Supporting Information

Synthesis of Fluorinated Tubastatin A Derivatives with Bi-, Tri-, and Tetracyclic Cap Groups: Molecular Docking with HDAC6 and Evaluation of *in Vitro* Antitumor Activity

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Experimental Procedures and Characterization Data

Chemistry: General. Unless otherwise stated, all chemicals and reagents were purchased from commercial companies and used without further purification. Tubastatin A (CAS: 1252003-15-8) was purchased from Bide-pharmatech. The progress of reactions was monitored by thin-layer chromatography (TLC) on SiO_2. The final compound was purified by silica gel column chromatography (DAMAO CHEMICAL REAGENT FACTORY; 200−300 mesh). The structure of synthesized compounds was characterized by ^{1}H NMR, ^{13}C NMR, and HRMS. ^{1}H NMR and ^{13}C NMR spectrum for the synthesized compounds were recorded on the BRUKER AVANCE 600 MHz spectrometer. Chemical shifts are reported in parts per million (δ). The tetramethylsilane peak was used as the reference for the ^{1}H NMR spectrum (TMS, 0 ppm). The solvent peak was used as the reference for the ^{13}C NMR spectrum (DMSO-d_6, 39.52 ppm). High-resolution mass measurements were carried out on a Thermo LTQ Orbitrap XL HRMS instrument with electrospray ionization (ESI).

Molecular Modeling. The 3D crystal structure of HDAC6 (PDB ID:6THV) was obtained from the Protein Data Bank (www.pdb.com) at a resolution of 1.10 Å. The 3D crystal structure of HDAC10 (PDB ID: 6UIL) was obtained from the Protein Data Bank (www.pdb.com) at a resolution of 2.85 Å. PyMOL was used to remove water molecules from the target protein and remove existing organic small molecules. The proteins were sequentially hydrogenated and Gasteiger charged through the Autodock tool 1.5.6. The ligand structures were initially drawn using ChemDraw 2D software, followed by conversion to 3D structures using ChemDraw 3D software. The lowest energies were calculated, and saved in PDB format. The protein was considered to be rigid and the conformation of the ligand was considered to be variable by semi-flexible docking using the Autodock tool 1.5.6. For HDAC6, the grid box was defined as 40×40×40 points, with the center coordinates (x: -6.049, y: 18.419, z: -19.031), and the "spacing" parameter set to 0.586. For HDAC10, the grid box was similarly set at 40×40×40 points, with the center coordinates (x: 64.666, y: 107.927, z: 276.284), and the "spacing" parameter set to 0.622. Lamarckian genetic algorithm was selected for the docking algorithm, and the number of genetic algorithm runs was set to 100. The results were visualized and analyzed using PyMOL software or the PLIP web tool. [1]

The ADME values of Tubastatin A and its derivatives were calculated through the login-free website http://www.swissadme.ch. [2]

Table S1 The ADME values of Tubastatin A and its derivatives

Compd.	Consensus Log P	Lipinski #violations
12a	3.56	0
12b	3.87	0
13a	4.31	1
13b	4.09	0
13c	4.1	0
13d	4.3	1

13e	4.46	1
13f	4.41	1
13g	4.31	1
13h	4.72	1
14a	3.56	0
14b	3.82	0
14c	4.56	0
14d	4.73	1
14e	4.05	0
14f	4.29	0
Tubastatin A	2.25	0

Biological Methods. *In vitro antitumor activity testing.* Using MTT [3 (4,5 dimethylthiazole 2) 2,5 diphenyltetrazolium bromide] method to determine the minimum inhibitory concentration of new compounds. Specific procedures were as follows: a certain number of human hepatocarcinoma cell lines (Bel7402, HepG2), human nasopharyngeal carcinoma cell lines (CNE2, SUNE1), human breast cancer cell lines (MDA-MB-231, MCF-7), human pancreatic cancer cell lines (SW1990), and human embryonic kidney cells (HEK-293T) were placed in culture medium and cultured in an incubator at 37 °C, 100% humidity and 5% CO_2. Cells in the logarithmic growth phase were then taken and 100 μL of cell suspension at a concentration of 3 to 5×10^4 cells /mL was added to each well of 96 Wells. Seven concentration gradients were set up for each sample, and each concentration was set up in triplicate. DMSO solution was used as the corresponding control group. The samples were added to the corresponding Wells and cultured in a 5% CO_2 incubator at 37 °C for 72 hours, and then 20 μL MTT solution with a concentration of 5 mg/mL was added to each well. After 4 hours, the culture medium was discarded and dissolved in 150 μL DMSO, and then the OD value at 570 nm was measured by BioRad iMark enzyme-linked immunosorbent assay. The inhibition rate was calculated as the inhibition rate IR (%) = (1- average OD value of the drug group/average OD value of the control group) × 100%.

Abbreviations Used

MTT, 3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-2-*H*-tetrazolium bromide; IC_{50}, half-maximal inhibitory concentration; SD, standard deviation; DMSO, dimethyl sulfoxide; THF, tetrahydrofuran; DCM, dichloromethane; PE, petroleum ether; EA, ethyl acetate; EtOH, ethyl alcohol; MeCN, acetonitrile; DIEA, N, N-Diisopropylethylamine; CDI, 1,1'-Carbonyldiimidazole; HDAC6, Histone Deacetylase 6.

General procedure

General procedure A (GP-A) for the construction of substituted *N′*-phenylacetohydrazide 2a-2f. [3]

Add 4-H, 4-F, 4-OCF_3, 4-CF_3, 4-Cl, or 4-Br substituted phenylhydrazine raw materials **1a-1f** (100 mmol) to a 1 L single-neck flask containing THF (40 mL), NaOH (10.0 g, 250 mmol), and H_2O (200 mL). Begin stirring the mixture at room temperature, then slowly add acetic anhydride (37.0 mL, 391 mmol) drop by drop through a constant pressure dropping funnel. After reacting for 2 hours, a large amount of solid will precipitate. Stop the reaction, filter the mixture, wash the solid with DCM, and recrystallize the solid using EA to obtain the pure solid. For each compound, yield (%) and ^{1}H NMR are reported.

General procedure B (GP-B) for the construction of substituted methyl 4-((2-acetyl-1-phenylhydrazinyl)methyl)benzoate 4a-4f.

Substituted *N′*-phenylacetohydrazide **2a-2f** (75 mmol), methyl 4-(bromomethyl) benzoate (25.77 g, 112.5 mmol), MeCN (100 mL), and DIEA (45 mL, 300 mmol) were sequentially added into 500 mL double-neck flask. The reaction mixture was refluxed for 18 hours, after which the solvent was removed by rotary evaporation. The target product was purified by column chromatography (PE: EA=1: 1). For each compound, yield (%) and ^{1}H NMR are reported.

General procedure C (GP-C) for the construction of substituted 4-((1-phenylhydrazinyl)methyl)benzoic acid 5a-5f.

Substituted methyl 4-((2-acetyl-1-phenylhydrazinyl)methyl) benzoate **4a-4f** (60 mmol), glacial acetic acid (30.0 mL), and concentrated hydrochloric acid (60.0 mL) were sequentially added into a 500 mL double-neck flask. The reaction mixture was heated to 120°C and stirred for 6 hours, with reaction progress monitored by TLC. Upon completion, the reaction mixture was cooled in an ice water bath, resulting in the precipitation of a large amount of solid. The solids were filtered and washed with DCM, then recrystallized from EA to yield the final solid product. For each compound, yield (%) and ^{1}H NMR are reported.

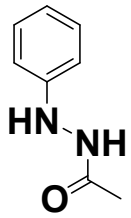
General procedure D (GP-D) for the construction of the intermediates 9a-9b, 10a-10h, and 11a-11f.

Substituted 4-((1-phenylhydrazine)methyl)benzoic acid **5a-5f** (10 mmol), ketone compounds (**6**, **7a-7d**, or **8**; 15 mmol), and EtOH (15.0 mL) were added to a 100 mL double-neck flask. Stir the mixture at room temperature for 2 hours, then add glacial acetic acid (25.0 mL) and heat the reaction to 125°C for 4 hours. Monitor the reaction progress by TLC. Upon completion, stop the reaction and remove the solvent by rotary evaporation. The target product was purified by column chromatography (PE: EA=1: 1). For each compound, yield (%); ^{1}H NMR; ^{19}F NMR; ^{13}C NMR; and MS (ESI) are reported.

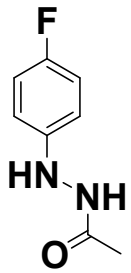
General procedure E (GP-E) for the construction of the target product 12a-12b, 13a-13h, and 14a-14f.

Intermediates (**9a-9b**, **10a-10h**, or **11a-11f**; 2 mmol), CDI (648.6 mg, 4 mmol), and DMSO (20.0 mL) were sequentially added to a 100 mL double-neck flask. Stir the mixture at room temperature under a nitrogen atmosphere for 2 hours. Then add hydroxylamine hydrochloride (555.92 mg, 8 mmol) and continue stirring at room temperature under a nitrogen atmosphere for 16 hours. Upon completion of the reaction, wash the reaction mixture with water, extract with ethyl acetate (EA), retain the organic layer, and remove the solvent by rotary evaporation. The target product was purified by column chromatography (PE: EA=1: 1). For each compound, yield (%); ^{1}H NMR; ^{19}F NMR; ^{13}C NMR; and MS (ESI) are reported.

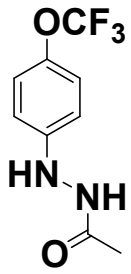
Characterization Data



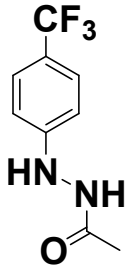
***N'*-phenylacetohydrazide (2a):** white solid, 57% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.59 (d, J = 2.9 Hz, 1H), 7.63 (d, J = 2.9 Hz, 1H), 7.15 – 7.09 (m, 2H), 6.70 – 6.66 (m, 3H), 1.89 (s, 3H).



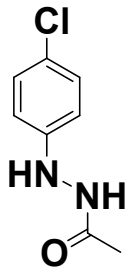
***N'*-(4-fluorophenyl)acetohydrazide (2b):** white solid, 67% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.61 (s, 1H), 7.62 (d, J = 2.9 Hz, 1H), 7.01 – 6.90 (m, 2H), 6.70 – 6.67 (m, 2H), 1.88 (s, 3H).



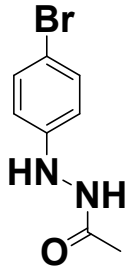
***N'*-(4-(trifluoromethoxy)phenyl)acetohydrazide (2c)**: white solid, 97% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.73 (s, 1H), 7.92 (s, 1H), 7.12 (d, J = 8.5 Hz, 2H), 6.74 (d, J = 9.0 Hz, 2H), 1.90 (s, 3H).



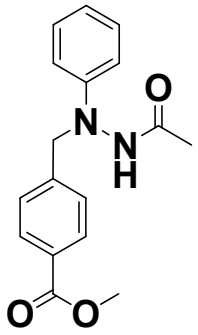
***N'*-(4-(trifluoromethyl)phenyl)acetohydrazide (2d)**: white solid, 98% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.75 (s, 1H), 8.31 (s, 1H), 7.45 (d, J = 8.6 Hz, 2H), 6.79 (d, J = 8.6 Hz, 2H), 1.92 (s, 3H).



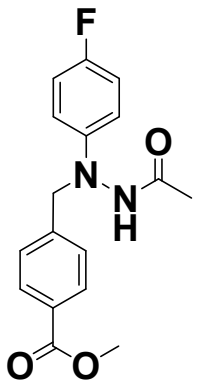
***N'*-(4-chlorophenyl)acetohydrazide (2e):** white solid, 99% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.66 (s, 1H), 7.84 (s, 1H), 7.15 (d, J = 8.8 Hz, 2H), 6.69 (d, J = 8.9 Hz, 2H), 1.89 (s, 3H).



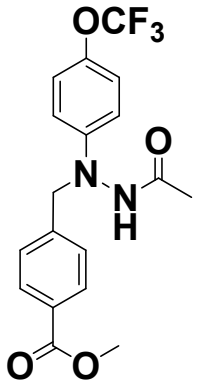
***N'*-(4-bromophenyl)acetohydrazide (2f):** white solid, 98% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 9.64 (s, 1H), 7.87 (s, 1H), 7.27 (d, J = 8.8 Hz, 2H), 6.65 (d, J = 8.8 Hz, 2H), 1.89 (s, 3H).



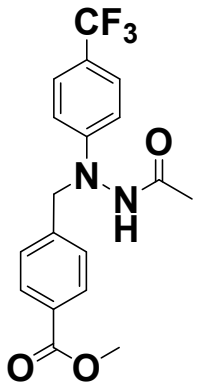
methyl 4-((2-acetyl-1-phenylhydrazinyl)methyl)benzoate (4a): white solid, 82% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.04 (s, 1H), 7.93 (d, J = 8.2 Hz, 2H), 7.55 (d, J = 8.1 Hz, 2H), 7.16 (t, J = 7.8 Hz, 2H), 6.76 – 6.71 (m, 3H), 4.73 (s, 2H), 3.84 (s, 3H), 1.87 (s, 3H).



methyl 4-((2-acetyl-1-(4-fluorophenyl)hydrazinyl)methyl)benzoate (4b): white solid, 83% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.03 (s, 1H), 7.93 (d, J = 8.3 Hz, 2H), 7.54 (d, J = 8.4 Hz, 2H), 7.05 – 6.98 (m, 2H), 6.77 – 6.71 (m, 2H), 4.71 (s, 2H), 3.84 (s, 3H), 1.84 (s, 3H).

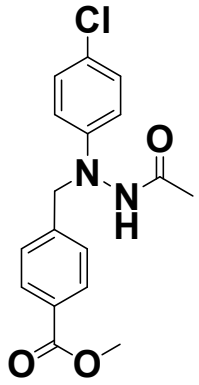


methyl 4-((2-acetyl-1-(4-(trifluoromethoxy)phenyl)hydrazinyl)methyl)benzoate (4c): white solid, 93% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.16 (s, 1H), 7.94 (d, J = 8.3 Hz, 2H), 7.54 (d, J = 8.4 Hz, 2H), 7.16 (d, J = 8.7 Hz, 2H), 6.78 (d, J = 9.2 Hz, 2H), 4.76 (s, 2H), 3.84 (s, 3H), 1.87 (s, 3H).

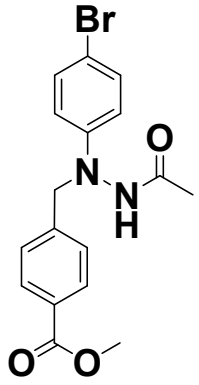


methyl 4-((2-acetyl-1-(4-(trifluoromethyl)phenyl)hydrazinyl)methyl)benzoate (4d): white solid, 93% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.30 (s, 1H), 7.94 (d, J = 8.3 Hz, 2H), 7.52 (d, J = 8.3 Hz, 2H), 7.48 (d, J = 8.8 Hz, 2H), 6.85 (d, J = 8.8 Hz,

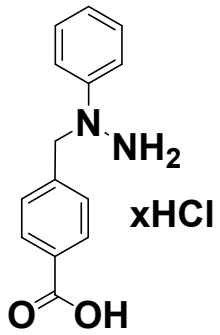
2H), 4.85 (s, 2H), 3.84 (s, 3H), 1.90 (s, 3H).



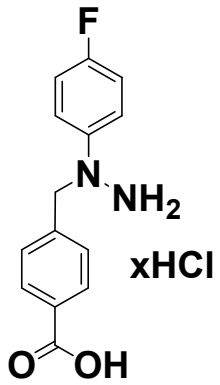
methyl 4-((2-acetyl-1-(4-chlorophenyl)hydrazinyl)methyl)benzoate (4e): white solid, 94% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.12 (s, 1H), 7.94 (d, J = 8.3 Hz, 2H), 7.53 (d, J = 8.3 Hz, 2H), 7.19 (d, J = 9.1 Hz, 2H), 6.74 (d, J = 9.1 Hz, 2H), 4.74 (s, 2H), 3.84 (s, 3H), 1.87 (s, 3H).



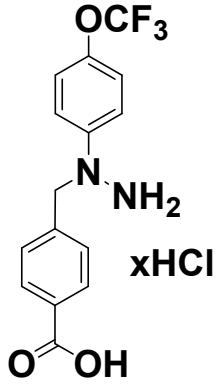
methyl 4-((2-acetyl-1-(4-bromophenyl)hydrazinyl)methyl)benzoate (4f): white solid, 91% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.13 (s, 1H), 7.93 (d, J = 8.3 Hz, 2H), 7.52 (d, J = 8.3 Hz, 2H), 7.31 (d, J = 9.1 Hz, 2H), 6.68 (d, J = 9.1 Hz, 2H), 4.73 (s, 2H), 3.84 (s, 3H), 1.86 (s, 3H).



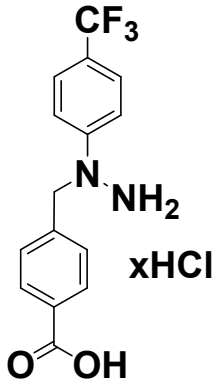
4-((1-phenylhydrazinyl)methyl)benzoic acid (5a): white solid, 95% yield.**^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.94 (s, 1H), 10.52 (s, 2H), 7.92 – 7.88 (m, 2H), 7.46 (d, J = 8.4 Hz, 2H), 7.37 – 7.31 (m, 2H), 7.21 – 7.16 (m, 2H), 7.12 – 7.07 (m, 1H), 4.79 (s, 2H).



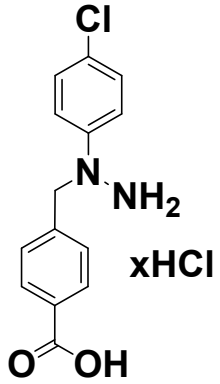
4-((1-(4-fluorophenyl)hydrazinyl)methyl)benzoic acid (5b): white solid, 96% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.94 (s, 1H), 10.40 (s, 2H), 7.95 – 7.87 (m, 2H), 7.43 (d, J = 8.3 Hz, 2H), 7.33 – 7.27 (m, 2H), 7.24 – 7.11 (m, 2H), 4.71 (s, 2H).



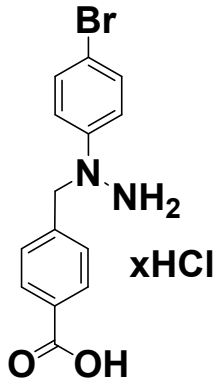
4-((1-(4-(trifluoromethoxy)phenyl)hydrazinyl)methyl)benzoic acid (5c): white solid, 99% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.49 (s, 2H), 7.91 (d, J = 8.3 Hz, 2H), 7.47 (d, J = 8.3 Hz, 2H), 7.35 (d, J = 8.7 Hz, 2H), 7.26 (d, J = 9.2 Hz, 2H), 4.83 (s, 2H).



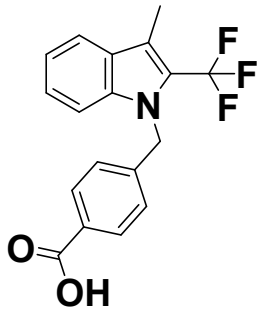
4-((1-(4-(trifluoromethyl)phenyl)hydrazinyl)methyl)benzoic acid (5d): white solid, 99% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.44 (s, 1H), 7.91 (d, J = 8.2 Hz, 2H), 7.84 (d, J = 8.8 Hz, 2H), 7.46 (d, J = 8.1 Hz, 2H), 7.08 (d, J = 8.8 Hz, 2H), 4.97 (s, 2H).



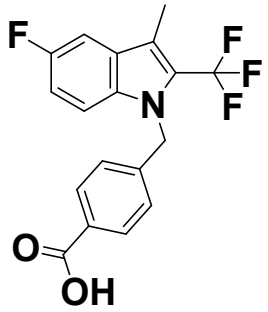
4-((1-(4-chlorophenyl)hydrazinyl)methyl)benzoic acid (5e): white solid, 94% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.75 (s, 2H), 7.90 (d, J = 8.3 Hz, 2H), 7.44 (d, J = 8.2 Hz, 2H), 7.38 (d, J = 9.0 Hz, 2H), 7.19 (d, J = 9.0 Hz, 2H), 4.81 (s, 2H).



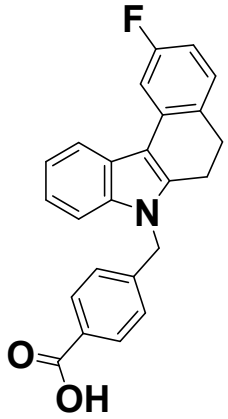
4-((1-(4-bromophenyl)hydrazinyl)methyl)benzoic acid (5f): white solid, 94% yield. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 10.77 (s, 2H), 7.90 (d, J = 8.3 Hz, 2H), 7.51 (d, J = 9.0 Hz, 2H), 7.45 (d, J = 8.3 Hz, 2H), 7.12 (d, J = 9.0 Hz, 2H), 4.82 (s, 2H).



