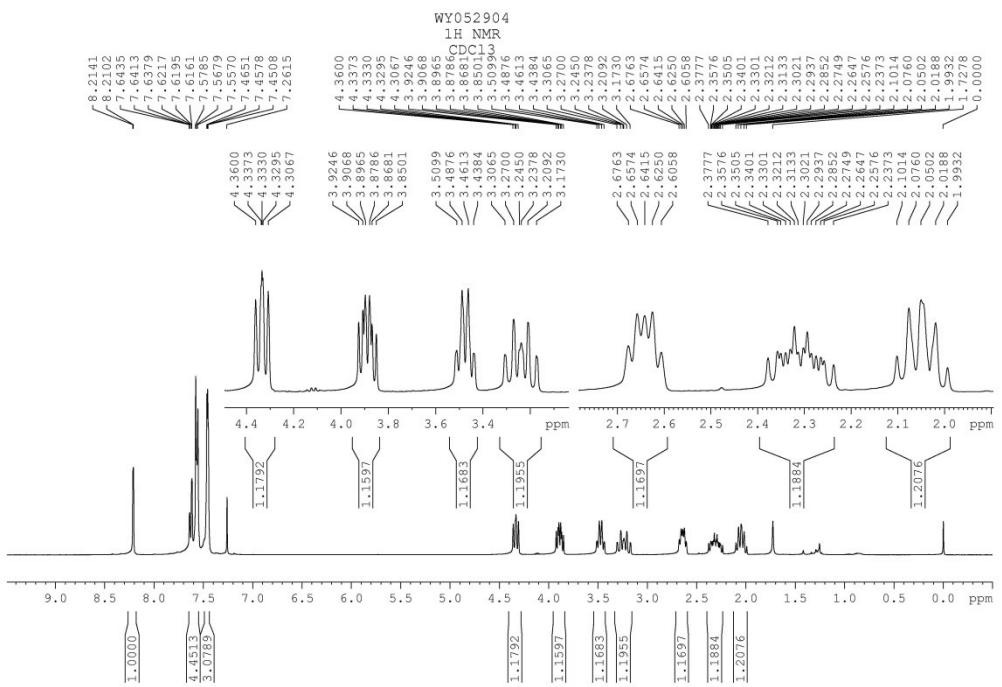


Fig. S91 ^1H NMR spectrum of compound **5m**

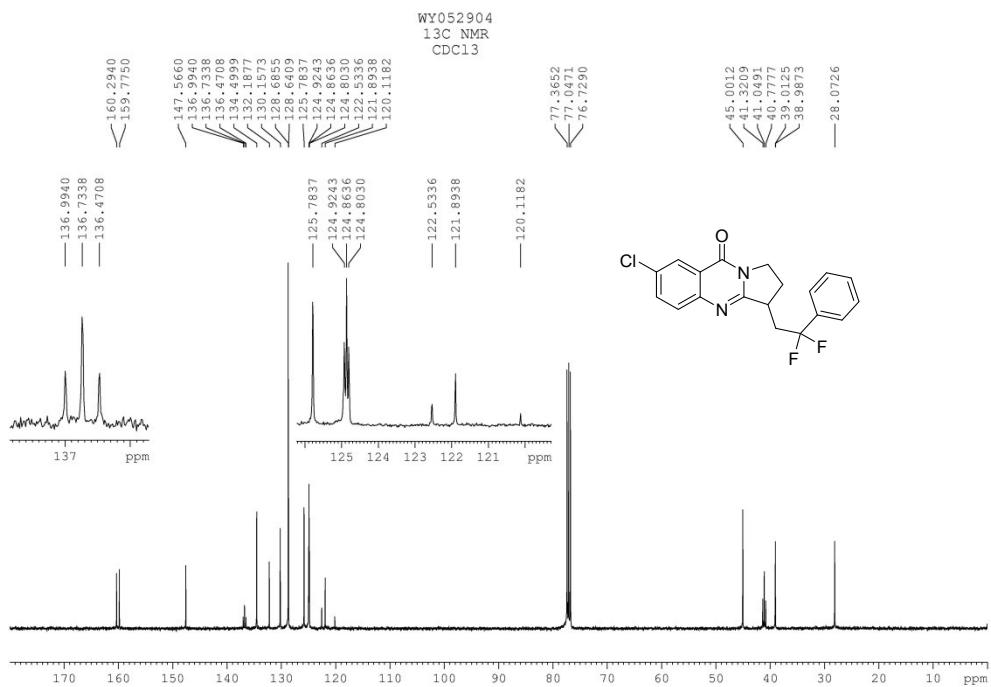


Fig. S92 ^{13}C NMR spectrum of compound **5m**

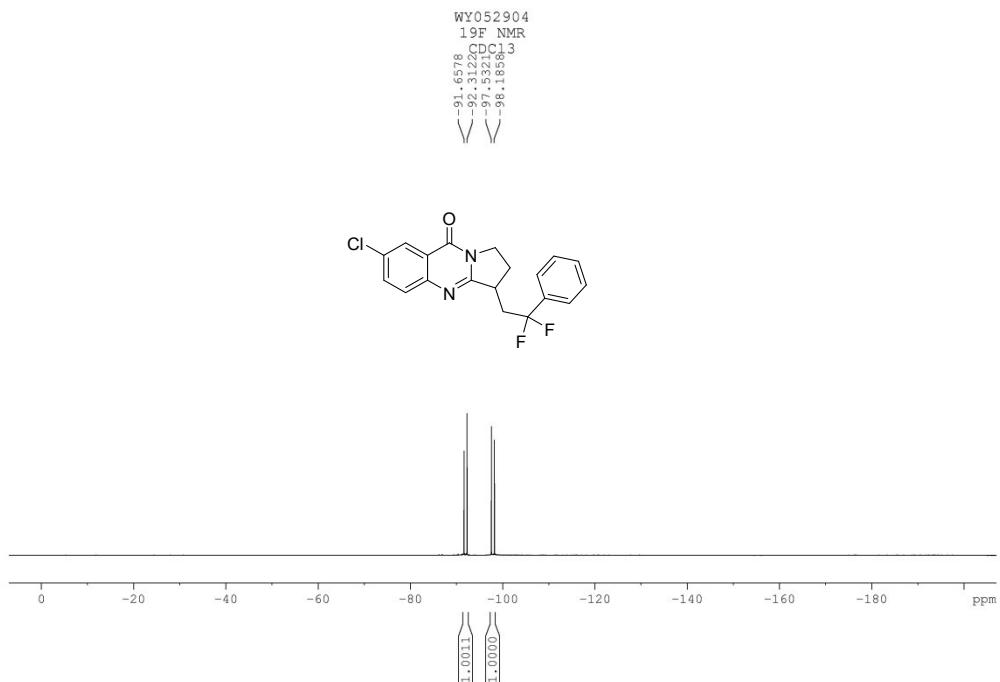