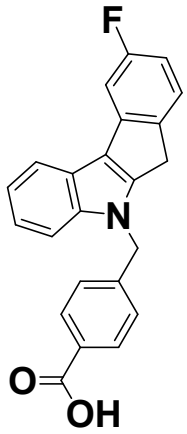
4-((3-methyl-2-(trifluoromethyl)-1H-indol-1-yl)methyl)benzoic acid (9a): white solid, 51% yield, MP: 216-219 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.90 (s, 1H), 7.86 (d, J = 8.3 Hz, 2H), 7.78 (d, J = 8.0 Hz, 1H), 7.46 (d, J = 8.4 Hz, 1H), 7.38 – 7.29 (m, 1H), 7.21 (t, J = 7.5 Hz, 1H), 7.02 (d, J = 8.2 Hz, 2H), 5.64 (s, 2H), 2.50 – 2.46 (m, 3H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 142.9, 137.4, 129.8, 129.7, 128.9 (q, J_{CF} = 250.66 Hz), 126.5, 125.7, 125.4, 121.3 (q, J_{CF} = 30.2 Hz), 120.5, 120.5, 115.1 (d, J_{CF} = 3.0 Hz), 110.9, 47.3 (d, J_{CF} = 2.6 Hz), 8.8 (q, J_{CF} = 3.02 Hz). **^{19}F NMR** (564 MHz, DMSO-d_6) δ -54.21. **HRMS** m/z: calcd for $C_{18}H_{14}F_3NO_2$: 334.1049, found: 334.1049.



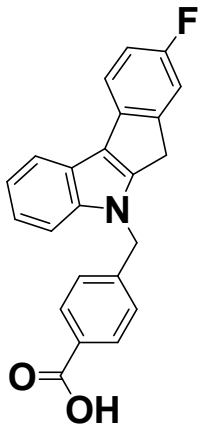
4-((5-fluoro-3-methyl-2-(trifluoromethyl)-1H-indol-1-yl)methyl)benzoic acid (9b): white solid, 40% yield, MP: 192-194 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.91 (s, 1H), 7.86 (d, J = 8.3 Hz, 2H), 7.61 (d, J = 9.5 Hz, 1H), 7.51 (dd, J = 9.1, 4.3 Hz, 1H), 7.21 (td, J = 9.2, 2.5 Hz, 1H), 7.01 (d, J = 8.2 Hz, 2H), 5.64 (s, 2H), 2.46 – 2.43 (m, 3H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 157.6 (d, J_{CF} = 235.0 Hz), 142.7, 134.0, 129.8, 129.7, 126.8 (d, J_{CF} = 10.0 Hz), 125.7, 123.1 (q, J_{CF} = 24.2 Hz), 123.0 (q, J_{CF} = 282.4 Hz), 115.0 (dt, J_{CF} = 5.6, 2.8 Hz), 114.1 (d, J_{CF} = 26.6 Hz), 112.5 (d, J_{CF} = 9.4 Hz), 105.2 (d, J_{CF} = 23.6 Hz), 47.5, 8.9. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -54.62, -122.65. **HRMS** m/z: calcd for $C_{18}H_{13}F_4NO_2$: 352.0955, found: 352.0966.



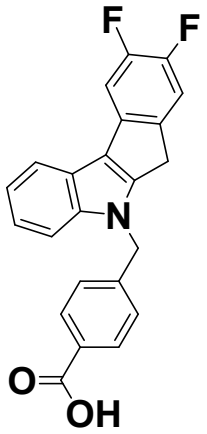
4-((2-fluoro-5,6-dihydro-7*H*-benzo[*c*]carbazol-7-yl)methyl)benzoic acid (10a): white solid, 50% yield, MP: 241-245 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.92 (s, 1H), 7.90 (d, J = 8.4 Hz, 2H), 7.64 (d, J = 7.8 Hz, 1H), 7.42 (d, J = 8.2 Hz, 1H), 7.37 (dd, J = 8.3, 6.1 Hz, 1H), 7.21 – 7.14 (m, 3H), 7.12 (t, J = 7.4 Hz, 1H), 7.07 (dd, J = 10.7, 2.6 Hz, 1H), 6.97 (td, J = 8.5, 2.6 Hz, 1H), 5.82 (s, 2H), 2.91 (t, J = 2.5 Hz, 4H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.1, 160.3, 143.5, 139.0, 133.3 (d, J_{CF} = 2.8 Hz), 133.0 (d, J_{CF} = 2.2 Hz), 130.1 (d, J_{CF} = 8.5 Hz), 130.0 (d, J_{CF} = 8.4 Hz), 129.9, 129.8, 126.0, 125.5, 123.0, 120.1, 119.1, 115.3, 112.5 (d, J_{CF} = 20.9 Hz), 110.3, 108.9 (d, J_{CF} = 24.1 Hz), 47.4, 29.2, 19.6. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -115.30. **HRMS** m/z: calcd for $C_{24}H_{18}FNO_2$: 372.1394, found: 372.1384.



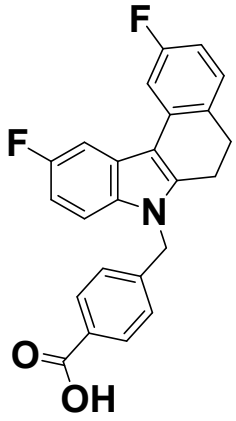
4-((9-fluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzoic acid (10b): light brown solid, 45% yield, MP: 279-282 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.90 (s, 1H), 7.86 (d, J = 8.4 Hz, 2H), 7.66 (d, J = 7.8 Hz, 1H), 7.59 (d, J = 8.2 Hz, 1H), 7.55 (dd, J = 8.2, 5.2 Hz, 1H), 7.43 (dd, J = 9.5, 2.5 Hz, 1H), 7.22 (d, J = 8.3 Hz, 2H), 7.20 – 7.15 (m, 1H), 7.15 – 7.10 (m, 1H), 7.03 – 6.97 (m, 1H), 5.90 (s, 2H), 3.75 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 161.7 (d, J_{CF} = 239.9 Hz), 143.5, 143.2, 142.8 (d, J_{CF} = 2.9 Hz), 141.5, 136.0 (d, J_{CF} = 9.8 Hz), 129.9, 129.8, 126.6 (d, J_{CF} = 9.3 Hz), 126.4, 123.6, 122.8, 122.1, 120.0, 119.3, 111.0, 110.9 (d, J_{CF} = 22.6 Hz), 105.4 (d, J_{CF} = 24.9 Hz), 46.9, 29.4. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -116.14. **HRMS** m/z: calcd for $C_{23}H_{16}FNO_2$: 358.1238, found: 358.1239.



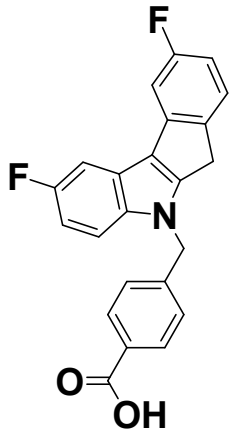
4-((8-fluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzoic acid (10c): light yellow solid, 54% yield, MP: 249-253 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.88 (s, 1H), 7.85 (d, J = 8.2 Hz, 2H), 7.63 (d, J = 7.7 Hz, 1H), 7.59 – 7.53 (m, 2H), 7.45 (d, J = 9.0 Hz, 1H), 7.22 (d, J = 8.2 Hz, 2H), 7.17 – 7.08 (m, 3H), 5.87 (s, 2H), 3.78 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 159.7, 150.4 (d, J_{CF} = 8.6 Hz), 143.4, 143.0, 141.2, 131.0 (d, J_{CF} = 2.2 Hz), 129.8, 129.8, 126.4, 123.8, 121.5, 120.4 (d, J_{CF} = 2.8 Hz), 119.9, 119.0, 118.7 (d, J_{CF} = 8.7 Hz), 113.6 (d, J_{CF} = 23.2 Hz), 113.3 (d, J_{CF} = 22.5 Hz), 110.8, 47.0, 30.2. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -117.57. **HRMS** m/z: calcd for $C_{23}H_{16}FNO_2$: 358.1238, found: 358.1241.



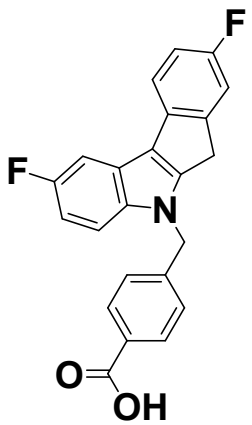
4-((8,9-difluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzoic acid (10d): white solid, 75% yield, MP: 279-283 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.88 (s, 1H), 7.86 (d, J = 8.3 Hz, 2H), 7.69 – 7.62 (m, 3H), 7.57 (d, J = 8.2 Hz, 1H), 7.21 (d, J = 8.3 Hz, 2H), 7.19 – 7.14 (m, 1H), 7.12 (t, J = 7.4 Hz, 1H), 5.88 (s, 2H), 3.77 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 148.9 (dd, J_{CF} = 219.0, 13.6 Hz), 147.3 (dd, J_{CF} = 220.4, 13.6 Hz), 144.2 (dd, J_{CF} = 6.5, 2.7 Hz), 143.4, 142.2, 141.4, 131.1 (dd, J_{CF} = 7.9, 2.8 Hz), 129.9, 129.8, 126.5, 123.6, 122.2, 122.0, 120.1, 119.2, 115.2, 111.0, 106.8 (d, J_{CF} = 20.3 Hz), 46.8, 29.9. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -140.91, -142.93. **HRMS** m/z: calcd for $C_{23}H_{15}F_2NO_2$: 376.1144, found: 376.1150.



4-((2,10-difluoro-5,6-dihydro-7*H*-benzo[*c*]carbazol-7-yl)methyl)benzoic acid (10e): white solid, 81% yield, MP: 261-263 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.93 (s, 1H), 7.90 (d, J = 8.4 Hz, 2H), 7.52 – 7.41 (m, 2H), 7.38 (dd, J = 8.3, 6.1 Hz, 1H), 7.14 (d, J = 8.1 Hz, 2H), 7.09 (dd, J = 10.6, 2.6 Hz, 1H), 7.06 – 6.97 (m, 2H), 5.83 (s, 2H), 2.95 – 2.85 (m, 4H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 161.0 (d, J_{CF} = 240.8 Hz), 157.6 (d, J_{CF} = 233.4 Hz), 143.3, 135.6, 134.7 (d, J_{CF} = 2.2 Hz), 133.5 (d, J_{CF} = 2.8 Hz), 130.1 (d, J_{CF} = 8.2 Hz), 129.9, 129.8, 129.8 (d, J_{CF} = 8.4 Hz), 125.9, 125.8 (d, J_{CF} = 10.2 Hz), 115.1 (d, J_{CF} = 4.9 Hz), 112.9 (d, J_{CF} = 20.9 Hz), 111.6 (d, J_{CF} = 9.7 Hz), 111.0 (d, J_{CF} = 26.2 Hz), 109.1 (d, J_{CF} = 24.3 Hz), 103.8 (d, J_{CF} = 23.4 Hz), 47.6, 29.1, 19.5. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -115.20, -123.61. **HRMS** m/z: calcd for $C_{24}H_{17}F_2NO_2$: 390.1300, found: 390.1295.

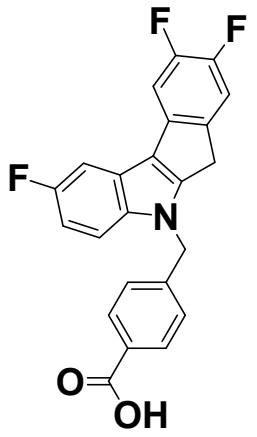


4-((2,9-difluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzoic acid (10f): yellow solid, 84% yield, MP: 290-292 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.89 (s, 1H), 7.87 (d, J = 8.2 Hz, 2H), 7.60 (dd, J = 9.0, 4.4 Hz, 1H), 7.57 (dd, J = 8.3, 5.3 Hz, 1H), 7.48 – 7.40 (m, 2H), 7.21 (d, J = 8.2 Hz, 2H), 7.06 – 6.99 (m, 2H), 5.90 (s, 2H), 3.74 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 161.7 (d, J_{CF} = 240.3 Hz), 157.5 (d, J_{CF} = 233.3 Hz), 144.6 (d, J_{CF} = 2.8 Hz), 143.3 (d, J_{CF} = 2.1 Hz), 143.3, 138.2, 135.7 (d, J_{CF} = 9.9 Hz), 129.9, 129.8, 126.7 (d, J_{CF} = 9.3 Hz), 126.4, 123.7 (d, J_{CF} = 10.4 Hz), 122.5 (d, J_{CF} = 4.8 Hz), 112.1 (d, J_{CF} = 9.9 Hz), 111.5 (d, J_{CF} = 22.5 Hz), 109.9 (d, J_{CF} = 26.1 Hz), 105.7 (d, J_{CF} = 25.0 Hz), 104.1 (d, J_{CF} = 23.6 Hz), 47.1, 29.4. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -115.99, -123.62. **HRMS** m/z: calcd for $C_{23}H_{15}F_2NO_2$: 376.1144, found: 376.1141.

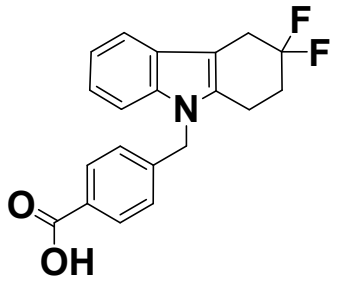


4-((2,8-difluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzoic acid (10g): light yellow solid, 77% yield, MP: 278-281 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.90 (s, 1H), 7.86 (d, J = 8.3 Hz, 2H), 7.61 – 7.55 (m, 2H), 7.46 (dd, J = 9.1, 2.5 Hz, 1H), 7.40 (dd, J = 9.8, 2.6 Hz, 1H), 7.21 (d, J = 8.4 Hz, 2H), 7.13 (td, J = 9.2, 8.7, 2.6 Hz, 1H), 6.98 (td, J = 9.2, 2.6 Hz, 1H), 5.88 (s, 2H), 3.77 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 160.7 (d, J_{CF} = 242.2 Hz), 157.5 (d, J_{CF} = 233.0 Hz), 150.5 (d, J_{CF} = 8.5 Hz), 144.7, 143.2, 137.9, 130.6 (d, J_{CF} = 2.2 Hz), 129.9, 129.8, 126.4, 123.9 (d, J_{CF} = 10.7 Hz), 120.1 (q, J_{CF} = 6.04 Hz), 119.1 (d, J_{CF} = 8.8 Hz), 113.7 (d, J_{CF} = 23.2 Hz), 113.4 (d, J_{CF} = 22.6 Hz), 111.9 (d, J_{CF} = 10.0 Hz), 109.2 (d, J_{CF} = 26.1 Hz), 103.8

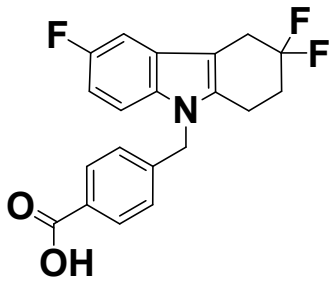
(d, J_{CF} = 23.7 Hz), 47.1, 30.2. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -116.89, -123.78. **HRMS** m/z: calcd for $C_{23}H_{15}F_2NO_2$: 376.1144, found: 376.1142.



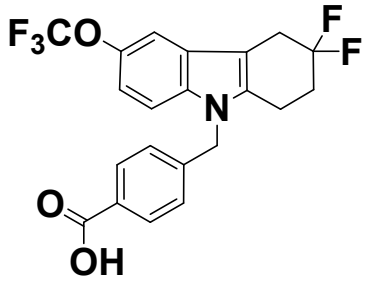
4-((2,8,9-trifluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzoic acid (10h): yellow solid, 71% yield, MP: 250-253 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.89 (s, 1H), 7.86 (d, *J* = 8.3 Hz, 2H), 7.72 – 7.65 (m, 2H), 7.58 (dd, *J* = 9.0, 4.4 Hz, 1H), 7.42 (dd, *J* = 9.7, 2.6 Hz, 1H), 7.20 (d, *J* = 8.4 Hz, 2H), 7.01 (td, *J* = 9.2, 2.6 Hz, 1H), 5.89 (s, 2H), 3.75 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.0, 157.5 (d, J_{CF} = 233.3 Hz), 148.2 (dd, J_{CF} = 243.3, 183.7 Hz), 147.5 (d, J_{CF} = 184.6 Hz), 144.3 (dd, J_{CF} = 6.6, 2.8 Hz), 143.9, 143.2, 138.0, 130.7 (dd, J_{CF} = 3.02 Hz), 129.9, 129.8, 126.4, 123.7 (d, J_{CF} = 10.5 Hz), 121.9 (dd, J_{CF} = 4.53 Hz), 115.2 (d, J_{CF} = 18.7 Hz), 112.1 (d, *J* = 9.8 Hz), 109.8 (d, J_{CF} = 25.9 Hz), 107.2 (d, J_{CF} = 20.5 Hz), 104.1 (d, J_{CF} = 23.8 Hz), 47.0, 29.9. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -123.56, -140.71, -142.19. **HRMS** m/z: calcd for $C_{23}H_{14}F_3NO_2$: 394.1049, found: 394.1057.



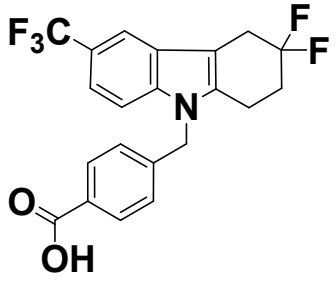
4-((3,3-difluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzoic acid (11a): white solid, 70% yield, MP: 264-266 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.92 (s, 1H), 7.88 (d, *J* = 7.9 Hz, 2H), 7.45 (s, 1H), 7.39 (s, 1H), 7.12 (d, *J* = 8.2 Hz, 2H), 7.09 (s, 1H), 7.03 (s, 1H), 5.45 (s, 2H), 3.27 (s, 2H), 2.86 (s, 2H), 2.34 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.5, 143.8, 137.5, 133.4, 130.2, 126.9, 126.6, 125.1, 121.8 (q, J_{CF} = 77.46 Hz, CF_2), 119.6, 118.2, 117.7, 110.1, 105.2, 46.1, 31.6 (t, J_{CF} = 26.73 Hz), 30.6 (t, J_{CF} = 25.07 Hz), 19.7 (t, J_{CF} = 4.98 Hz). **HRMS** m/z: calcd for $C_{20}H_{17}F_2NO_2$: 342.1300, found: 342.1297.



4-((3,3,6-trifluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzoic acid (11b): white solid, 70% yield, MP: 291-293 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.92 (s, 1H), 7.87 (d, J = 7.8 Hz, 2H), 7.40 (s, 1H), 7.27 (s, 1H), 7.11 (d, J = 8.0 Hz, 2H), 6.93 (s, 1H), 5.46 (s, 2H), 3.25 (s, 2H), 2.86 (s, 2H), 2.34 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.5, 158.4, 156.8, 143.6, 135.5, 134.1, 130.3 (t, J_{CF} = 8.76 Hz), 126.9 (q J_{CF} = 31.33 Hz, CF_2), 124.9, 123.3, 111.2, 109.6, 105.5, 103.4, 103.2, 46.3, 31.5 (t, J_{CF} = 26.88 Hz), 30.5 (t, J_{CF} = 25.22 Hz), 19.8 (t, J_{CF} = 5.13 Hz). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -95.39, -124.65. **HRMS** m/z: calcd for $C_{20}H_{16}F_3NO_2$: 360.1206, found: 360.1207.

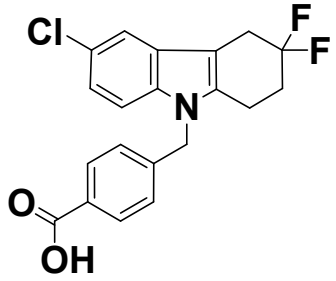


4-((3,3-difluoro-6-(trifluoromethoxy)-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzoic acid (11c): white solid, 67% yield, MP: 272-274 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.93 (s, 1H), 7.88 (d, J = 8.3 Hz, 2H), 7.50 (s, 1H), 7.48 (s, 1H), 7.13 (d, J = 8.4 Hz, 2H), 7.08 (s, 1H), 5.50 (s, 2H), 3.29 (s, 2H), 2.88 (s, 2H), 2.35 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.4, 143.3, 142.4, 136.0, 130.3 (q, J_{CF} = 12.84 Hz, OCF_3), 127.6, 127.0, 126.8, 126.4, 124.8, 121.8 (q, J_{CF} = 35.21 Hz, CF_2), 115.2, 113.1, 111.3 105.9, 46.4, 31.4 (t, J_{CF} = 27.18 Hz), 30.4 (t, J_{CF} = 25.22 Hz), 19.8 (t, J_{CF} = 4.53 Hz). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -56.87, -95.50. **HRMS** m/z: calcd for $C_{21}H_{16}F_5NO_3$: 426.1123, found: 426.1117.

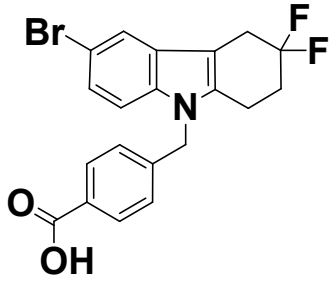


4-((3,3-difluoro-6-(trifluoromethyl)-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzoic acid (11d): white solid, 64% yield, MP: 253-255 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.94 (s, 1H), 7.89 (d, J = 4.3 Hz, 2H), 7.88 (s, 1H), 7.62 (s, 1H),

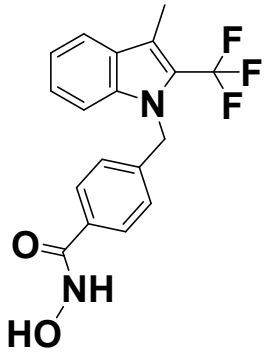
7.41 (s, 1H), 7.12 (d, J = 8.3 Hz, 2H), 5.55 (s, 2H), 3.35 (s, 2H), 2.89 (s, 2H), 2.36 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.5, 143.2, 139.0, 136.1, 130.3 (q, J_{CF} = 15.86 Hz, CF_3), 126.9, 126.0, 125.1, 124.8, 123.2, 120.7 (q, J_{CF} = 31.11 Hz, CF_2), 118.2, 116.0, 110.9, 106.6, 46.4, 31.3 (t, J_{CF} = 27.18 Hz), 30.4 (t, J_{CF} = 25.22 Hz), 19.8 (t, J_{CF} = 27.18 Hz). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -58.43, -95.49. **HRMS** m/z: calcd for $C_{21}H_{16}F_5NO_2$: 410.1174, found: 410.1180.



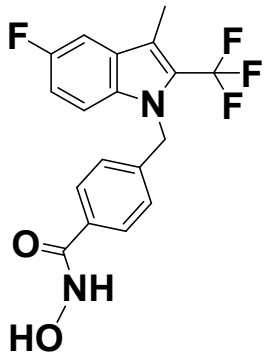
4-((6-chloro-3,3-difluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzoic acid (11e): white solid, 68% yield, MP: 296-299 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.92 (s, 1H), 7.87 (d, J = 5.2 Hz, 2H), 7.54 (s, 1H), 7.43 (s, 1H), 7.11 (d, J = 7.0 Hz, 2H), 7.09 (s, 1H), 5.47 (s, 2H), 3.26 (s, 2H), 2.86 (s, 2H), 2.34 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.5, 143.4, 136.0, 135.4, 130.3, 127.7, 127.6, 126.9, 124.4 (q, J_{CF} = 71.42 Hz, CF_2), 121.6, 117.6, 114.1, 111.8, 105.3, 46.3, 31.4 (t, J_{CF} = 26.73 Hz), 30.4 (t, J_{CF} = 25.07 Hz), 19.8 (t, J_{CF} = 4.68 Hz). **HRMS** m/z: calcd for $C_{20}H_{16}ClF_2NO_2$: 376.0910, found: 376.0910.



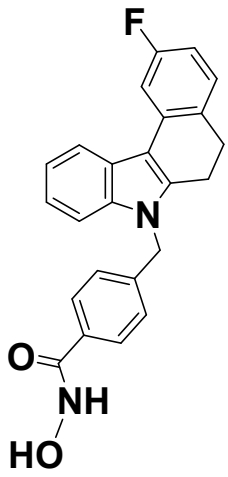
4-((6-bromo-3,3-difluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzoic acid (11f): white solid, 60% yield, MP: 295-297 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 12.91 (s, 1H), 7.87 (d, J = 7.0 Hz, 2H), 7.68 (s, 1H), 7.39 (s, 1H), 7.21 (s, 1H), 7.10 (d, J = 8.3 Hz, 2H), 5.47 (s, 2H), 3.26 (s, 2H), 2.86 (s, 2H), 2.34 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 167.5, 143.3, 136.2, 135.2, 131.8, 130.3, 128.4, 126.9, 124.2 (q, J_{CF} = 105.55 Hz, CF_2), 120.6, 112.3, 112.2, 105.2, 46.3, 31.4 (t, J_{CF} = 26.88 Hz), 30.4 (t, J_{CF} = 32.77 Hz), 19.7 (t, J_{CF} = 9.21 Hz). **HRMS** m/z: calcd for $C_{20}H_{16}BrF_2NO_2$: 420.0405, found: 420.0407.



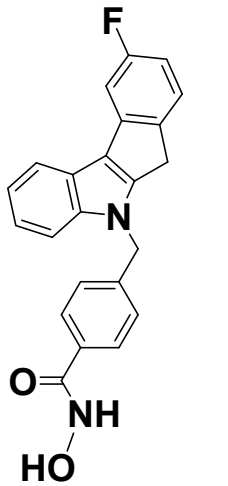
***N*-hydroxy-4-((3-methyl-2-(trifluoromethyl)-1*H*-indol-1-yl)methyl)benzamide (12a):** white solid, 37% yield, MP: 195-197 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.12 (s, 1H), 8.99 (s, 1H), 7.78 (d, J = 8.0 Hz, 1H), 7.64 (d, J = 8.3 Hz, 2H), 7.45 (d, J = 8.4 Hz, 1H), 7.32 (t, J = 7.1 Hz, 1H), 7.20 (t, J = 7.5 Hz, 1H), 6.96 (d, J = 8.3 Hz, 2H), 5.60 (s, 2H), 2.48 (q, J = 2.7 Hz, 3H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 141.4, 137.8, 132.3, 127.6, 127.0, 126.0, 125.8, 123.8 (q, J_{CF} = 268.78 Hz), 121.7 (q, J_{CF} = 34.9 Hz), 120.9, 115.5 (q, J_{CF} = 3.02 Hz), 111.4, 47.6, 9.3. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -54.17. **HRMS** m/z: calcd for $C_{18}H_{15}F_3N_2O_2$: 349.1158, found: 349.1157.



4-((5-fluoro-3-methyl-2-(trifluoromethyl)-1*H*-indol-1-yl)methyl)-*N*-hydroxybenzamide (12b): white solid, 27% yield, MP: 161-163 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.13 (s, 1H), 9.01 (s, 1H), 7.65 (d, J = 8.3 Hz, 2H), 7.60 (d, J = 9.4 Hz, 1H), 7.50 (dd, J = 9.1, 4.3 Hz, 1H), 7.20 (td, J = 9.1, 2.5 Hz, 1H), 6.96 (d, J = 8.0 Hz, 2H), 5.61 (s, 2H), 2.46 – 2.43 (m, 3H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 163.9, 157.6 (d, J_{CF} = 234.8 Hz), 140.8, 134.0, 131.9, 127.2, 126.8 (d, J_{CF} = 9.9 Hz), 125.5, 123.0 (q, J_{CF} = 280.86 Hz), 122.9 (d, J_{CF} = 45.8 Hz), 115.0 (q, J_{CF} = 3.02 Hz), 114.1 (d, J_{CF} = 26.6 Hz), 112.6 (d, J_{CF} = 9.6 Hz), 105.2 (d, J_{CF} = 23.6 Hz), 47.4 (d, J_{CF} = 2.5 Hz), 8.9 (q, J_{CF} = 3.02 Hz) **^{19}F NMR** (564 MHz, DMSO-d_6) δ -54.57, -122.65. **HRMS** m/z: calcd for $C_{18}H_{14}F_4N_2O_2$: 367.1064, found: 367.1050.

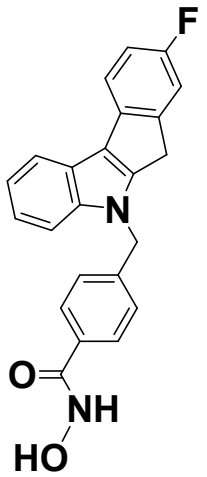


4-((2-fluoro-5,6-dihydro-7*H*-benzo[*c*]carbazol-7-yl)methyl)-*N*-hydroxybenzamide (13a): light yellow solid, 38% yield, MP: 207-210 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.14 (s, 1H), 9.00 (s, 1H), 7.69 (d, J = 8.1 Hz, 2H), 7.64 (d, J = 7.8 Hz, 1H), 7.42 (d, J = 8.2 Hz, 1H), 7.38 (dd, J = 8.3, 6.1 Hz, 1H), 7.20 – 7.15 (m, 1H), 7.14 – 7.06 (m, 4H), 6.97 (td, J = 8.5, 2.6 Hz, 1H), 5.79 (s, 2H), 2.91 (t, J = 2.5 Hz, 4H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.0, 161.1 (d, J_{CF} = 240.6 Hz), 141.5, 139.0, 133.3 (d, J_{CF} = 2.9 Hz), 133.0 (d, J_{CF} = 2.2 Hz), 131.9, 130.1 (d, J_{CF} = 8.5 Hz), 130.0 (d, J_{CF} = 8.4 Hz), 127.5, 125.8, 125.5, 123.0, 120.0, 119.1, 115.2, 112.5 (d, J_{CF} = 20.9 Hz), 110.3, 108.9 (d, J_{CF} = 24.2 Hz), 47.3, 29.2, 19.6. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -115.23. **HRMS** m/z: calcd for $C_{24}H_{19}FN_2O_2$: 387.1503, found: 387.1493.

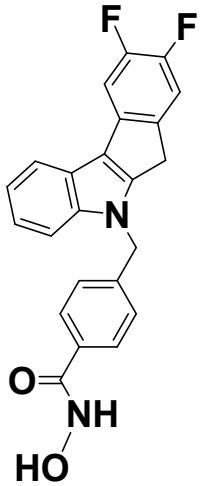


4-((9-fluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)-*N*-hydroxybenzamide (13b): white solid, 39% yield, MP: 228-230 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.10 (s, 1H), 8.99 (s, 1H), 7.79 – 7.62 (m, 3H), 7.62 – 7.57 (m, 1H), 7.55 (dd, J = 8.3, 5.2 Hz, 1H), 7.48 – 7.42 (m, 1H), 7.20 – 7.15 (m, 3H), 7.12 (t, J = 7.4 Hz, 1H), 7.03 – 6.97 (m, 1H), 5.86 (s, 2H), 3.74 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.0, 161.7 (d, J_{CF} = 240.1 Hz), 143.2 (d, J_{CF} = 2.4 Hz), 142.8 (d, J_{CF} = 3.0 Hz), 141.6 (q, J_{CF} = 9.06 Hz), 136.1 (d, J_{CF} = 9.9 Hz), 131.9, 127.9, 127.3, 126.5 (d, J_{CF} = 9.3 Hz), 126.3, 126.1, 123.6, 122.8, 122.0, 119.99, 119.3, 111.0, 105.5 (d, J_{CF} = 24.9 Hz), 46.8, 29.4. **^{19}F**

NMR (564 MHz, DMSO-d_6) δ -116.09. **HRMS** m/z: calcd for $C_{23}H_{17}FN_2O_2$: 373.1347, found: 373.1341.

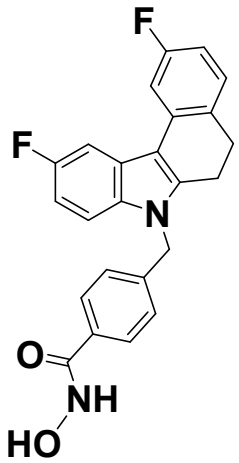


4-((8-fluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)-*N*-hydroxybenzamide (13c): white solid, 38% yield, MP: 194-196 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.10 (s, 1H), 8.98 (s, 1H), 7.68 – 7.61 (m, 3H), 7.61 – 7.56 (m, 2H), 7.45 (dd, J = 9.1, 2.5 Hz, 1H), 7.19 – 7.08 (m, 5H), 5.83 (s, 2H), 3.78 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.0, 160.4 (d, J_{CF} = 241.8 Hz), 150.4 (d, J_{CF} = 8.6 Hz), 142.9, 141.5, 141.2, 131.9, 131.0 (d, J_{CF} = 2.2 Hz), 127.3, 126.2, 123.8, 121.4, 120.3 (d, J_{CF} = 3.0 Hz), 119.9, 119.0, 118.7 (d, J_{CF} = 8.7 Hz), 113.6 (d, J_{CF} = 23.3 Hz), 113.3 (d, J_{CF} = 22.7 Hz), 110.9, 46.9, 30.1. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -117.55. **HRMS** m/z: calcd for $C_{23}H_{17}FN_2O_2$: 373.1347, found: 373.1343.

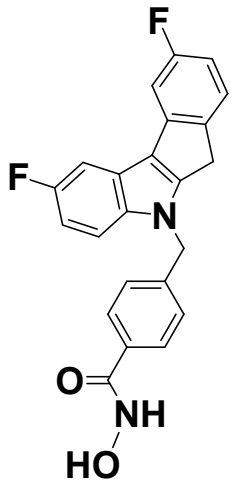


4-((8,9-difluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)-*N*-hydroxybenzamide (13d): white solid, 37% yield, MP: 213-215 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.11 (s, 1H), 8.99 (s, 1H), 7.80 – 7.61 (m, 5H), 7.58 (d, J = 8.2 Hz, 1H), 7.21 – 7.14 (m, 3H), 7.12 (t, J = 7.4 Hz, 1H), 5.85 (s, 2H), 3.76 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.0, 148.2 (dd, J_{CF} = 242.9, 221.1 Hz), 148.1 (dd, J_{CF} = 242.9, 221.1 Hz), 144.1 (dd, J_{CF} = 6.6, 2.8 Hz), 142.2, 141.5 (dd, J_{CF} =22.65, 9.06 Hz), 131.1 (d, J_{CF} = 7.7 Hz),

127.9, 127.3, 126.3, 126.2, 123.6, 122.2 (d, J_{CF} = 3.1 Hz), 121.9, 120.1, 119.2, 115.1 (d, J_{CF} = 18.7 Hz), 111.1, 106.8 (d, J_{CF} = 20.4 Hz), 46.7, 29.9. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -140.84, -142.90. **HRMS** m/z: calcd for $C_{23}H_{16}F_2N_2O_2$: 391.1253, found: 391.1245.

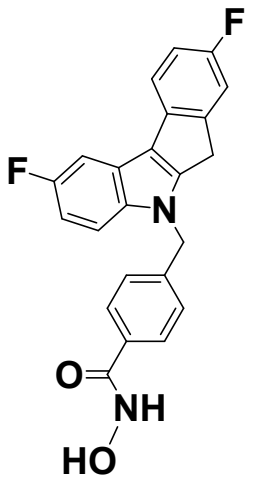


4-((2,10-difluoro-5,6-dihydro-7*H*-benzo[*c*]carbazol-7-yl)methyl)-*N*-hydroxybenzamide (13e): light brown solid, 24% yield, MP: 193-195 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.15 (s, 1H), 9.01 (s, 1H), 7.69 (d, J = 8.3 Hz, 2H), 7.47 – 7.41 (m, 2H), 7.41 – 7.36 (m, 1H), 7.16 – 7.07 (m, 3H), 7.05 – 6.97 (m, 2H), 5.80 (s, 2H), 2.94 – 2.85 (m, 4H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.0, 160.1 (d, J_{CF} = 532.9 Hz), 158.5 (d, J_{CF} = 525.8 Hz), 141.3, 135.6, 134.7 (d, J_{CF} = 2.1 Hz), 133.5 (d, J_{CF} = 2.9 Hz), 131.9, 130.1 (d, J_{CF} = 8.3 Hz), 129.8 (d, J = 8.3 Hz), 127.5, 125.8, 125.7, 115.1 (d, J_{CF} = 4.9 Hz), 112.9 (d, J_{CF} = 20.8 Hz), 111.6 (d, J_{CF} = 9.6 Hz), 110.9 (d, J_{CF} = 26.1 Hz), 109.1 (d, J_{CF} = 24.3 Hz), 103.8 (d, J_{CF} = 23.4 Hz), 47.5, 29.1, 19.5. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -115.14, -123.63. **HRMS** m/z: calcd for $C_{24}H_{18}F_2N_2O_2$: 405.1409, found: 405.1393.

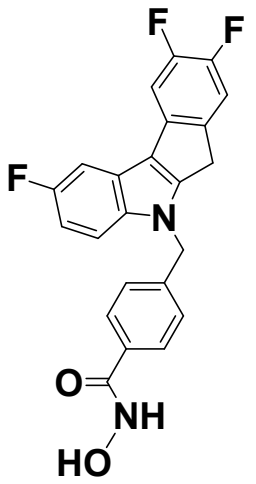


4-((2,9-difluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)-*N*-hydroxybenzamide (13f): light grayish yellow solid, 39% yield, MP: 210-213 °C. **^{1}H NMR** (600 MHz, DMSO-d_6)

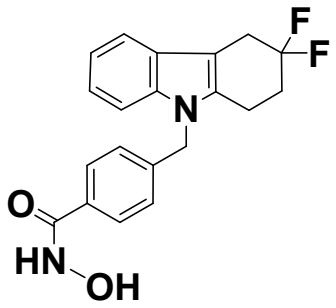
δ 11.11 (s, 1H), 9.00 (s, 1H), 7.74 – 7.64 (m, 2H), 7.61 (dd, *J* = 9.0, 4.4 Hz, 1H), 7.57 (dd, *J* = 8.3, 5.2 Hz, 1H), 7.48 (dd, *J* = 9.4, 2.5 Hz, 1H), 7.42 (dd, *J* = 9.7, 2.6 Hz, 1H), 7.17 (d, *J* = 6.8 Hz, 2H), 7.06 – 6.99 (m, 2H), 5.86 (s, 2H), 3.73 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 163.9, 160.4 (d, J_{CF} = 635.5 Hz), 158.8 (d, J_{CF} = 628.8 Hz), 144.5 (d, J_{CF} = 2.9 Hz), 143.3 (d, J_{CF} = 2.2 Hz), 141.4, 138.2, 135.7 (d, J_{CF} = 10.0 Hz), 132.0, 127.3, 126.7 (d, J_{CF} = 9.2 Hz), 126.2, 123.7 (d, J_{CF} = 10.4 Hz), 122.4, 112.1 (d, J_{CF} = 9.8 Hz), 111.4 (d, J_{CF} = 22.5 Hz), 109.9 (d, J_{CF} = 26.3 Hz), 105.8 (d, J_{CF} = 25.0 Hz), 104.1 (d, J_{CF} = 23.8 Hz), 47.0, 29.4. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -115.95, -123.62. **HRMS** m/z: calcd for $C_{23}H_{16}F_2N_2O_2$: 391.1253, found: 391.1249.



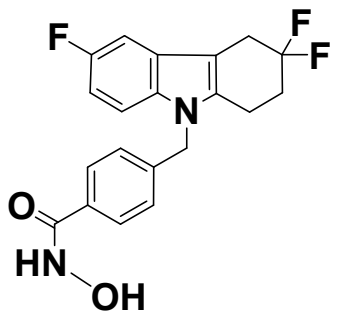
4-((2,8-difluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)-*N*-hydroxybenzamide (13g): light yellow solid, 42% yield, MP: 212-215 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.11 (s, 1H), 8.99 (s, 1H), 7.64 (d, *J* = 8.3 Hz, 2H), 7.61 (dd, *J* = 8.4, 5.1 Hz, 1H), 7.59 (dd, *J* = 9.0, 4.4 Hz, 1H), 7.46 (dd, *J* = 9.2, 2.5 Hz, 1H), 7.39 (dd, *J* = 9.7, 2.6 Hz, 1H), 7.20 – 7.09 (m, 3H), 6.98 (td, *J* = 9.2, 2.5 Hz, 1H), 5.84 (s, 2H), 3.77 (s, 2H). ^{13}C NMR (151 MHz, DMSO-d_6) δ 163.9, 159.9 (d, J_{CF} = 485.7 Hz), 158.3 (d, J_{CF} = 476.7 Hz), 150.5 (d, J_{CF} = 8.7 Hz), 144.7, 141.3, 137.9, 132.0, 130.6, 127.3, 126.2, 123.9 (d, J_{CF} = 10.6 Hz), 120.1 (q, J_{CF} = 3.02 Hz), 119.1 (d, J_{CF} = 8.8 Hz), 113.7 (d, J_{CF} = 23.3 Hz), 113.4 (d, J_{CF} = 22.5 Hz), 111.9 (d, J_{CF} = 10.0 Hz), 109.2 (d, J_{CF} = 25.8 Hz), 103.8 (d, J_{CF} = 23.8 Hz), 47.0, 30.1. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -116.87, -123.79. **HRMS** m/z: calcd for $C_{23}H_{16}F_2N_2O_2$: 391.1253, found: 391.1238.