Fig. S93 ¹⁹F NMR spectrum of compound 5m

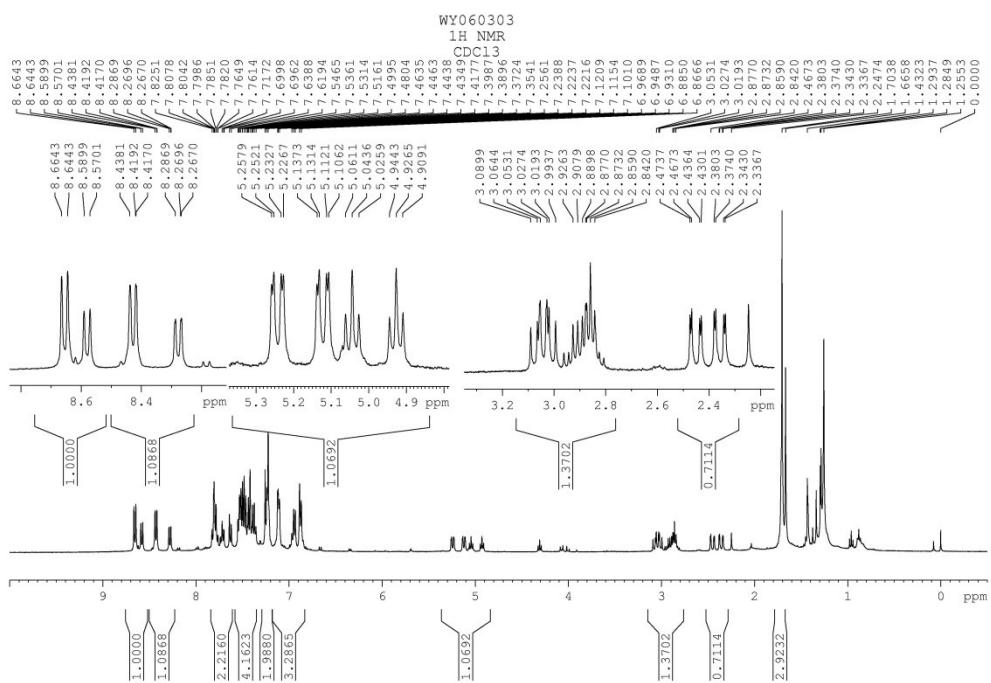


Fig. S94 ¹H NMR spectrum of compound 7a

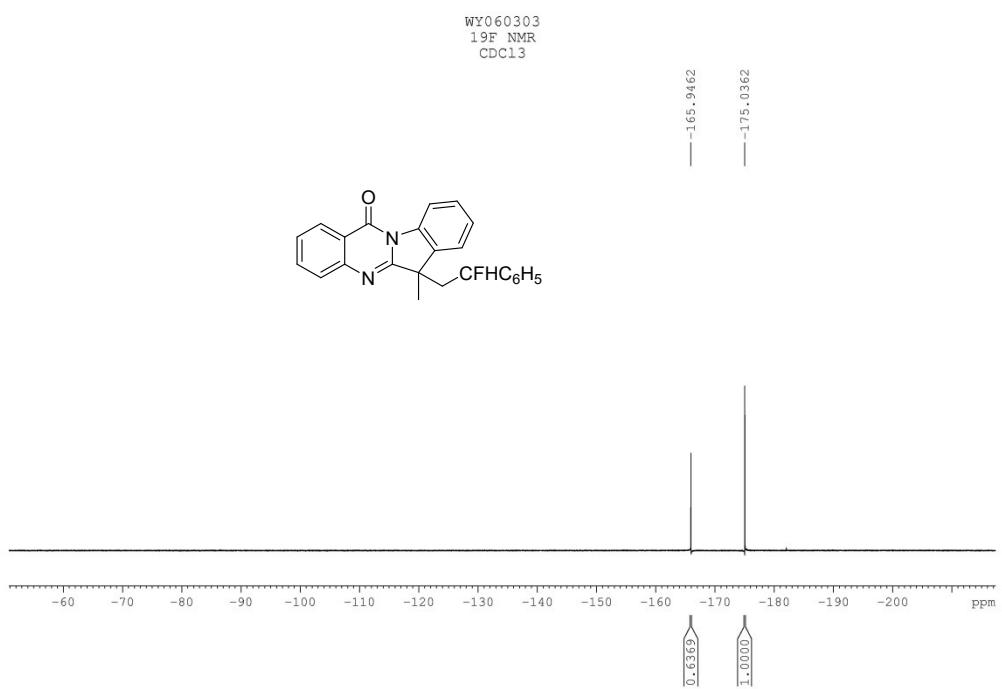