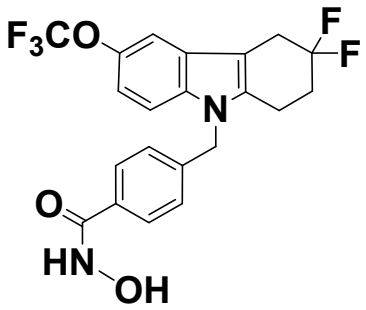
***N*-hydroxy-4-((2,8,9-trifluoroindeno[2,1-*b*]indol-5(6*H*)-yl)methyl)benzamide (13h):** light earth-yellow solid, 42% yield, MP: 240-242 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.12 (s, 1H), 9.00 (s, 1H), 7.75 – 7.63 (m, 4H), 7.59 (dd, J = 9.1, 4.3 Hz, 1H), 7.41 (dt, J = 9.7, 2.6 Hz, 1H), 7.16 (d, J = 8.4 Hz, 2H), 7.01 (td, J = 9.2, 2.7 Hz, 1H), 5.85 (s, 2H), 3.74 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 163.9, 157.5 (d, J_{CF} = 233.2 Hz), 149.1 (dd, J_{CF} = 184.4, 13.4 Hz), 147.4 (dd, J_{CF} = 186.1, 13.6 Hz), 144.3 (dd, J_{CF} = 7.0, 2.7 Hz), 143.9, 141.3, 138.0, 132.0, 130.7 (dd, J_{CF} = 8.2, 2.7 Hz), 127.3, 126.3, 123.7 (d, J_{CF} = 10.7 Hz), 121.8 (t, J_{CF} = 4.0 Hz), 115.2 (d, J_{CF} = 18.9 Hz), 112.1 (d, J_{CF} = 10.0 Hz), 109.8 (d, J_{CF} = 26.0 Hz), 107.2 (d, J_{CF} = 20.2 Hz), 104.0 (d, J_{CF} = 23.6 Hz), 46.9, 29.9. **^{19}F NMR** (564 MHz, DMSO-d_6) δ -123.57, -140.67, -142.17. **HRMS** m/z: calcd for $C_{23}H_{15}F_3N_2O_2$: 409.1158, found: 409.1157.



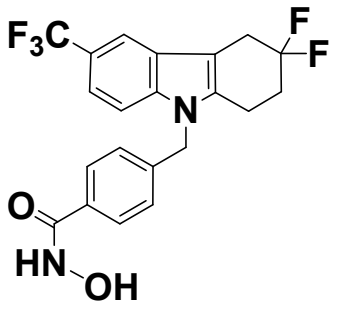
4-((3,3-difluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)-*N*-hydroxybenzamide (14a): white solid, 59% yield, MP: 243-245 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.15 (s, 1H), 9.02 (s, 1H), 7.67 (d, J = 8.4 Hz, 2H), 7.45 (s, 1H), 7.39 (s, 1H), 7.11(s, 1H), 7.09 (d J = 7.8 Hz, 2H), 7.03 (s, 1H), 5.42 (s, 2H), 3.27 (s, 2H), 2.88 (s, 2H), 2.35 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 141.9, 137.4, 133.4, 132.3, 127.8, 126.8, 125.1, 123.5, 121.8, 119.6, 118.2, 110.2, 105.2, 46.1, 31.6 (t, J_{CF} = 26.88 Hz), 30.6 (t, J_{CF} = 25.22 Hz), 19.7 (t, J_{CF} = 4.98 Hz). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -95.28. **HRMS** m/z: calcd for $C_{20}H_{18}F_2N_2O_2$: 357.1409, found: 357.1401.



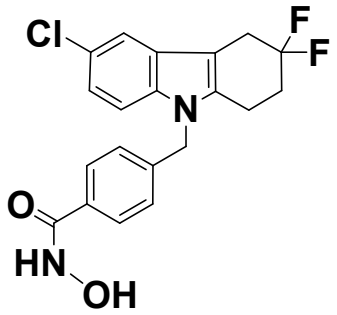
***N*-hydroxy-4-((3,3,6-trifluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)benzamide (14b):** white solid, 57% yield, MP: 222-224 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.14 (s, 1H), 9.01 (s, 1H), 7.67 (d, J = 8.4 Hz, 2H), 7.41 (s, 1H), 7.26 (s, 1H), 7.07 (d, J = 8.4 Hz, 2H), 6.93 (s, 1H), 5.42 (s, 2H), 3.25 (s, 2H), 2.88 (s, 2H), 2.35 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 158.3, 141.7, 135.53, 134.1, 132.4, 129.9 (t, J_{CF} = 30.65 Hz), 127.8, 126.8, 115.8, 114.1, 111.2, 109.6, 105.4, 46.3, 31.5 (t, J_{CF} = 26.88 Hz), 30.5 (t, J_{CF} = 25.22 Hz), 19.9 (t, J_{CF} = 4.98 Hz). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -95.39, -124.65. **HRMS** m/z: calcd for $C_{20}H_{17}F_3N_2O_2$: 375.1315, found: 375.1312.



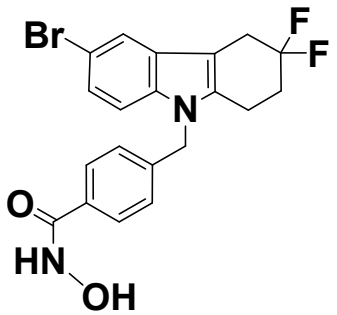
4-((3,3-difluoro-6-(trifluoromethoxy)-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)-*N*-hydroxybenzamide (14c): white solid, 56% yield, MP: 205-207 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.16 (s, 1H), 9.02 (s, 1H), 7.68 (d, J = 8.2 Hz, 2H), 7.51 (s, 1H), 7.48 (s, 1H), 7.09 (d, J = 8.2 Hz, 2H), 7.06 (s, 1H), 5.46 (s, 2H), 3.29 (s, 2H), 2.90 (s, 2H), 2.36 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 142.4, 141.4, 135.9, 132.4, 127.8, 126.8 (q, J_{CF} = 11.33 Hz, OCF_3), 124.9, 121.8, 120.1, 115.2, 111.3, 110.8, 105.9, 46.3, 31.4 (t, J_{CF} = 26.88 Hz), 30.4 (t, J_{CF} = 24.92 Hz), 19.9 (t, J_{CF} = 4.83 Hz). **^{19}F NMR** (564 MHz, DMSO-d_6) δ -56.87, -95.50. **HRMS** m/z: calcd for $C_{21}H_{17}F_5N_2O_3$: 441.1232, found: 441.1227.



4-((3,3-difluoro-6-(trifluoromethyl)-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)-*N*-hydroxybenzamide (14d): white solid, 54% yield, MP: 212-214 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.15 (s, 1H), 9.02 (s, 1H), 7.89 (s, 1H), 7.67 (d, J = 8.4 Hz, 2H), 7.63 (s, 1H), 7.41 (s, 1H), 7.08 (d, J = 8.4 Hz, 2H), 5.51 (s, 2H), 3.34 (s, 2H), 2.91 (s, 2H), 2.37 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 141.3, 138.9, 136.0, 132.5, 127.8, 126.8 (q, J_{CF} = 14.35 Hz, CF_3), 126.0, 125.1, 124.8, 120.4 (q, J_{CF} = 31.41 Hz, CF_2), 118.2, 116.0, 110.9, 106.6, 46.3, 31.3 (t, J_{CF} = 27.18 Hz), 30.4 (t, J_{CF} = 48.17 Hz), 19.8 (t, J_{CF} = 5.59 Hz). **^{19}F NMR** (565 MHz, DMSO-d_6) δ -58.40, -95.48. **HRMS** m/z: calcd for $C_{21}H_{17}F_5N_2O_2$: 425.1283, found: 425.1281.



4-((6-chloro-3,3-difluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)-*N*-hydroxybenzamide (14e): white solid, 53% yield, MP: 217-219 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.16 (s, 1H), 9.02 (s, 1H), 7.68 (d, J = 7.8 Hz, 2H), 7.54 (s, 1H), 7.43 (s, 1H), 7.10 (s, 1H), 7.07 (d, J = 7.8 Hz, 2H), 5.43 (s, 2H), 3.26 (s, 2H), 2.88 (s, 2H), 2.35 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 141.5, 136.0, 135.4, 132.4, 127.8, 126.8, 124.9, 124.4, 123.3, 121.6, 117.6, 111.8, 105.2, 46.2, 31.4 (t, J_{CF} = 20.99 Hz), 30.4 (t, J_{CF} = 25.37 Hz), 19.8 (t, J_{CF} = 4.98 Hz). **HRMS** m/z: calcd for $C_{20}H_{17}ClF_2N_2O_2$: 391.1019, found: 391.1015.



4-((6-bromo-3,3-difluoro-1,2,3,4-tetrahydro-9*H*-carbazol-9-yl)methyl)-*N*-hydroxybenzamide (14f): white solid, 54% yield, MP: 230-233 °C. **^{1}H NMR** (600 MHz, DMSO-d_6) δ 11.15 (s, 1H), 9.01(S, 1H), 7.68 (d, J = 4.2 Hz, 2H), 7.66 (s, 1H), 7.39 (s), 7.21 (s, 1H), 7.07 (d, J =7.8 Hz), 5.43 (s, 2H), 3.26 (s, 2H), 2.88 (s, 2H), 2.34 (s, 2H). **^{13}C NMR** (151 MHz, DMSO-d_6) δ 164.4, 141.5, 136.2, 135.2, 132.4, 128.4, 127.8, 127.4, 126.8, 126.5, 124.1 (q, J_{CF} = 117.03 Hz, CF_2), 120.6, 112.3, 105.1, 46.2, 31.4 (t, J_{CF} = 27.48 Hz), 30.4 (t, J_{CF} = 25.07 Hz), 19.8 (t, J_{CF} = 4.38 Hz). **HRMS** m/z: calcd for $C_{20}H_{17}BrF_2N_2O_2$: 435.0514, found: 435.0504.

Antitumor Activity Data

Table S2 Antitumor activity of **12a** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**12a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.587	0.462	0.432	0.368	0.296	0.292	0.242	0.128
	0.591	0.487	0.467	0.398	0.303	0.27	0.248	0.145
	0.558	0.463	0.447	0.367	0.28	0.276	0.256	0.131
□	0.728	0.532	0.487	0.411	0.3	0.284	0.265	0.133
Mean	0.544	0.486	0.458	0.386	0.295	0.281	0.253	0.134
Std	0.072	0.033	0.024	0.022	0.010	0.010	0.010	0.007
IR	□	0.107	0.158	0.290	0.458	0.484	0.535	0.753
IC50:	22.96026							
lower 95%:	18.54935							
upper 95%:	28.42006							
r:	0.98299							

Table S3 Antitumor activity of **12b** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	□	□
	DMSO	**12b** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.46	0.514	0.328	0.275	0.307	0.212	0.172
(λ 570nm)	0.57	0.421	0.344	0.243	0.238	0.27	0.175	0.094
	0.443	0.459	0.368	0.302	0.258	0.275	0.201	0.106
□	0.487	0.434	0.375	0.309	0.277	0.258	0.21	0.107
Mean	0.536	0.444	0.400	0.296	0.262	0.278	0.200	0.120
Std	0.065	0.019	0.077	0.037	0.018	0.021	0.017	0.035
IR	□	0.173	0.253	0.449	0.511	0.482	0.628	0.777
IC50:	12.97844							
lower 95%:	9.27214							
upper 95%:	18.16623							
r:	0.96495							

Table S4 Antitumor activity of **13a** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.484	0.455	0.389	0.326	0.289	0.267	0.149	0.084
(λ 570nm)	0.512	0.517	0.429	0.329	0.308	0.253	0.165	0.084

	0.531	0.449	0.453	0.3	0.36	0.314	0.176	0.089
□	0.512	0.464	0.441	0.369	0.305	0.247	0.159	0.086
Mean	0.544	0.471	0.428	0.331	0.316	0.270	0.162	0.086
Std	0.072	0.031	0.028	0.028	0.031	0.030	0.011	0.002
IR	□	0.134	0.213	0.392	0.420	0.503	0.702	0.842
IC50:	12.85042							
lower 95%:	10.27360							
upper 95%:	16.07356							
r:	0.98397							

Table S5 Antitumor activity of **13b** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.438	0.418	0.271	0.247	0.198	0.105	0.106
(λ570nm)	0.504	0.487	0.365	0.277	0.229	0.17	0.09	0.091
	0.512	0.398	0.426	0.303	0.249	0.166	0.103	0.088
□	0.468	0.455	0.389	0.283	0.256	0.2	0.099	0.091
Mean	0.544	0.445	0.400	0.284	0.245	0.184	0.099	0.094
Std	0.072	0.037	0.028	0.014	0.012	0.018	0.007	0.008
IR	□	0.183	0.266	0.479	0.549	0.663	0.818	0.827
IC50:	7.79538							
lower 95%:	6.39121							
upper 95%:	9.50804							
r:	0.98731							

Table S6 Antitumor activity of **13c** on Bel7402 cells

Bel7402(20240624-27)	□	□	□	□	□	□	
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.42	0.321	0.328	0.265	0.241	0.217	0.11	0.119
	0.432	0.333	0.26	0.276	0.242	0.173	0.105	0.12
	0.421	0.334	0.375	0.193	0.235	0.186	0.109	0.112
□	0.532	0.425	0.393	0.322	0.238	0.201	0.146	0.153
Mean	0.449	0.353	0.339	0.264	0.239	0.194	0.118	0.126
Std	0.055	0.048	0.059	0.053	0.003	0.019	0.019	0.018
IR	□	0.213	0.245	0.412	0.468	0.567	0.738	0.719
IC50:	10.59067							
lower 95%:	8.53158							
upper 95%:	13.14672							
r:	0.9848							

Table S7 Antitumor activity of **13d** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.673	0.438	0.295	0.265	0.269	0.152	0.142	0.112
(λ570nm)	0.579	0.42	0.346	0.296	0.266	0.196	0.153	0.087
	0.5	0.446	0.358	0.313	0.292	0.205	0.113	0.112
□	0.488	0.465	0.324	0.289	0.292	0.214	0.112	0.095
Mean	0.536	0.442	0.331	0.291	0.280	0.192	0.130	0.102
Std	0.065	0.019	0.028	0.020	0.014	0.028	0.021	0.013
IR	□	0.175	0.383	0.458	0.478	0.642	0.757	0.811
IC50:	7.07062							
lower 95%:	5.37976							
upper 95%:	9.29293							
r:	0.97995							

Table S8 Antitumor activity of **13e** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13e** (μmol/L)					
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.52	0.433	0.312	0.262	0.248	0.255	0.158	0.087
	0.524	0.404	0.321	0.258	0.233	0.251	0.149	0.088
	0.49	0.434	0.331	0.274	0.239	0.242	0.178	0.092
□	0.583	0.503	0.367	0.313	0.275	0.231	0.2	0.16
Mean	0.524	0.444	0.333	0.277	0.249	0.245	0.171	0.107
Std	0.028	0.042	0.024	0.025	0.019	0.011	0.023	0.036
IR	□	0.154	0.365	0.472	0.525	0.533	0.673	0.796
IC50:	8.15264							
lower 95%:	5.64602							
upper 95%:	11.77210							
r:	0.96116							

Table S9 Antitumor activity of **13f** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.506	0.403	0.327	0.268	0.246	0.203	0.117	0.099
(λ570nm)	0.514	0.408	0.319	0.305	0.269	0.187	0.122	0.106
	0.52	0.425	0.331	0.293	0.254	0.212	0.136	0.11
□	0.561	0.405	0.347	0.286	0.285	0.22	0.133	0.101
Mean	0.524	0.410	0.331	0.288	0.264	0.206	0.127	0.104
Std	0.028	0.010	0.012	0.015	0.017	0.014	0.009	0.005

IR	□	0.217	0.368	0.450	0.497	0.608	0.758	0.802
IC50:	8.05003							
lower 95%:	6.68178							
upper 95%:	9.69846							
r:	0.98872							

Table S10 Antitumor activity of **13g** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13g** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 値	□	0.467	0.341	0.311	0.284	0.269	0.171	0.114
(λ570nm)	0.546	0.4	0.291	0.257	0.249	0.243	0.16	0.098
	0.5	0.412	0.288	0.256	0.257	0.235	0.157	0.097
□	0.501	0.384	0.32	0.279	0.281	0.234	0.16	0.087
Mean	0.524	0.416	0.310	0.276	0.268	0.245	0.162	0.099
Std	0.028	0.036	0.025	0.026	0.017	0.016	0.006	0.011
IR	□	0.207	0.408	0.474	0.489	0.532	0.691	0.811
IC50:	10.92728							
lower 95%:	8.06216							
upper 95%:	14.8106							
r:	0.97086							

Table S11 Antitumor activity of **13h** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13h** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.659	0.453	0.288	0.296	0.255	0.244	0.156	0.107
	0.465	0.379	0.319	0.307	0.257	0.243	0.143	0.1
	0.761	0.398	0.29	0.273	0.287	0.223	0.154	0.112
□	0.663	0.543	0.385	0.3	0.301	0.262	0.154	0.111
Mean	0.594	0.443	0.321	0.294	0.275	0.243	0.152	0.108
Std	0.101	0.074	0.045	0.015	0.023	0.016	0.006	0.005
IR	□	0.254	0.460	0.505	0.537	0.591	0.745	0.819
IC50:	4.83438							
lower 95%:	4.29754							
upper 95%:	5.43829							
r:	0.99519							

Table S12 Antitumor activity of **14a** on Bel7402 cells

Bel7402(20240325-28)	□	□	□	□	□	□
DMSO	**14a** (μmol/L)					

□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.686	0.683	0.593	0.394	0.371	0.114	0.044	0.07
(λ570nm)	0.729	0.653	0.647	0.412	0.373	0.098	0.043	0.045
	0.694	0.739	0.642	0.416	0.398	0.217	0.047	0.061
□	0.952	0.8	0.682	0.483	0.366	0.121	0.055	0.074
Mean	0.749	0.719	0.641	0.426	0.377	0.138	0.047	0.063
Std	0.107	0.065	0.037	0.039	0.014	0.054	0.005	0.013
IR	□	0.040	0.144	0.431	0.497	0.816	0.937	0.917
IC50:	1.23278							
lower 95%:	0.65161							
upper 95%:	2.3323							
r:	0.94973							

Table S13 Antitumor activity of **14b** on Bel7402 cells

Bel7402(20240325-28)		□	□	□	□	□	□
	DMSO	**14b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.693	0.708	0.576	0.386	0.382	0.224	0.084	0.077
(λ570nm)	0.694	0.737	0.558	0.452	0.411	0.252	0.084	0.077
	0.675	0.796	0.652	0.454	0.446	0.133	0.081	0.083
□	0.859	0.793	0.65	0.482	0.426	0.192	0.091	0.086
Mean	0.719	0.759	0.609	0.444	0.416	0.200	0.085	0.081
Std	0.049	0.043	0.049	0.041	0.027	0.051	0.004	0.005
IR	□	-0.055	0.153	0.383	0.421	0.721	0.882	0.888
IC50:	9.31492							
lower 95%:	7.51663							
upper 95%:	11.54344							
r:	0.9819							

Table S14 Antitumor activity of **14c** on Bel7402 cells

Bel7402(20240325-28)		□	□	□	□	□	□
	DMSO	**14c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.517	0.431	0.339	0.364	0.312	0.278	0.148
(λ570nm)	0.813	0.536	0.432	0.325	0.331	0.218	0.028	0.046
	0.872	0.544	0.398	0.339	0.335	0.219	0.026	0.035
□	0.587	0.468	0.371	0.291	0.33	0.23	0.12	0.046
Mean	0.749	0.516	0.408	0.324	0.340	0.245	0.113	0.069
Std	0.107	0.034	0.029	0.023	0.016	0.045	0.118	0.053

IR	□	0.311	0.455	0.568	0.546	0.673	0.849	0.908
IC50:	4.20782							
lower 95%:	2.89029							
upper 95%:	6.12593							
r:	0.96731							

Table S15 Antitumor activity of **14d** on Bel7402 cells

Bel7402(20240325-28)		□	□	□	□	□	□
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.844	0.458	0.375	0.32	0.331	0.209	0.03	0.043
(λ 570nm)	0.71	0.519	0.379	0.343	0.312	0.246	0.033	0.046
	0.683	0.522	0.47	0.34	0.329	0.29	0.029	0.04
□	0.669	0.536	0.379	0.306	0.306	0.195	0.034	0.041
Mean	0.749	0.509	0.401	0.327	0.320	0.235	0.032	0.043
Std	0.107	0.035	0.046	0.017	0.012	0.043	0.002	0.003
IR	□	0.321	0.465	0.563	0.573	0.686	0.958	0.943
IC50:	3.97176							
lower 95%:	2.78828							
upper 95%:	5.65756							
r:	0.96442							

Table S16 Antitumor activity of **14e** on Bel7402 cells

Bel7402(20240325-28)		□	□	□	□	□	□
	DMSO	**14e** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.703	0.569	0.404	0.343	0.359	0.238	0.098	0.086
(λ 570nm)	0.733	0.56	0.412	0.357	0.338	0.251	0.096	0.084
	0.719	0.552	0.416	0.409	0.355	0.23	0.1	0.088
□	0.713	0.564	0.425	0.371	0.347	0.232	0.1	0.078
Mean	0.719	0.561	0.414	0.370	0.350	0.238	0.099	0.084
Std	0.049	0.007	0.009	0.028	0.009	0.009	0.002	0.004
IR	□	0.219	0.424	0.485	0.514	0.669	0.863	0.883
IC50:	5.74742							
lower 95%:	4.21602							
upper 95%:	7.83507							
r:	0.97309							

Table S17 Antitumor activity of **14f** on Bel7402 cells

Bel7402(20240325-28)		□	□	□	□	□	□
	DMSO	**14f** (μmol/L)					

□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.508	0.411	0.314	0.32	0.183	0.162	0.074
(λ570nm)	0.714	0.481	0.407	0.297	0.32	0.209	0.064	0.078
	0.696	0.481	0.42	0.354	0.334	0.23	0.069	0.087
□	0.713	0.52	0.436	0.358	0.334	0.23	0.074	0.078
Mean	0.719	0.498	0.419	0.331	0.327	0.213	0.092	0.079
Std	0.049	0.020	0.013	0.030	0.008	0.022	0.047	0.006
IR	□	0.308	0.418	0.540	0.545	0.704	0.872	0.890
IC50:	4.43652							
lower 95%:	3.23634							
upper 95%:	6.08176							
r:	0.97583							

Table S18 Antitumor activity of **Tub A** on Bel7402 cells

BEL7402(2024016-0819)	□	□	□	□	□	□	
	DMSO	**Tub A** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.631	0.426	0.387	0.329	0.279	0.224	0.133	0.146
(λ570nm)	0.502	0.37	0.336	0.339	0.334	0.23	0.11	0.144
	0.522	0.396	0.347	0.331	0.323	0.217	0.12	0.111
□	0.546	0.404	0.542	0.337	0.365	0.191	0.112	0.12
Mean	0.594	0.399	0.403	0.334	0.325	0.216	0.119	0.130
Std	0.101	0.023	0.095	0.005	0.036	0.017	0.010	0.017
IR	□	0.328	0.322	0.438	0.452	0.637	0.800	0.781
IC50:	8.11992							
lower 95%:	5.91194							
upper 95%:	11.15253							
r:	0.96300							

Table S19 Antitumor activity of **12a** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□	
	DMSO	**12a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.442	0.386	0.354	0.256	0.254	0.148	0.11	0.085
	0.454	0.366	0.362	0.25	0.184	0.106	0.099	0.063
	0.383	0.353	0.38	0.246	0.179	0.104	0.104	0.071
□	0.482	0.469	0.359	0.261	0.237	0.139	0.122	0.088
Mean	0.426	0.394	0.364	0.253	0.214	0.124	0.109	0.077
Std	0.046	0.052	0.011	0.007	0.038	0.023	0.010	0.012
IR	□	0.076	0.146	0.406	0.499	0.708	0.745	0.820
IC50:	9.21698							
lower 95%:	7.49809							

upper 95%:	11.32990
r:	0.98777

Table S20 Antitumor activity of **12b** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□	
	DMSO	**12b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.422	0.287	0.258	0.23	0.187	0.149	0.164
(λ 570nm)	0.448	0.394	0.347	0.273	0.223	0.187	0.135	0.166
	0.451	0.363	0.324	0.292	0.241	0.169	0.113	0.102
□	0.377	0.411	0.347	0.282	0.226	0.161	0.159	0.122
Mean	0.410	0.398	0.326	0.276	0.230	0.176	0.139	0.139
Std	0.038	0.026	0.028	0.014	0.008	0.013	0.020	0.032
IR	□	0.030	0.204	0.326	0.439	0.571	0.661	0.662
IC50:	14.58053							
lower 95%:	13.22916							
upper 95%:	16.06993							
r:	0.99667							

Table S21 Antitumor activity of **13a** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□	
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.369	0.372	0.297	0.252	0.124	0.096	0.084	0.06
(λ 570nm)	0.45	0.331	0.326	0.243	0.125	0.096	0.086	0.062
	0.446	0.435	0.28	0.207	0.13	0.092	0.077	0.063
□	0.416	0.476	0.301	0.245	0.139	0.079	0.068	0.057
Mean	0.426	0.404	0.301	0.237	0.130	0.091	0.079	0.061
Std	0.046	0.065	0.019	0.020	0.007	0.008	0.008	0.003
IR	□	0.053	0.293	0.444	0.696	0.787	0.815	0.858
IC50:	5.59459							
lower 95%:	4.79301							
upper 95%:	6.53021							
r:	0.99064							

Table S22 Antitumor activity of **13b** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□	
	DMSO	**13b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.458	0.256	0.174	0.167	0.09	0.085	0.059
(λ 570nm)	0.339	0.378	0.317	0.226	0.149	0.072	0.076	0.088
	0.426	0.553	0.346	0.265	0.152	0.106	0.057	0.068

□	0.481	0.512	0.338	0.193	0.15	0.104	0.068	0.074
Mean	0.426	0.475	0.314	0.215	0.155	0.093	0.072	0.072
Std	0.046	0.076	0.041	0.040	0.008	0.016	0.012	0.012
IR	□	-0.116	0.262	0.496	0.637	0.782	0.832	0.830
IC50:	5.89635							
lower 95%:	5.17196							
upper 95%:	6.72219							
r:	0.99301							

Table S23 Antitumor activity of **13c** on HepG2 cells

HepG2(2024012-0815)		□	□	□	□	□	□
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.405	0.362	0.272	0.218	0.162	0.169	0.093	0.097
	0.399	0.365	0.307	0.223	0.145	0.129	0.107	0.093
	0.397	0.347	0.234	0.231	0.178	0.144	0.105	0.09
□	0.492	0.339	0.311	0.213	0.17	0.147	0.125	0.127
Mean	0.410	0.353	0.281	0.221	0.164	0.147	0.108	0.102
Std	0.038	0.012	0.036	0.008	0.014	0.017	0.013	0.017
IR	□	0.138	0.315	0.460	0.601	0.641	0.738	0.752
IC50:	7.0789							
lower 95%:	5.70993							
upper 95%:	8.77607							
r:	0.98371							

Table S24 Antitumor activity of **13d** on HepG2 cells

HepG2(2024012-0815)		□	□	□	□	□	□
	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.404	0.372	0.31	0.268	0.188	0.153	0.118	0.115
(λ 570nm)	0.38	0.366	0.35	0.256	0.179	0.154	0.094	0.089
	0.376	0.452	0.323	0.285	0.205	0.176	0.089	0.098
□	0.377	0.397	0.356	0.27	0.178	0.145	0.106	0.09
Mean	0.410	0.397	0.335	0.270	0.188	0.157	0.102	0.098
Std	0.038	0.039	0.022	0.012	0.013	0.013	0.013	0.012
IR	□	0.032	0.184	0.342	0.543	0.617	0.752	0.761
IC50:	10.88063							
lower 95%:	9.1304							
upper 95%:	12.96637							
r:	0.98782							

Table S25 Antitumor activity of **13e** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□
	DMSO	**13e** (μmol/L)				
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.373	0.321	0.24	0.212	0.181	0.128	0.088	0.074
	0.393	0.387	0.277	0.238	0.169	0.126	0.099	0.082
	0.378	0.34	0.315	0.183	0.14	0.149	0.11	0.073
□	0.416	0.313	0.248	0.181	0.156	0.123	0.082	0.119
Mean	0.374	0.340	0.270	0.204	0.162	0.132	0.095	0.087
Std	0.031	0.033	0.034	0.027	0.018	0.012	0.012	0.022
IR	□	0.090	0.278	0.456	0.568	0.648	0.747	0.767
IC50:	7.87921							
lower 95%:	6.57845							
upper 95%:	9.43718							
r:	0.98774							

Table S26 Antitumor activity of **13f** on HepG2 cells

HepG2(20240624-27)	□	□	□	□	□	□
	DMSO	**13f** (μmol/L)				
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.342	0.36	0.296	0.223	0.19	0.174	0.209	0.172
(λ 570nm)	0.387	0.4	0.347	0.255	0.198	0.161	0.184	0.157
	0.382	0.328	0.272	0.224	0.213	0.187	0.163	0.158
□	0.359	0.385	0.337	0.264	0.213	0.222	0.165	0.146
Mean	0.431	0.368	0.313	0.242	0.204	0.186	0.180	0.158
Std	0.079	0.032	0.035	0.021	0.011	0.026	0.021	0.011
IR	□	0.146	0.274	0.440	0.528	0.568	0.582	0.633
IC50:	9.0777							
lower 95%:	6.19755							
upper 95%:	13.29631							
r:	0.96593							

Table S27 Antitumor activity of **13g** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□
	DMSO	**13g** (μmol/L)				
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.378	0.246	0.168	0.15	0.131	0.099	0.117
(λ 570nm)	0.382	0.308	0.289	0.158	0.173	0.169	0.082	0.087
	0.389	0.31	0.373	0.183	0.155	0.126	0.088	0.082
□	0.335	0.332	0.293	0.187	0.126	0.111	0.081	0.081
Mean	0.374	0.332	0.300	0.174	0.151	0.134	0.088	0.092
Std	0.031	0.033	0.053	0.013	0.019	0.025	0.008	0.017

IR	□	0.112	0.197	0.535	0.596	0.641	0.766	0.755
IC50:	3.11663							
lower 95%:	2.57066							
upper 95%:	3.77856							
r:	0.99714							

Table S28 Antitumor activity of **13h** on HepG2 cells

HepG2(2024012-0815)		□	□	□	□	□	□
	DMSO	**13h** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.357	0.335	0.283	0.203	0.173	0.151	0.088	-0.01
	0.438	0.32	0.27	0.196	0.178	0.123	0.088	0.088
	0.351	0.339	0.312	0.188	0.149	0.147	0.087	0.093
□	0.504	0.304	0.285	0.177	0.168	0.147	0.114	0.123
Mean	0.391	0.325	0.288	0.191	0.167	0.142	0.094	0.074
Std	0.056	0.016	0.018	0.011	0.013	0.013	0.013	0.058
IR	□	0.170	0.265	0.512	0.573	0.637	0.759	0.812
IC50:	5.32729							
lower 95%:	3.95966							
upper 95%:	7.16730							
r:	0.98756							

Table S29 Antitumor activity of **14a** on HepG2 cells

HepG2(20240325-28)		□	□	□	□	□	□
	DMSO	**14a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.89	0.89	0.749	0.608	0.341	0.173	0.088	0.072
(λ 570nm)	0.76	0.846	0.783	0.637	0.36	0.138	0.081	0.071
	0.899	0.894	0.791	0.672	0.383	0.143	0.078	0.068
□	0.917	0.866	0.811	0.703	0.382	0.148	0.086	0.087
Mean	0.844	0.874	0.784	0.655	0.367	0.151	0.083	0.075
Std	0.065	0.022	0.026	0.041	0.020	0.016	0.005	0.009
IR	□	-0.036	0.072	0.224	0.566	0.822	0.901	0.912
IC50:	9.77161							
lower 95%:	8.53554							
upper 95%:	11.18669							
r:	0.99265							

Table S30 Antitumor activity of **14b** on HepG2 cells

HepG2(20240325-28)	□	□	□	□	□	□	
	DMSO	**14b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.783	0.944	0.841	0.538	0.307	0.154	0.086	0.077
(λ 570nm)	0.715	0.873	0.805	0.585	0.379	0.137	0.09	0.078
	0.866	0.921	0.882	0.598	0.397	0.146	0.085	0.079
□	0.859	1.155	0.961	0.568	0.374	0.163	0.084	0.082
Mean	0.806	0.973	0.872	0.572	0.364	0.150	0.086	0.079
Std	0.065	0.125	0.067	0.026	0.039	0.011	0.003	0.002
IR	□	-0.208	-0.082	0.290	0.548	0.814	0.893	0.902
IC50:	8.70351							
lower 95%:	7.42666							
upper 95%:	10.19989							
r:	0.99226							

Table S31 Antitumor activity of **14c** on HepG2 cells

HepG2(20240325-28)	□	□	□	□	□	□	
	DMSO	**14c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.679	0.404	0.336	0.159	0.121	0.075	0.06
(λ 570nm)	0.759	0.702	0.443	0.283	0.143	0.109	0.055	0.09
	0.845	0.722	0.413	0.256	0.138	0.091	0.054	0.079
□	0.831	0.684	0.452	0.26	0.119	0.105	0.053	0.072
Mean	0.844	0.697	0.428	0.284	0.140	0.107	0.059	0.075
Std	0.065	0.020	0.023	0.037	0.016	0.012	0.011	0.013
IR	□	0.174	0.493	0.664	0.834	0.874	0.930	0.911
IC50:	2.34175							
lower 95%:	1.76988							
upper 95%:	3.09841							
r:	0.99017							

Table S32 Antitumor activity of **14d** on HepG2 cells

HepG2(20240325-28)	□	□	□	□	□	□	
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.818	0.734	0.37	0.231	0.13	0.11	0.057	0.099
(λ 570nm)	0.781	0.752	0.364	0.201	0.147	0.112	0.056	0.072
	0.958	0.752	0.421	0.217	0.145	0.119	0.058	0.075
□	0.829	0.744	0.378	0.213	0.135	0.109	0.059	0.065

Mean	0.844	0.746	0.383	0.216	0.139	0.113	0.058	0.078
Std	0.065	0.009	0.026	0.012	0.008	0.005	0.001	0.015
IR	□	0.117	0.546	0.745	0.835	0.867	0.932	0.908
IC50:	1.6491							
lower 95%:	1.09282							
upper 95%:	2.48852							
r:	0.98466							

Table S33 Antitumor activity of **14e** on HepG2 cells

HepG2(20240325-28)		□	□	□	□	□	□
	DMSO	**14e** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.806	0.85	0.48	0.315	0.144	0.142	0.08	0.088
(λ 570nm)	0.81	0.871	0.546	0.317	0.152	0.133	0.08	0.077
	0.797	0.904	0.545	0.32	0.158	0.135	0.076	0.082
□	0.924	0.989	0.56	0.343	0.164	0.138	0.081	0.082
Mean	0.806	0.904	0.533	0.324	0.155	0.137	0.079	0.082
Std	0.065	0.061	0.036	0.013	0.009	0.004	0.002	0.005
IR	□	-0.121	0.339	0.598	0.808	0.830	0.902	0.898
IC50:	3.87038							
lower 95%:	3.83824							
upper 95%:	3.90278							
r:	0.99998							

Table S34 Antitumor activity of **14f** on HepG2 cells

HepG2(20240325-28)		□	□	□	□	□	□
	DMSO	**14f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.602	0.443	0.314	0.202	0.174	0.087	0.075
(λ 570nm)	0.71	0.597	0.416	0.226	0.144	0.137	0.069	0.076
	0.753	0.701	0.449	0.201	0.154	0.135	0.067	0.079
□	0.846	0.855	0.423	0.222	0.152	0.121	0.068	0.081
Mean	0.806	0.689	0.433	0.241	0.163	0.142	0.073	0.078
Std	0.065	0.121	0.016	0.050	0.026	0.023	0.010	0.003
IR	□	0.145	0.463	0.701	0.798	0.824	0.910	0.904
IC50:	3.01817							
lower 95%:	2.56981							
upper 95%:	3.54474							
r:	0.99067							

Table S35 Antitumor activity of **Tub A** on HepG2 cells

HepG2(2024012-0815)	□	□	□	□	□	□	
	DMSO	**Tub A** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.368	0.259	0.261	0.244	0.265	0.179	0.109	0.095
(λ 570nm)	0.346	0.35	0.367	0.292	0.281	0.199	0.137	0.088
	0.409	0.401	0.285	0.328	0.276	0.199	0.081	0.083
□	0.355	0.392	0.346	0.337	0.29	0.211	0.112	0.085
Mean	0.391	0.351	0.315	0.300	0.278	0.197	0.110	0.088
Std	0.056	0.065	0.050	0.042	0.010	0.013	0.023	0.005
IR	□	0.104	0.195	0.232	0.289	0.496	0.719	0.776
IC50:	18.29058							
lower 95%:	14.25679							
upper 95%:	23.46568							
r:	0.98279							

Table S36 Antitumor activity of **12a** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**12a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	1.217	1.11	1.019	0.594	0.43	0.349	0.307	0.218
	1.278	1.165	1.047	0.605	0.449	0.354	0.352	0.21
	1.025	1.063	0.983	0.622	0.448	0.376	0.3	0.218
□	1.221	1.173	0.979	0.661	0.486	0.382	0.32	0.253
Mean	1.132	1.128	1.007	0.621	0.453	0.365	0.320	0.225
Std	0.085	0.051	0.032	0.029	0.024	0.016	0.023	0.019
IR	□	0.004	0.110	0.452	0.600	0.677	0.718	0.801
IC50:	5.85091							
lower 95%:	4.29224							
upper 95%:	7.97559							
r:	0.98518							

Table S37 Antitumor activity of **12b** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**12b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.951	0.682	0.478	0.324	0.377	0.302	0.125
(λ 570nm)	0.965	0.862	0.595	0.411	0.281	0.351	0.299	0.149
	1.134	0.853	0.609	0.479	0.336	0.302	0.301	0.15
□	1.071	0.901	0.746	0.456	0.367	0.364	0.315	0.16
Mean	1.102	0.892	0.658	0.456	0.327	0.349	0.304	0.146
Std	0.067	0.045	0.070	0.032	0.036	0.033	0.007	0.015
IR	□	0.191	0.403	0.586	0.703	0.684	0.724	0.868

IC50:	4.07503
lower 95%:	3.43288
upper 95%:	4.8373
r:	0.98789

Table S38 Antitumor activity of **13a** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.088	1.036	0.628	0.454	0.353	0.35	0.301	0.203
(λ 570nm)	1.137	1.079	0.628	0.437	0.354	0.339	0.302	0.131
	1.106	1.13	0.613	0.45	0.351	0.337	0.318	0.204
□	1.202	1.135	0.698	0.457	0.363	0.342	0.331	0.152
Mean	1.132	1.095	0.642	0.450	0.355	0.342	0.313	0.173
Std	0.085	0.047	0.038	0.009	0.005	0.006	0.014	0.037
IR	□	0.033	0.433	0.603	0.686	0.698	0.723	0.848
IC50:	3.32228							
lower 95%:	2.60401							
upper 95%:	4.23866							
r:	0.98452							

Table S39 Antitumor activity of **13b** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.963	0.622	0.426	0.316	0.286	0.243	0.113
(λ 570nm)	1.04	1.003	0.605	0.406	0.311	0.289	0.165	0.09
	1.089	1.014	0.667	0.455	0.373	0.319	0.164	0.093
□	1.054	1.067	0.654	0.433	0.373	0.304	0.143	0.119
Mean	1.132	1.012	0.637	0.430	0.343	0.300	0.179	0.104
Std	0.085	0.043	0.029	0.020	0.034	0.015	0.044	0.014
IR	□	0.106	0.437	0.620	0.697	0.735	0.842	0.908
IC50:	3.19558							
lower 95%:	2.33914							
upper 95%:	4.36559							
r:	0.98627							

Table S40 Antitumor activity of **13c** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	1.163	0.952	0.595	0.422	0.434	0.425	0.203	0.128

	1.179	0.992	0.548	0.409	0.43	0.394	0.205	0.107
	1.072	0.986	0.57	0.41	0.412	0.391	0.219	0.113
□	1.13	1.02	0.507	0.435	0.378	0.427	0.217	0.167
Mean	1.102	0.988	0.555	0.419	0.414	0.409	0.211	0.129
Std	0.067	0.028	0.037	0.012	0.026	0.019	0.008	0.027
IR	□	0.104	0.496	0.620	0.625	0.629	0.809	0.883
IC50:	2.55545							
lower 95%:	2.55545							
upper 95%:	2.55545							
r:	1							

Table S41 Antitumor activity of **13d** on CNE2 cells

CNE2(2024016-0819)		□	□	□	□	□	□
	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.024	0.939	0.631	0.474	0.406	0.384	0.221	0.124
(λ 570nm)	1.09	0.927	0.555	0.439	0.377	0.384	0.208	0.145
	1.111	0.963	0.619	0.461	0.41	0.378	0.178	0.115
□	1.181	1.045	0.66	0.483	0.414	0.401	0.21	0.12
Mean	1.102	0.969	0.616	0.464	0.402	0.387	0.204	0.126
Std	0.067	0.053	0.044	0.019	0.017	0.010	0.018	0.013
IR	□	0.121	0.441	0.579	0.635	0.649	0.815	0.886
IC50:	3.44948							
lower 95%:	2.52847							
upper 95%:	4.70597							
r:	0.97367							

Table S42 Antitumor activity of **13e** on CNE2 cells

CNE2(2024016-0819)		□	□	□	□	□	□
	DMSO	**13e** (μmol/L)					
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.658	0.502	0.412	0.247	0.256	0.266	0.202	0.096
	0.706	0.594	0.361	0.224	0.227	0.227	0.234	0.11
	0.658	0.595	0.387	0.235	0.286	0.285	0.241	0.094
□	0.719	0.661	0.388	0.252	0.273	0.261	0.246	0.143
Mean	0.823	0.588	0.387	0.240	0.261	0.260	0.231	0.111
Std	0.126	0.065	0.021	0.013	0.025	0.024	0.020	0.023
IR	□	0.286	0.530	0.709	0.683	0.684	0.720	0.865
IC50:	2.43945							
lower 95%:	2.22067							
upper 95%:	2.67980							
r:	0.99644							