Fig. S95 ¹⁹F NMR spectrum of compound 7a

3. HR MS of the adduct of TEMPO and α,α -difluorophenylmethyl radical

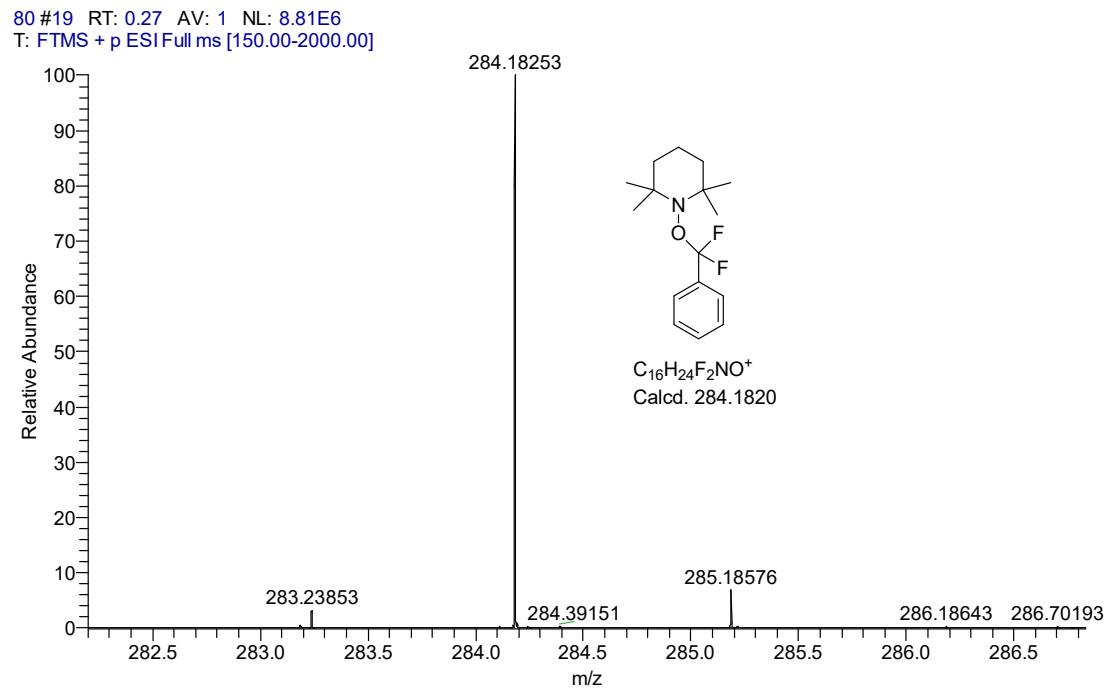


Fig. S96 HR MS of the adduct of TEMPO and α,α -difluorobenzyl radical