Table S43 Antitumor activity of **13f** on CNE2 cells

CNE2(B122:J13028-0701)	□	□	□	□	□	□	
	DMSO	**13f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.157	1.109	0.48	0.333	0.31	0.31	0.287	0.201
(λ 570nm)	1.225	1.233	0.467	0.364	0.321	0.322	0.276	0.219
	1.075	0.98	0.481	0.351	0.316	0.355	0.289	0.147
□	0.926	1.088	0.555	0.343	0.337	0.33	0.292	0.217
Mean	1.081	1.103	0.496	0.348	0.321	0.329	0.286	0.196
Std	0.144	0.104	0.040	0.013	0.012	0.019	0.007	0.034
IR	□	-0.020	0.541	0.678	0.703	0.695	0.735	0.819
IC50:	1.54651							
lower 95%:	0.58079							
upper 95%:	4.11798							
r:	0.93368							

Table S44 Antitumor activity of **13g** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13g** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.715	0.404	0.293	0.311	0.334	0.18	0.075
(λ 570nm)	0.808	0.697	0.355	0.282	0.347	0.261	0.16	0.068
	0.829	0.691	0.37	0.305	0.281	0.313	0.179	0.059
□	0.901	0.671	0.368	0.31	0.354	0.33	0.173	0.073
Mean	0.823	0.694	0.374	0.298	0.323	0.310	0.173	0.069
Std	0.126	0.018	0.021	0.013	0.034	0.034	0.009	0.007
IR	□	0.157	0.545	0.639	0.607	0.624	0.790	0.916
IC50:	2.33748							
lower 95%:	2.33748							
upper 95%:	2.33748							
r:	1							

Table S45 Antitumor activity of **13h** on CNE2 cells

CNE2(2024016-0819)	□	□	□	□	□	□	
	DMSO	**13h** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.851	0.505	0.378	0.305	0.289	0.291	0.217	0.117
	0.821	0.586	0.363	0.285	0.328	0.277	0.214	0.129
	0.857	0.548	0.402	0.289	0.286	0.313	0.263	0.13

□	0.882	0.61	0.431	0.308	0.315	0.318	0.258	0.153
Mean	0.824	0.562	0.394	0.297	0.305	0.300	0.238	0.132
Std	0.051	0.046	0.030	0.011	0.020	0.019	0.026	0.015
IR	□	0.318	0.522	0.640	0.630	0.636	0.711	0.840
IC50:	2.58743							
lower 95%:	2.17340							
upper 95%:	3.08034							
r:	0.98791							

Table S46 Antitumor activity of **14a** on CNE2 cells

CNE2(20240B11:J5401)	□	□	□	□	□	□	

	DMSO	**14a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	2.112	2.018	1.782	1.181	0.55	0.172	0.032	0.033
(λ 570nm)	2.092	2.112	1.875	1.429	0.646	0.283	0.034	0.037
	2.203	1.994	2.099	1.547	0.683	0.19	0.036	0.034
□	2.437	2.381	2.122	1.567	0.668	0.188	0.04	0.036
Mean	2.185	2.126	1.970	1.431	0.637	0.208	0.036	0.035
Std	0.136	0.177	0.167	0.177	0.060	0.050	0.003	0.002
IR	□	0.027	0.099	0.345	0.709	0.905	0.984	0.984
IC50:	6.80768							
lower 95%:	6.61508							
upper 95%:	7.00589							
r:	0.9997							

Table S47 Antitumor activity of **14b** on CNE2 cells

CNE2(20240B11:J5401)	□	□	□	□	□	□	

	DMSO	**14b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	2.231	2.338	1.909	0.861	0.531	0.293	0.064	0.06
(λ 570nm)	2.4	2.292	2.093	1	0.499	0.3	0.064	0.059
	2.273	2.319	2.038	1.122	0.529	0.31	0.064	0.056
□	2.354	2.442	2.062	1.389	0.534	0.331	0.068	0.066
Mean	2.253	2.348	2.026	1.093	0.523	0.309	0.065	0.060
Std	0.096	0.066	0.081	0.224	0.016	0.017	0.002	0.004
IR	□	-0.042	0.101	0.515	0.768	0.863	0.971	0.973
IC50:	6.27924							
lower 95%:	4.94098							
upper 95%:	7.97996							
r:	0.98148							

Table S48 Antitumor activity of **14c** on CNE2 cells

CNE2(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	1.556	0.772	0.524	0.599	0.469	0.039	0.03
(λ 570nm)	2.444	1.431	0.68	0.493	0.491	0.453	0.041	0.03
	2.17	1.495	0.709	0.623	0.592	0.493	0.038	0.032
□	2.195	1.212	0.621	0.416	0.53	0.461	0.043	0.034
Mean	2.185	1.406	0.494	0.278	0.236	0.193	0.085	0.030
Std	0.136	0.150	0.063	0.086	0.052	0.017	0.002	0.002
IR	□	0.357	0.774	0.873	0.892	0.912	0.961	0.986
IC50:	1.5641							
lower 95%:	1.5641							
upper 95%:	1.5641							
r:	1							

Table S49 Antitumor activity of **14d** on CNE2 cells

CNE2(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	2.02	1.386	0.65	0.441	0.517	0.489	0.142	0.031
(λ 570nm)	2.134	1.681	0.697	0.478	0.545	0.445	0.148	0.033
	2.122	1.626	0.656	0.466	0.533	0.513	0.112	0.031
□	2.105	1.778	0.657	0.45	0.547	0.434	0.132	0.034
Mean	2.185	1.618	0.665	0.459	0.536	0.470	0.134	0.032
Std	0.136	0.167	0.022	0.016	0.014	0.037	0.016	0.002
IR	□	0.260	0.696	0.790	0.755	0.785	0.939	0.985
IC50:	1.84036							
lower 95%:	1.84036							
upper 95%:	1.84036							
r:	1							

Table S50 Antitumor activity of **14e** on CNE2 cells

CNE2(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14e** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	2.089	1.889	0.792	0.544	0.574	0.4	0.077	0.058
(λ 570nm)	2.284	1.859	0.953	0.496	0.583	0.437	0.082	0.067
	2.257	1.848	0.893	0.526	0.518	0.466	0.083	0.064
□	2.217	2.045	0.888	0.472	0.531	0.409	0.078	0.059
Mean	2.253	1.910	0.882	0.510	0.552	0.428	0.080	0.062
Std	0.096	0.091	0.067	0.032	0.032	0.030	0.003	0.004

IR	□	0.152	0.609	0.774	0.755	0.810	0.964	0.972
IC50:	2.80371							
lower 95%:	2.80371							
upper 95%:	2.80371							
r:	1							

Table S51 Antitumor activity of **14f** on CNE2 cells

CNE2(20240328-0401)		□	□	□	□	□	□
	DMSO	**14f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	2.096	1.065	0.588	0.545	0.54	0.089	0.064
(λ 570nm)	2.338	2.096	0.932	0.529	0.652	0.479	0.074	0.059
	2.236	2.007	0.907	0.539	0.602	0.512	0.081	0.064
□	2.103	1.883	0.852	0.521	0.554	0.457	0.088	0.061
Mean	2.253	1.406	0.494	0.278	0.236	0.193	0.085	0.030
Std	0.096	0.101	0.090	0.030	0.049	0.037	0.007	0.002
IR	□	0.376	0.781	0.877	0.895	0.914	0.962	0.987
IC50:	1.52471							
lower 95%:	1.52471							
upper 95%:	1.52471							
r:	1							

Table S52 Antitumor activity of **Tub A** on CNE2 cells

CNE2(20240628-0701)		□	□	□	□	□	□
	DMSO	**Tub A** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.091	0.938	1.022	0.724	0.333	0.267	0.253	0.492
(λ 570nm)	0.898	0.849	0.798	0.557	0.319	0.227	0.156	0.318
	0.885	1.268	0.95	0.931	0.366	0.182	0.193	0.251
□	0.99	1.021	1.269	0.813	0.331	0.21	0.183	0.257
Mean	1.038	1.019	1.010	0.756	0.337	0.222	0.196	0.330
Std	0.133	0.180	0.196	0.158	0.020	0.036	0.041	0.112
IR	□	0.018	0.027	0.271	0.675	0.787	0.811	0.683
IC50:	9.17397							
lower 95%:	6.74541							
upper 95%:	12.47688							
r:	0.97333							

Table S53 Antitumor activity of **12a** on SUNE1 cells

SUNE1(20240625-28)		□	□	□	□	□	□
	DMSO	**12a** (μmol/L)					

□	0.0008	1.25	2.5	5	10	20	40	80
□	0.81	0.777	0.758	0.497	0.361	0.313	0.284	0.219
	0.854	0.691	0.701	0.375	0.303	0.309	0.212	0.223
	0.729	0.717	0.718	0.529	0.333	0.268	0.272	0.216
□	1.319	0.937	0.917	0.608	0.433	0.317	0.338	0.289
Mean	0.864	0.781	0.774	0.502	0.358	0.302	0.277	0.237
Std	0.158	0.110	0.099	0.097	0.056	0.023	0.052	0.035
IR	□	0.097	0.105	0.419	0.586	0.651	0.680	0.726
IC50:	7.31137							
lower 95%:	5.37963							
upper 95%:	9.93676							
r:	0.97194							

Table S54 Antitumor activity of **12b** on SUNE1 cells

SUNE1(20240625-28)		□	□	□	□	□	□
	DMSO	**12b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0	0.548	0.52	0.28	0.263	0.248	0.209	0.217
(λ 570nm)	0.599	0.641	0.537	0.303	0.282	0.217	0.205	0.122
	0.682	0.594	0.557	0.3	0.277	0.205	0.19	0.118
□	0.744	0.595	0.595	0.276	0.296	0.239	0.268	0.126
Mean	0.614	0.595	0.552	0.290	0.280	0.227	0.218	0.146
Std	0.203	0.038	0.032	0.014	0.014	0.020	0.034	0.048
IR	□	0.032	0.101	0.528	0.545	0.630	0.645	0.763
IC50:	3.61600							
lower 95%:	1.82077							
upper 95%:	7.18127							
r:	0.95363							

Table S55 Antitumor activity of **13a** on SUNE1 cells

SUNE1(20240625-28)		□	□	□	□	□	□
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.764	0.739	0.496	0.31	0.238	0.24	0.171	0.143
(λ 570nm)	0.842	0.822	0.522	0.323	0.237	0.247	0.249	0.14
	0.774	1.008	0.502	0.318	0.265	0.287	0.183	0.182
□	0.822	1.089	0.705	0.321	0.269	0.304	0.173	0.175
Mean	0.864	0.915	0.556	0.318	0.252	0.270	0.194	0.160
Std	0.158	0.162	0.100	0.006	0.017	0.031	0.037	0.022
IR	□	-0.058	0.356	0.632	0.708	0.688	0.775	0.815
IC50:	3.85300							

lower 95%:	2.64517
upper 95%:	5.61236
r:	0.95570

Table S56 Antitumor activity of **13b** on SUNE1 cells

SUNE1(20240625-28)	□	□	□	□	□	□	
	DMSO	**13b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.866	0.655	0.386	0.252	0.253	0.21	0.226
(λ 570nm)	0.868	0.728	0.531	0.406	0.278	0.227	0.189	0.143
	0.832	0.698	0.592	0.353	0.243	0.231	0.149	0.13
□	0.887	0.72	0.626	0.32	0.244	0.223	0.157	0.187
Mean	0.864	0.753	0.601	0.366	0.254	0.234	0.176	0.172
Std	0.158	0.076	0.053	0.038	0.016	0.013	0.028	0.044
IR	□	0.128	0.304	0.576	0.706	0.730	0.796	0.802
IC50:	4.70064							
lower 95%:	4.01369							
upper 95%:	5.50517							
r:	0.9906							

Table S57 Antitumor activity of **13c** on SUNE1 cells

SUNE1(20240625-28)	□	□	□	□	□	□	
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.657	0.719	0.384	0.249	0.221	0.211	0.182	0.145
	0.632	0.651	0.478	0.293	0.255	0.224	0.183	0.111
	0.675	0.751	0.416	0.369	0.195	0.193	0.189	0.15
□	0.805	0.646	0.464	0.302	0.238	0.233	0.267	0.337
Mean	0.614	0.692	0.436	0.303	0.227	0.215	0.205	0.186
Std	0.203	0.052	0.043	0.050	0.026	0.017	0.041	0.102
IR	□	-0.127	0.291	0.506	0.630	0.649	0.666	0.697
IC50:	5.57349							
lower 95%:	4.62643							
upper 95%:	6.71441							
r:	0.98668							

Table S58 Antitumor activity of **13d** on SUNE1 cells

SUNE1(20240625-28)	□	□	□	□	□	□	
	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80

A 值	0.57	0.836	0.467	0.279	0.19	0.223	0.191	0.11
(λ 570nm)	0.646	0.674	0.49	0.295	0.238	0.232	0.14	0.129
	0.653	0.792	0.549	0.298	0.243	0.254	0.183	0.125
□	0.709	0.701	0.54	0.287	0.217	0.201	0.161	0.13
Mean	0.614	0.751	0.512	0.290	0.222	0.228	0.169	0.124
Std	0.203	0.076	0.039	0.009	0.024	0.022	0.023	0.009
IR	□	-0.223	0.167	0.528	0.638	0.629	0.725	0.799
IC50:	3.73622							
lower 95%:	2.05454							
upper 95%:	6.7944							
r:	0.96495							

Table S59 Antitumor activity of **13e** on SUNE1 cells

SUNE1(20240719-0722)	□	□	□	□	□	□	
DMSO	**13e** (μmol/L)						
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.775	0.718	0.71	0.362	0.274	0.247	0.193	0.131
	0.756	0.85	0.83	0.399	0.308	0.254	0.199	0.136
	0.871	0.86	0.936	0.459	0.326	0.236	0.207	0.151
□	□	0.937	0.874	0.463	0.391	0.313	0.312	0.289
Mean	0.719	0.841	0.838	0.421	0.325	0.263	0.228	0.177
Std	0.244	0.091	0.095	0.049	0.049	0.034	0.056	0.075
IR	□	-0.170	-0.165	0.415	0.548	0.635	0.683	0.754
IC50:	8.0761							
lower 95%:	6.38464							
upper 95%:	10.21568							
r:	0.98812							

Table S60 Antitumor activity of **13f** on SUNE1 cells

SUNE1(20240719-0722)	□	□	□	□	□	□	
DMSO	**13f** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.744	0.725	0.643	0.341	0.232	0.228	0.192	0.085
(λ 570nm)	0.733	0.63	0.651	0.308	0.23	0.235	0.255	0.09
	0.751	0.655	0.618	0.331	0.221	0.223	0.21	0.088
□	0.744	0.686	0.701	0.36	0.223	0.232	0.214	0.134
Mean	0.719	0.674	0.653	0.335	0.227	0.230	0.218	0.099
Std	0.244	0.041	0.035	0.022	0.005	0.005	0.027	0.023

IR	□	0.063	0.091	0.534	0.685	0.681	0.697	0.862
IC50:	6.13138							
lower 95%:	4.12332							
upper 95%:	9.11736							
r:	0.95752							

Table S61 Antitumor activity of **13g** on SUNE1 cells

SUNE1(20240719-0722)	□	□	□	□	□	□	
	DMSO	**13g** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0	0.939	0.402	0.301	0.241	0.28	0.335	0.273
(λ570nm)	0.846	0.647	0.412	0.26	0.24	0.235	0.225	0.111
	0.826	0.604	0.434	0.274	0.238	0.251	0.26	0.095
□	0.864	0.72	0.493	0.331	0.242	0.247	0.228	0.084
Mean	0.719	0.728	0.435	0.292	0.240	0.253	0.262	0.141
Std	0.244	0.149	0.041	0.031	0.002	0.019	0.051	0.089
IR	□	-0.012	0.395	0.595	0.666	0.648	0.636	0.804
IC50:	3.82303							
lower 95%:	2.77347							
upper 95%:	5.26976							
r:	0.96749							

Table S62 Antitumor activity of **13h** on SUNE1 cells

SUNE1(20240719-0722)	□	□	□	□	□	□	
	DMSO	**13h** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.744	0.428	0.423	0.284	0.219	0.198	0.171	0.186
	0.573	0.734	0.47	0.3	0.273	0.252	0.193	0.193
	0.564	0.823	0.519	0.323	0.242	0.235	0.225	0.216
□	0.903	0.728	0.57	0.457	0.362	0.366	0.5	0.334
Mean	0.692	0.678	0.496	0.341	0.274	0.263	0.272	0.232
Std	0.235	0.172	0.063	0.079	0.063	0.072	0.153	0.069
IR	□	0.020	0.284	0.507	0.604	0.620	0.607	0.664
IC50:	5.88408							
lower 95%:	4.46330							
upper 95%:	7.75713							
r:	0.97251							

Table S63 Antitumor activity of **14a** on SUNE1 cells

SUNE1 (20240325-28)	□	□	□	□	□	□
	DMSO	**14a** (μmol/L)				

□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.949	1.701	1.658	2.009	0.679	0.507	0.247	0.071
(λ570nm)	1.784	2.089	1.87	2.092	0.646	0.352	0.147	0.072
	1.87	1.906	2.242	0.818	0.716	0.467	0.137	0.481
□	2.021	1.84	1.892	1.018	0.705	0.487	0.105	0.074
Mean	1.799	1.884	1.916	1.484	0.687	0.453	0.159	0.175
Std	0.360	0.161	0.242	0.660	0.031	0.069	0.061	0.204
IR	□	-0.047	-0.065	0.175	0.618	0.748	0.912	0.903
IC50:	10.13929							
lower 95%:	7.83488							
upper 95%:	13.12146							
r:	0.97652							

Table S64 Antitumor activity of **14b** on SUNE1 cells

SUNE1 (20240325-28)	□	□	□	□	□	□		
	DMSO	**14b** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.543	1.391	1.041	0.571	0.44	0.38	0.057	0.057
(λ570nm)	1.463	1.514	1.202	0.605	0.466	0.458	0.052	0.051
	1.682	1.745	1.108	0.652	0.497	0.402	0.063	0.052
□	1.958	1.524	1.271	0.679	0.494	0.378	0.05	0.056
Mean	1.486	1.544	1.156	0.627	0.474	0.405	0.056	0.054
Std	0.244	0.147	0.101	0.048	0.027	0.037	0.006	0.003
IR	□	-0.039	0.222	0.578	0.681	0.728	0.963	0.964
IC50:	5.59437							
lower 95%:	3.5741							
upper 95%:	8.75658							
r:	0.94459							

Table S65 Antitumor activity of **14c** on SUNE1 cells

SUNE1 (20240325-28)	□	□	□	□	□	□		
	DMSO	**14c** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.902	0.81	0.541	0.525	0.242	0.06	0.069
(λ570nm)	1.5	0.837	0.733	0.558	0.478	0.218	0.059	0.068
	2.097	1.057	0.771	0.562	0.515	0.22	0.062	0.068
□	2.143	1.223	0.835	0.53	0.456	0.251	0.061	0.072
Mean	1.799	1.005	0.787	0.548	0.494	0.233	0.061	0.069

Std	0.360	0.172	0.045	0.015	0.032	0.016	0.001	0.002
IR	□	0.441	0.562	0.696	0.726	0.871	0.966	0.962
IC50:	1.78716							
lower 95%:	1.28177							
upper 95%:	2.49182							
r:	0.9793							

Table S66 Antitumor activity of **14d** on SUNE1 cells

SUNE1 (20240325-28)		□	□	□	□	□	□
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.585	1.275	0.704	0.558	0.566	0.413	0.148	0.083
(λ 570nm)	1.191	0.978	0.802	0.522	0.455	0.338	0.065	0.073
	1.323	1.049	0.792	0.487	0.495	0.305	0.07	0.076
□	2.326	0.954	0.784	0.491	0.442	0.333	0.066	0.072
Mean	1.799	1.064	0.771	0.515	0.490	0.347	0.087	0.076
Std	0.360	0.146	0.045	0.033	0.056	0.046	0.041	0.005
IR	□	0.409	0.572	0.714	0.728	0.807	0.952	0.958
IC50:	1.74904							
lower 95%:	1.16416							
upper 95%:	2.62776							
r:	0.97006							

Table S67 Antitumor activity of **14e** on SUNE1 cells

SUNE1 (20240325-28)		□	□	□	□	□	□
	DMSO	**14e** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.314	0.919	0.606	0.418	0.496	0.45	0.041	0.054
(λ 570nm)	1.673	1.006	0.685	0.405	0.468	0.379	0.056	0.059
	1.481	0.926	0.624	0.48	0.488	0.431	0.105	0.059
□	1.405	0.737	0.627	0.406	0.461	0.404	0.085	0.057
Mean	1.486	0.897	0.636	0.427	0.478	0.416	0.072	0.057
Std	0.244	0.114	0.034	0.036	0.016	0.031	0.029	0.002
IR	□	0.396	0.572	0.712	0.678	0.720	0.952	0.961
IC50:	1.91014							
lower 95%:	1.81359							
upper 95%:	2.01182							
r:	0.99911							

Table S68 Antitumor activity of **14f** on SUNE1 cells

SUNE1 (20240325-28)		□	□	□	□	□	□

	DMSO	**14f** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.545	0.455	0.326	0.401	0.308	0.049	0.071
(λ570nm)	1.067	0.596	0.59	0.401	0.418	0.401	0.044	0.126
	1.203	0.587	0.493	0.422	0.449	0.397	0.044	0.068
□	1.559	0.637	0.617	0.467	0.491	0.338	0.049	0.065
Mean	1.486	0.591	0.539	0.404	0.440	0.361	0.047	0.083
Std	0.244	0.038	0.077	0.059	0.040	0.046	0.003	0.029
IR	□	0.602	0.637	0.728	0.704	0.757	0.969	0.944
IC50:	0.51105							
lower 95%:	0.36574							
upper 95%:	0.71408							
r:	0.96377							

Table S69 Antitumor activity of **Tub A** on SUNE1 cells

SUNE1(20240719-0722)	□	□	□	□	□	□	
	DMSO	**Tub A** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.161	0.748	0.512	0.571	0.556	0.217	0.109	0.182
(λ570nm)	0.475	0.458	0.461	0.539	0.291	0.207	0.097	0.123
	0.619	0.42	0.502	0.567	0.368	0.218	0.087	0.114
□	0.497	0.538	0.517	0.546	0.422	0.216	0.095	0.123
Mean	0.692	0.541	0.498	0.556	0.409	0.215	0.097	0.136
Std	0.235	0.147	0.025	0.016	0.112	0.005	0.009	0.031
IR	□	0.218	0.280	0.197	0.409	0.690	0.860	0.804
IC50:	12.35922							
lower 95%:	12.00557							
upper 95%:	12.72329							
r:	0.99965							

Table S70 Antitumor activity of **12a** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)	□	□	□	□	□	□	
	DMSO	**12a** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.472	0.482	0.421	0.412	0.325	0.232	0.192	0.15
	0.769	0.513	0.399	0.393	0.306	0.233	0.196	0.206
	0.768	0.557	0.492	0.402	0.3	0.246	0.216	0.194
□	0.771	0.663	0.554	0.528	0.319	0.288	0.227	0.151
Mean	0.629	0.554	0.467	0.434	0.313	0.250	0.208	0.175
Std	0.113	0.079	0.071	0.063	0.012	0.026	0.017	0.029
IR	□	0.120	0.258	0.310	0.503	0.603	0.670	0.721

IC50:	13.28588
lower 95%:	10.53140
upper 95%:	16.76078
r:	0.98058

Table S71 Antitumor activity of **12b** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)	□	□	□	□	□	□	
	DMSO	**12b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.491	0.361	0.365	0.258	0.268	0.25	0.129
(λ 570nm)	0.336	0.499	0.411	0.316	0.257	0.211	0.165	0.086
	0.514	0.454	0.408	0.36	0.331	0.185	0.132	0.179
□	0.423	0.304	0.341	0.389	0.264	0.204	0.172	0.165
Mean	0.459	0.437	0.380	0.358	0.278	0.217	0.180	0.140
Std	0.065	0.091	0.035	0.030	0.036	0.036	0.050	0.042
IR	□	0.048	0.172	0.221	0.395	0.527	0.608	0.696
IC50:	21.77741							
lower 95%:	18.12151							
upper 95%:	26.17086							
r:	0.98911							

Table S72 Antitumor activity of **13a** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)		□	□	□	□	□	□
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.602	0.404	0.383	0.286	0.257	0.213	0.126	0.133
(λ 570nm)	0.586	0.455	0.36	0.304	0.244	0.201	0.155	0.15
	0.469	0.56	0.347	0.318	0.225	0.175	0.139	0.126
□	0.524	0.43	0.427	0.318	0.267	0.189	0.13	0.163
Mean	0.629	0.462	0.379	0.307	0.248	0.195	0.138	0.143
Std	0.113	0.068	0.035	0.015	0.018	0.016	0.013	0.017
IR	□	0.265	0.397	0.513	0.605	0.691	0.781	0.773
IC50:	5.28444							
lower 95%:	4.78227							
upper 95%:	5.83935							
r:	0.99653							

Table S73 Antitumor activity of **13b** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)		□	□	□	□	□	□
	DMSO	**13b** (μmol/L)					

□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.55	0.338	0.346	0.263	0.151	0.103	0.123
(λ570nm)	0.689	0.465	0.404	0.287	0.202	0.179	0.07	0.129
	0.628	0.384	0.402	0.332	0.254	0.183	0.109	0.11
□	0.644	0.364	0.389	0.334	0.275	0.185	0.093	0.13
Mean	0.629	0.441	0.383	0.325	0.249	0.175	0.094	0.123
Std	0.113	0.085	0.031	0.026	0.032	0.016	0.017	0.009
IR	□	0.299	0.391	0.484	0.605	0.723	0.851	0.804
IC50:	4.71727							
lower 95%:	3.99236							
upper 95%:	5.5738							
r:	0.99087							

Table S74 Antitumor activity of **13c** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)		□	□	□	□	□	□
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.449	0.362	0.322	0.237	0.19	0.16	0.115	0.136
	0.541	0.479	0.332	0.251	0.176	0.125	0.107	0.119
	0.434	0.39	0.293	0.215	0.189	0.142	0.11	0.159
□	0.541	0.452	0.37	0.265	0.199	0.194	0.16	0.147
Mean	0.459	0.421	0.329	0.242	0.189	0.155	0.123	0.140
Std	0.065	0.054	0.032	0.021	0.009	0.030	0.025	0.017
IR	□	0.083	0.283	0.473	0.589	0.662	0.732	0.694
IC50:	7.42363							
lower 95%:	5.74447							
upper 95%:	9.59363							
r:	0.9764							

Table S75 Antitumor activity of **13d** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)		□	□	□	□	□	□
	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.378	0.444	0.393	0.417	0.219	0.165	0.136	0.131
(λ570nm)	0.498	0.399	0.426	0.395	0.203	0.178	0.122	0.143
	0.449	0.372	0.483	0.328	0.191	0.17	0.119	0.156
□	0.487	0.36	0.459	0.276	0.182	0.176	0.113	0.143
Mean	0.459	0.394	0.440	0.354	0.199	0.172	0.123	0.143
Std	0.065	0.037	0.039	0.064	0.016	0.006	0.010	0.010
IR	□	0.142	0.041	0.229	0.567	0.625	0.733	0.688
IC50:	12.23958							

lower 95%:	8.03358
upper 95%:	18.64765
r:	0.93311

Table S76 Antitumor activity of **13e** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)								
	DMSO	**13e** (μmol/L)						
	0.0012	1.25	2.5	5	10	20	40	80
	0.622	0.542	0.448	0.319	0.268	0.215	0.142	0.128
	0.61	0.583	0.386	0.343	0.249	0.192	0.192	0.188
	0.569	0.55	0.443	0.407	0.303	0.262	0.21	0.162
	0.712	0.494	0.46	0.344	0.297	0.222	0.16	0.226
Mean	0.589	0.542	0.434	0.353	0.279	0.223	0.176	0.176
Std	0.052	0.037	0.033	0.038	0.025	0.029	0.031	0.041
IR		0.079	0.263	0.400	0.526	0.622	0.701	0.701
IC50:	9.94579							
lower 95%:	8.70349							
upper 95%:	11.36541							
r:	0.99284							

Table S77 Antitumor activity of **13f** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)								
	DMSO	**13f** (μmol/L)						
	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.559	0.503	0.423	0.38	0.24	0.19	0.135	0.168
(λ 570nm)	0.514	0.516	0.422	0.318	0.205	0.243	0.106	0.155
	0.551	0.473	0.47	0.337	0.229	0.164	0.151	0.16
	0.585	0.572	0.392	0.376	0.314	0.202	0.133	0.134
Mean	0.589	0.516	0.427	0.353	0.247	0.200	0.131	0.154
Std	0.052	0.041	0.032	0.030	0.047	0.033	0.019	0.015
IR		0.124	0.275	0.401	0.581	0.661	0.777	0.738
IC50:	8.02787							
lower 95%:	7.17307							
upper 95%:	8.98453							
r:	0.99513							

Table S78 Antitumor activity of **13g** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)								
	DMSO	**13g** (μmol/L)						
	0.0008	1.25	2.5	5	10	20	40	80

A 值	□	0.633	0.397	0.307	0.283	0.249	0.162	0.184
(λ 570nm)	0.614	0.482	0.416	0.287	0.221	0.23	0.158	0.159
	0.586	0.537	0.327	0.309	0.206	0.16	0.136	0.143
□	0.555	0.463	0.425	0.329	0.214	0.163	0.126	0.127
Mean	0.589	0.529	0.391	0.308	0.231	0.201	0.146	0.153
Std	0.052	0.076	0.044	0.017	0.035	0.046	0.017	0.024
IR	□	0.102	0.336	0.477	0.608	0.660	0.753	0.740
IC50:	6.31040							
lower 95%:	5.26741							
upper 95%:	7.55990							
r:	0.98931							

Table S79 Antitumor activity of **13h** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)		□	□	□	□	□	□
	DMSO	**13h** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.662	0.65	0.471	0.341	0.316	0.254	0.207	0.255
	0.685	0.557	0.533	0.35	0.296	0.279	0.213	0.253
	0.743	0.644	0.528	0.352	0.331	0.299	0.217	0.261
□	0.787	0.663	0.512	0.384	0.339	0.29	0.247	0.249
Mean	0.714	0.629	0.511	0.357	0.321	0.281	0.221	0.255
Std	0.046	0.048	0.028	0.019	0.019	0.019	0.018	0.005
IR	□	0.120	0.284	0.500	0.551	0.607	0.690	0.644
IC50:	5.47828							
lower 95%:	4.29859							
upper 95%:	6.98173							
r:	0.98995							

Table S80 Antitumor activity of **14a** on MDA-MB-231 cells

MDA-MB-231(20240325-28)		□	□	□	□	□	□
	DMSO	**14a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.001	0.951	0.606	0.458	0.378	0.234	0.093	0.109
(λ 570nm)	0.937	0.889	0.625	0.459	0.413	0.215	0.097	0.104
	1.046	0.956	0.725	0.506	0.396	0.237	0.097	0.107
□	1.073	1.099	0.663	0.449	0.443	0.206	0.101	0.114
Mean	1.006	0.974	0.655	0.468	0.408	0.223	0.097	0.109
Std	0.102	0.089	0.052	0.026	0.028	0.015	0.003	0.004
IR	□	0.032	0.349	0.535	0.595	0.778	0.904	0.892
IC50:	5.02521							
lower 95%:	3.90558							

upper 95%:	6.4658
r:	0.98314

Table S81 Antitumor activity of **14b** on MDA-MB-231 cells

MDA-MB-231(20240325-28)	□	□	□	□	□	□	□
	DMSO	**14b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.048	0.785	0.481	0.447	0.358	0.294	0.108	0.107
(λ 570nm)	0.872	0.918	0.536	0.425	0.364	0.277	0.107	0.107
	1.16	0.713	0.53	0.442	0.378	0.305	0.108	0.113
□	0.965	0.839	0.51	0.497	0.377	0.263	0.12	0.119
Mean	1.049	0.814	0.514	0.453	0.369	0.285	0.111	0.112
Std	0.131	0.087	0.025	0.031	0.010	0.019	0.006	0.006
IR	□	0.224	0.510	0.568	0.648	0.729	0.894	0.894
IC50:	4.01866							
lower 95%:	2.79272							
upper 95%:	5.78275							
r:	0.96218							

Table S82 Antitumor activity of **14c** on MDA-MB-231 cells

MDA-MB-231(20240325-28)	□	□	□	□	□	□	□
	DMSO	**14c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.495	0.446	0.412	0.383	0.277	0.121	0.118
(λ 570nm)	0.8	0.491	0.411	0.366	0.324	0.276	0.086	0.13
	1.16	0.467	0.427	0.348	0.336	0.251	0.085	0.133
□	0.931	0.51	0.436	0.34	0.348	0.266	0.084	0.127
Mean	1.006	0.491	0.430	0.367	0.348	0.268	0.094	0.127
Std	0.102	0.018	0.015	0.032	0.025	0.012	0.018	0.006
IR	□	0.512	0.573	0.636	0.654	0.734	0.907	0.874
IC50:	1.0571							
lower 95%:	0.74079							
upper 95%:	1.50847							
r:	0.98569							

Table S83 Antitumor activity of **14d** on MDA-MB-231 cells

MDA-MB-231(20240325-28)	□	□	□	□	□	□	□
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.13	0.478	0.371	0.359	0.364	0.294	0.104	0.126
(λ 570nm)	1.003	0.454	0.39	0.346	0.346	0.299	0.089	0.124

	1.045	0.489	0.418	0.357	0.381	0.299	0.093	0.137
□	0.941	0.471	0.427	0.369	0.34	0.286	0.094	0.113
Mean	1.006	0.473	0.402	0.358	0.358	0.295	0.095	0.125
Std	0.102	0.015	0.026	0.009	0.019	0.006	0.006	0.010
IR	□	0.530	0.601	0.644	0.644	0.707	0.906	0.876
IC50:	0.60533							
lower 95%:	0.38067							
upper 95%:	0.96257							
r:	0.96367							

Table S84 Antitumor activity of **14e** on MDA-MB-231 cells

MDA-MB-231(20240325-28)	□	□	□	□	□	□		
	DMSO	**14e** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.175	0.544	0.43	0.38	0.338	0.27	0.114	0.105
(λ570nm)	1.064	0.501	0.454	0.34	0.301	0.289	0.133	0.116
	1.16	0.513	0.481	0.334	0.291	0.262	0.125	0.112
□	0.891	0.515	0.44	0.339	0.342	0.231	0.12	0.117
Mean	1.049	0.518	0.451	0.348	0.318	0.263	0.123	0.113
Std	0.131	0.018	0.022	0.021	0.026	0.024	0.008	0.005
IR	□	0.506	0.570	0.668	0.697	0.749	0.883	0.893
IC50:	1.10367							
lower 95%:	0.8148							
upper 95%:	1.49494							
r:	0.9891							

Table S85 Antitumor activity of **14f** on MDA-MB-231 cells

MDA-MB-231(20240325-28)	□	□	□	□	□	□		
	DMSO	**14f** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.409	0.324	0.302	0.299	0.116	0.105	0.189
(λ570nm)	0.903	0.501	0.374	0.306	0.305	0.236	0.105	0.117
	1.265	0.411	0.431	0.321	0.301	0.242	0.1	0.128
□	1.036	0.447	0.426	0.343	0.328	0.282	0.11	0.131
Mean	1.049	0.442	0.389	0.318	0.308	0.219	0.105	0.141
Std	0.131	0.043	0.050	0.019	0.013	0.072	0.004	0.032
IR	□	0.579	0.629	0.697	0.706	0.791	0.900	0.865
IC50:	0.51612							
lower 95%:	0.3637							
upper 95%:	0.73241							
r:	0.97523							

Table S86 Antitumor activity of **Tub A** on MDA-MB-231 cells

MDA-MB-231(2024013-0816)		□	□	□	□	□	□
	DMSO	**Tub A** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.694	0.615	0.599	0.457	0.297	0.251	0.28	0.319
(λ 570nm)	0.768	0.56	0.545	0.469	0.284	0.247	0.237	0.426
	0.687	0.574	0.531	0.45	0.261	0.225	0.268	0.256
□	0.683	0.531	0.532	0.48	0.267	0.242	0.277	0.252
Mean	0.714	0.570	0.552	0.464	0.277	0.241	0.266	0.313
Std	0.046	0.035	0.032	0.013	0.016	0.011	0.020	0.081
IR	□	0.202	0.227	0.350	0.612	0.662	0.628	0.561
IC50:	7.32399							
lower 95%:	5.90546							
upper 95%:	9.08326							
r:	0.98730							

Table S87 Antitumor activity of **12a** on MCF-7 cells

MCF-7(20240621-0624)		□	□	□	□	□	□
	DMSO	**12a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.601	0.437	0.426	0.357	0.322	0.332	0.284	0.274
(λ 570nm)	0.634	0.436	0.273	0.321	0.31	0.253	0.3	0.3
	1.074	0.414	0.398	0.314	0.31	0.281	0.305	0.281
□	0.963	0.676	0.527	0.527	0.403	0.341	0.343	0.352
Mean	0.725	0.491	0.406	0.380	0.336	0.302	0.308	0.302
Std	0.163	0.124	0.105	0.100	0.045	0.042	0.025	0.035
IR	□	0.323	0.440	0.476	0.536	0.584	0.575	0.584
IC50:	6.91038							
lower 95%:	5.30298							
upper 95%:	9.00500							
r:	0.97526							

Table S88 Antitumor activity of **12b** on MCF-7 cells

MCF-7(20240621-0624)		□	□	□	□	□	□
	DMSO	**12b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.599	0.419	0.434	0.316	0.369	0.389	0.44
(λ 570nm)	0.526	0.395	0.381	0.292	0.256	0.259	0.299	0.349
	0.497	0.445	0.422	0.363	0.289	0.303	0.29	0.338
□	0.471	0.421	0.373	0.332	0.275	0.266	0.318	0.298

Mean	0.562	0.465	0.399	0.355	0.284	0.299	0.324	0.356
Std	0.170	0.092	0.025	0.060	0.025	0.050	0.045	0.060
IR	□	0.173	0.290	0.368	0.495	0.468	0.423	0.366
IC50:								
lower 95%:								
upper 95%:								
r:								

Table S89 Antitumor activity of **13a** on MCF-7 cells

MCF-7(20240621-0624)	□	□	□	□	□	□	□
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.611	0.391	0.335	0.263	0.251	0.283	0.245	0.194
(λ 570nm)	0.657	0.411	0.353	0.26	0.296	0.303	0.243	0.191
	0.642	0.407	0.401	0.269	0.261	0.275	0.246	0.228
□	0.599	0.374	0.344	0.29	0.268	0.292	0.235	0.214
Mean	0.725	0.396	0.358	0.271	0.269	0.288	0.242	0.207
Std	0.163	0.017	0.029	0.014	0.019	0.012	0.005	0.017
IR	□	0.454	0.506	0.627	0.629	0.602	0.666	0.715
IC50:	1.97528							
lower 95%:	1.48887							
upper 95%:	2.6206							
r:	0.97342							

Table S90 Antitumor activity of **13b** on MCF-7 cells

MCF-7(20240621-0624)	□	□	□	□	□	□	□
	DMSO	**13b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.741	0.513	0.351	0.336	0.288	0.307	0.247
(λ 570nm)	0.848	0.416	0.334	0.285	0.271	0.268	0.229	0.179
	0.702	0.41	0.415	0.318	0.261	0.241	0.212	0.168
□	0.641	0.422	0.398	0.3	0.259	0.259	0.212	0.168
Mean	0.725	0.497	0.415	0.314	0.282	0.264	0.240	0.191
Std	0.163	0.163	0.074	0.028	0.037	0.020	0.045	0.038
IR	□	0.314	0.428	0.568	0.611	0.636	0.669	0.737
IC50:	4.96596							
lower 95%:	3.34251							
upper 95%:	7.37791							
r:	0.96022							

Table S91 Antitumor activity of **13c** on MCF-7 cells

MCF-7(2024016-0819)		□	□	□	□	□	□
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.764	0.62	0.534	0.48	0.424	0.497	0.349	0.168
	0.786	0.687	0.555	0.533	0.513	0.57	0.395	0.182
	0.763	0.638	0.607	0.602	0.533	0.517	0.386	0.195
□	0.909	0.772	0.75	0.613	0.57	0.48	0.584	0.238
Mean	0.727	0.679	0.612	0.557	0.510	0.516	0.429	0.196
Std	0.079	0.068	0.097	0.062	0.062	0.039	0.106	0.030
IR	□	0.066	0.159	0.234	0.298	0.290	0.411	0.731
IC50:	42.57147							
lower 95%:	32.17020							
upper 95%:	56.33568							
r:	0.96991							

Table S92 Antitumor activity of **13d** on MCF-7 cells

MCF-7(20240621-0624)		□	□	□	□	□	□
	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.508	0.408	0.355	0.31	0.318	0.308	0.241	0.213
(λ 570nm)	0.46	0.38	0.37	0.328	0.323	0.312	0.221	0.197
	0.486	0.393	0.36	0.339	0.323	0.371	0.271	0.227
□	0.502	0.444	0.377	0.308	0.328	0.324	0.329	0.227
Mean	0.562	0.406	0.366	0.321	0.323	0.329	0.266	0.216
Std	0.170	0.028	0.010	0.015	0.004	0.029	0.047	0.014
IR	□	0.277	0.350	0.428	0.425	0.415	0.528	0.616
IC50:	25.53966							
lower 95%:	15.3843							
upper 95%:	42.39871							
r:	0.94517							

Table S93 Antitumor activity of **13e** on MCF-7 cells

MCF-7(2024016-0819)		□	□	□	□	□	□
	DMSO	**13e** (μmol/L)					
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.844	0.567	0.507	0.497	0.495	0.386	0.304	0.216
	0.668	0.591	0.498	0.487	0.425	0.507	0.313	0.177
	0.746	0.584	0.527	0.452	0.494	0.416	0.312	0.245
□	0.87	0.72	0.645	0.603	0.538	0.493	0.418	0.227
Mean	0.705	0.616	0.544	0.510	0.488	0.451	0.337	0.216
Std	0.087	0.070	0.068	0.065	0.047	0.059	0.054	0.029
IR	□	0.127	0.228	0.277	0.308	0.361	0.522	0.693

IC50:	35.81579
lower 95%:	34.70235
upper 95%:	36.96494
r:	0.99961

Table S94 Antitumor activity of **13f** on MCF-7 cells

MCF-7(20240621-0624)	□	□	□	□	□	□

	DMSO	**13f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.412	0.39	0.32	0.287	0.323	0.29	0.259	0.201
(λ 570nm)	0.478	0.365	0.363	0.378	0.3	0.317	0.318	0.204
	0.51	0.388	0.355	0.355	0.318	0.34	0.268	0.211
□	0.475	0.388	0.368	0.338	0.335	0.316	0.244	0.143
Mean	0.566	0.383	0.352	0.340	0.319	0.316	0.272	0.190
Std	0.205	0.012	0.022	0.039	0.015	0.020	0.032	0.031
IR	□	0.324	0.379	0.400	0.436	0.442	0.519	0.665

IC50:	19.7002
lower 95%:	11.60629
upper 95%:	33.43858
r:	0.9313

Table S95 Antitumor activity of **13g** on MCF-7 cells

MCF-7(2024016-0819)	□	□	□	□	□	□

	DMSO	**13g** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.69	0.559	0.538	0.471	0.683	0.487	0.299
(λ 570nm)	0.661	0.613	0.516	0.476	0.456	0.501	0.482	0.139
	0.683	0.535	0.552	0.451	0.538	0.463	0.339	0.178
□	0.629	0.537	0.546	0.472	0.418	0.558	0.36	0.191
Mean	0.705	0.594	0.543	0.484	0.471	0.551	0.417	0.202
Std	0.087	0.074	0.019	0.037	0.050	0.096	0.078	0.068
IR	□	0.158	0.229	0.313	0.332	0.218	0.409	0.714

IC50:	46.65938
lower 95%:	41.66759
upper 95%:	52.2492
r:	0.99519

Table S96 Antitumor activity of **13h** on MCF-7 cells

MCF-7(20240621-0624)	□	□	□	□	□	□

	DMSO	**13h** (μmol/L)					
□	0.0012	1.25	2.5	5	10	20	40	80
A 值	0.395	0.464	0.373	0.288	0.3	0.285	0.225	0.222

(λ570nm)	0.574	0.384	0.329	0.304	0.304	0.289	0.201	0.256
	0.716	0.483	0.371	0.299	0.334	0.281	0.243	0.27
□	0.91	0.773	0.561	0.445	0.501	0.413	0.357	0.347
Mean	0.602	0.526	0.409	0.334	0.360	0.317	0.257	0.274
Std	0.162	0.170	0.104	0.074	0.095	0.064	0.069	0.053
IR	□	0.126	0.321	0.445	0.402	0.473	0.574	0.545
IC50:	22.95039							
lower 95%:	20.53610							
upper 95%:	25.64852							
r:	0.99529							

Table S97 Antitumor activity of **14a** on MCF-7 cells

MCF-7 (20240325-28)		□	□	□	□	□	□
	DMSO	**14a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.49	0.497	0.417	0.366	0.374	0.238	0.18	0.141
(λ570nm)	0.447	0.471	0.426	0.359	0.327	0.228	0.183	0.165
	0.439	0.523	0.39	0.366	0.303	0.225	0.177	0.145
□	0.469	0.511	0.469	0.376	0.352	0.245	0.196	0.148
Mean	0.459	0.501	0.426	0.367	0.339	0.234	0.184	0.150
Std	0.030	0.022	0.033	0.007	0.031	0.009	0.008	0.011
IR	□	-0.090	0.073	0.201	0.261	0.490	0.599	0.674
IC50:	28.21387							
lower 95%:	21.66701							
upper 95%:	36.73891							
r:	0.98122							

Table S98 Antitumor activity of **14b** on MCF-7 cells

MCF-7 (20240325-28)		□	□	□	□	□	□
	DMSO	**14b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.348	0.297	0.297	0.271	0.203	0.151	0.121	0.132
(λ570nm)	0.384	0.328	0.296	0.248	0.219	0.16	0.137	0.143
	0.389	0.417	0.328	0.253	0.218	0.144	0.115	0.053
□	0.449	0.47	0.33	0.258	0.279	0.139	0.109	0.151
Mean	0.372	0.378	0.313	0.258	0.230	0.149	0.121	0.120
Std	0.038	0.080	0.019	0.010	0.034	0.009	0.012	0.045
IR	□	-0.016	0.159	0.308	0.382	0.601	0.676	0.678

IC50:	15.17372
lower 95%:	12.57411
upper 95%:	18.31078
r:	0.98807

Table S99 Antitumor activity of **14c** on MCF-7 cells

MCF-7 (20240325-28)	□	□	□	□	□	□	
	DMSO	**14c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.369	0.37	0.272	0.259	0.185	0.124	0.132
(λ 570nm)	0.418	0.358	0.332	0.261	0.246	0.171	0.105	0.137
	0.47	0.363	0.327	0.304	0.252	0.183	0.106	0.119
□	0.411	0.381	0.355	0.269	0.26	0.18	0.104	0.124
Mean	0.459	0.368	0.346	0.277	0.254	0.180	0.110	0.128
Std	0.030	0.010	0.020	0.019	0.007	0.006	0.010	0.008
IR	□	0.199	0.246	0.398	0.446	0.608	0.761	0.721
IC50:	10.0812							
lower 95%:	8.34175							
upper 95%:	12.18336							
r:	0.98799							

Table S100 Antitumor activity of **14d** on MCF-7 cells

MCF-7 (20240325-28)	□	□	□	□	□	□	
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.456	0.413	0.351	0.311	0.288	0.219	0.11	0.117
(λ 570nm)	0.455	0.411	0.344	0.295	0.259	0.213	0.129	0.132
	0.502	0.41	0.39	0.296	0.293	0.215	0.123	0.131
□	0.494	0.407	0.396	0.291	0.275	0.201	0.119	0.129
Mean	0.459	0.410	0.370	0.298	0.279	0.212	0.120	0.127
Std	0.030	0.003	0.027	0.009	0.015	0.008	0.008	0.007
IR	□	0.106	0.193	0.350	0.393	0.538	0.738	0.723
IC50:	13.70411							
lower 95%:	10.90542							
upper 95%:	17.22104							
r:	0.98132							

Table S101 Antitumor activity of **14e** on MCF-7 cells

MCF-7 (20240325-28)	□	□	□	□	□	□

	DMSO	**14e** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.398	0.305	0.267	0.219	0.181	0.168	0.114	0.106
(λ570nm)	0.332	0.297	0.267	0.232	0.223	0.168	0.109	0.087
	0.314	0.288	0.284	0.274	0.212	0.171	0.105	0.069
□	0.343	0.265	0.254	0.247	0.192	0.165	0.105	0.066
Mean	0.372	0.289	0.268	0.243	0.202	0.168	0.108	0.082
Std	0.038	0.017	0.012	0.024	0.019	0.002	0.004	0.018
IR	□	0.224	0.280	0.347	0.457	0.548	0.709	0.780
IC50:	11.59851							
lower 95%:	9.9721							
upper 95%:	13.49019							
r:	0.99244							

Table S102 Antitumor activity of **14f** on MCF-7 cells

MCF-7 (20240325-28)		□	□	□	□	□	□
	DMSO	**14f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.267	0.235	0.199	0.15	0.117	0.09	0.032
(λ570nm)	0.357	0.237	0.235	0.227	0.153	0.163	0.085	0.044
	0.389	0.273	0.268	0.227	0.167	0.148	0.09	0.028
□	0.393	0.26	0.276	0.208	0.174	0.131	0.075	0.039
Mean	0.372	0.259	0.254	0.215	0.161	0.140	0.085	0.036
Std	0.038	0.016	0.022	0.014	0.011	0.020	0.007	0.007
IR	□	0.303	0.319	0.421	0.567	0.624	0.772	0.904
IC50:	7.66137							
lower 95%:	6.598							
upper 95%:	8.89611							
r:	0.99166							

Table S103 Antitumor activity of **Tub A** on MCF-7 cells

MCF-7(20240621-0624)		□	□	□	□	□	□
	DMSO	**Tub A** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.683	0.578	0.503	0.465	0.436	0.237	0.286	0.292
(λ570nm)	0.541	0.423	0.375	0.397	0.324	0.295	0.189	0.235
	0.467	0.399	0.37	0.334	0.403	0.248	0.187	0.228
□	0.533	0.37	0.41	0.337	0.341	0.23	0.219	0.239
Mean	0.602	0.443	0.415	0.383	0.376	0.253	0.220	0.249
Std	0.162	0.093	0.062	0.062	0.052	0.029	0.046	0.029
IR	□	0.265	0.311	0.363	0.375	0.581	0.634	0.587

IC50:	14.5599
lower 95%:	9.59172
upper 95%:	22.10145
r:	0.95593

Table S104 Antitumor activity of **12a** on SW1990 cells

SW1990(2024012-0815)	□	□	□	□	□	□	
	DMSO	**12a** (μmol/L)					
□	0.0008	1.453125	2.90625	5.8125	11.625	23.25	46.5	93
□	0.583	0.543	0.421	0.303	0.211	0.166	0.13	0.098
	0.598	0.506	0.474	0.292	0.235	0.158	0.131	0.093
	0.571	0.565	0.493	0.308	0.222	0.192	0.116	0.095
□	0.6	0.592	0.454	0.272	0.209	0.134	0.123	0.104
Mean	0.587	0.552	0.461	0.294	0.219	0.163	0.125	0.098
Std	0.053	0.036	0.031	0.016	0.012	0.024	0.007	0.005
IR	□	0.073	0.226	0.506	0.632	0.727	0.790	0.836
IC50:	4.87906							
lower 95%:	3.87521							
upper 95%:	6.14294							
r:	0.99396							

Table S105 Antitumor activity of **12b** on SW1990 cells

SW1990(2024012-0815)	□	□	□	□	□	□	
	DMSO	**12b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.638	0.479	0.266	0.191	0.188	0.182	0.109
(λ 570nm)	0.6	0.677	0.449	0.254	0.2	0.158	0.162	0.09
	0.59	0.581	0.411	0.311	0.208	0.184	0.158	0.093
□	0.569	0.559	0.371	0.272	0.201	0.176	0.154	0.101
Mean	0.561	0.614	0.428	0.276	0.200	0.177	0.164	0.098
Std	0.037	0.054	0.047	0.025	0.007	0.013	0.012	0.009
IR	□	-0.094	0.238	0.508	0.643	0.685	0.708	0.825
IC50:	5.77027							
lower 95%:	4.53432							
upper 95%:	7.34312							
r:	0.97852							

Table S106 Antitumor activity of **13a** on SW1990 cells

SW1990(20240730-0802)	□	□	□	□	□	□	
	DMSO	**13a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.702	0.773	0.692	0.391	0.195	0.129	0.124	0.132
(λ 570nm)	0.747	0.899	0.704	0.325	0.224	0.163	0.127	0.128
	0.761	0.766	0.702	0.296	0.227	0.172	0.14	0.148
□	0.837	0.843	0.823	0.358	0.243	0.183	0.159	0.129
Mean	0.791	0.820	0.730	0.343	0.222	0.162	0.138	0.134
Std	0.089	0.063	0.062	0.041	0.020	0.023	0.016	0.009
IR	□	-0.037	0.077	0.567	0.719	0.796	0.826	0.830
IC50:	3.36911							
lower 95%:	2.45851							
upper 95%:	4.61698							
r:	0.99152							

Table S107 Antitumor activity of **13b** on SW1990 cells

SW1990(2024012-0815)	□	□	□	□	□	□	
	DMSO	**13b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.71	0.404	0.265	0.191	0.19	0.143	0.127
(λ 570nm)	0.595	0.589	0.476	0.274	0.194	0.192	0.15	0.098
	0.537	0.714	0.42	0.331	0.203	0.175	0.164	0.122
□	0.712	0.576	0.446	0.267	0.173	0.169	0.119	0.1
Mean	0.587	0.647	0.437	0.284	0.190	0.182	0.144	0.112
Std	0.053	0.075	0.032	0.031	0.013	0.011	0.019	0.015
IR	□	-0.088	0.266	0.522	0.680	0.695	0.758	0.812
IC50:	3.03202							
lower 95%:	1.6211							
upper 95%:	5.67096							
r:	0.96776							

Table S108 Antitumor activity of **13c** on SW1990 cells

SW1990(20240730-0802)	□	□	□	□	□	□	
	DMSO	**13c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.717	0.713	0.535	0.291	0.154	0.145	0.094	0.046
	0.801	0.743	0.663	0.274	0.188	0.14	0.113	0.087
	0.753	0.759	0.644	0.295	0.283	0.19	0.185	0.131

□	0.823	0.876	0.635	0.359	0.284	0.202	0.186	0.151
Mean	0.752	0.773	0.619	0.305	0.227	0.169	0.145	0.104
Std	0.041	0.071	0.057	0.037	0.066	0.031	0.048	0.047
IR	□	-0.028	0.177	0.595	0.698	0.775	0.808	0.862
IC50:	2.0604							
lower 95%:	1.47463							
upper 95%:	2.87888							
r:	0.99294							

Table S109 Antitumor activity of **13d** on SW1990 cells

SW1990(20240730-0802) □ □ □ □ □ □

	DMSO	**13d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.787	0.703	0.599	0.354	0.217	0.139	0.088	0.065
(λ570nm)	0.741	0.777	0.681	0.311	0.156	0.116	0.115	0.059
	0.749	0.83	0.62	0.29	0.194	0.126	0.106	0.071
□	0.726	0.779	0.667	0.288	0.192	0.126	0.126	0.086
Mean	0.752	0.772	0.642	0.311	0.190	0.127	0.109	0.070
Std	0.041	0.052	0.039	0.031	0.025	0.009	0.016	0.012
IR	□	-0.027	0.147	0.587	0.748	0.831	0.855	0.907
IC50:	3.2337							
lower 95%:	2.47667							
upper 95%:	4.22212							
r:	0.99424							

Table S110 Antitumor activity of **13e** on SW1990 cells

SW1990(2024012-0815) □ □ □ □ □ □

	DMSO	**13e** (μmol/L)					
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.433	0.387	0.264	0.189	0.13	0.112	0.142	0.081
	0.433	0.414	0.268	0.171	0.132	0.126	0.088	0.069
	0.465	0.401	0.23	0.152	0.112	0.134	0.127	0.07
□	0.517	0.401	0.297	0.195	0.154	0.145	0.131	0.078
Mean	0.491	0.401	0.265	0.177	0.132	0.129	0.122	0.075
Std	0.050	0.011	0.027	0.019	0.017	0.014	0.024	0.006
IR	□	0.184	0.461	0.640	0.731	0.737	0.752	0.848
IC50:	3.17671							
lower 95%:	2.59417							
upper 95%:	3.89007							
r:	0.98615							

Table S111 Antitumor activity of **13f** on SW1990 cells

SW1990(2024012-0815)	□	□	□	□	□	□
	DMSO	**13f** (μmol/L)				
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.462	0.356	0.267	0.189	0.134	0.125	0.123	0.11
(λ 570nm)	0.458	0.386	0.251	0.169	0.115	0.12	0.143	0.1
	0.487	0.343	0.272	0.166	0.132	0.128	0.137	0.092
□	0.477	0.453	0.223	0.15	0.126	0.118	0.132	0.076
Mean	0.491	0.385	0.253	0.169	0.127	0.123	0.134	0.095
Std	0.050	0.049	0.022	0.016	0.009	0.005	0.008	0.014
IR	□	0.217	0.484	0.657	0.742	0.750	0.728	0.808
IC50:	2.94779							
lower 95%:	2.46257							
upper 95%:	3.52862							
r:	0.9881							

Table S112 Antitumor activity of **13g** on SW1990 cells

SW1990(20240730-0802)	□	□	□	□	□	□
	DMSO	**13g** (μmol/L)				
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	0.78	0.366	0.291	0.184	0.148	0.137	0.081
(λ 570nm)	0.84	0.653	0.351	0.232	0.184	0.152	0.099	0.064
	0.69	0.668	0.361	0.217	0.119	0.122	0.089	0.059
□	0.754	0.591	0.338	0.191	0.135	0.107	0.101	0.085
Mean	0.722	0.673	0.354	0.233	0.156	0.132	0.107	0.072
Std	0.050	0.079	0.012	0.042	0.034	0.021	0.021	0.013
IR	□	0.068	0.510	0.678	0.785	0.817	0.852	0.900
IC50:	2.32501							
lower 95%:	2.03683							
upper 95%:	2.65397							
r:	0.9975							

Table S113 Antitumor activity of **13h** on SW1990 cells

SW1990(2024012-0815)	□	□	□	□	□	□
	DMSO	**13h** (μmol/L)				
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.454	0.382	0.285	0.157	0.118	0.095	0.109	0.074
	0.547	0.445	0.267	0.133	0.114	0.117	0.144	0.087
	0.467	0.373	0.268	0.141	0.119	0.129	0.104	0.076
□	0.476	0.36	0.26	0.129	0.129	0.122	0.108	0.088

Mean	0.523	0.390	0.270	0.140	0.120	0.116	0.116	0.081
Std	0.053	0.038	0.011	0.012	0.006	0.015	0.019	0.007
IR	□	0.254	0.484	0.732	0.771	0.779	0.778	0.845
IC50:	2.57696							
lower 95%:	2.53332							
upper 95%:	2.62135							
r:	0.99988							

Table S114 Antitumor activity of **14a** on SW1990 cells

SW1990(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.858	1.927	1.738	1.149	0.457	0.172	0.04	0.034
(λ 570nm)	2.043	2.033	1.802	1.22	0.473	0.166	0.041	0.033
	1.948	2.032	1.985	1.377	0.529	0.206	0.039	0.033
□	2.011	2.073	1.984	1.505	0.501	0.197	0.045	0.032
Mean	1.939	2.016	1.877	1.313	0.490	0.185	0.041	0.033
Std	0.084	0.062	0.127	0.160	0.032	0.019	0.003	0.001
IR	□	-0.040	0.032	0.323	0.747	0.904	0.979	0.983
IC50:	7.62996							
lower 95%:	6.28265							
upper 95%:	9.26619							
r:	0.98418							

Table S115 Antitumor activity of **14b** on SW1990 cells

SW1990(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14b** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.772	1.764	1.628	0.649	0.414	0.17	0.021	0.012
(λ 570nm)	1.674	1.847	1.329	0.654	0.413	0.174	0.026	0.013
	1.942	1.716	1.54	0.667	0.403	0.187	0.024	0.015
□	1.919	2.013	1.659	0.493	0.436	0.214	0.038	0.02
Mean	1.836	1.835	1.539	0.616	0.417	0.186	0.027	0.015
Std	0.082	0.130	0.149	0.082	0.014	0.020	0.007	0.004
IR	□	0.001	0.162	0.665	0.773	0.899	0.985	0.992
IC50:	4.90763							
lower 95%:	3.67943							
upper 95%:	6.54582							
r:	0.9833							

Table S116 Antitumor activity of **14c** on SW1990 cells

SW1990(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14c** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	1.29	0.584	0.306	0.291	0.206	0.121	0.027
(λ 570nm)	1.918	1.091	0.517	0.268	0.257	0.191	0.029	0.029
	1.959	1.137	0.49	0.282	0.243	0.187	0.034	0.028
□	1.857	1.191	0.513	0.265	0.247	0.178	0.035	0.03
Mean	1.939	1.406	0.494	0.278	0.236	0.193	0.085	0.030
Std	0.084	0.086	0.040	0.019	0.022	0.012	0.044	0.001
IR	□	0.275	0.745	0.857	0.878	0.900	0.956	0.985
IC50:	1.73721							
lower 95%:	1.73721							
upper 95%:	1.73721							
r:	1							

Table S117 Antitumor activity of **14d** on SW1990 cells

SW1990(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14d** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.781	1.406	0.494	0.278	0.236	0.193	0.085	0.03
(λ 570nm)	1.911	1.581	0.498	0.304	0.24	0.212	0.08	0.031
	2.02	1.621	0.474	0.353	0.239	0.22	0.096	0.03
□	2.027	1.573	0.493	0.289	0.25	0.218	0.105	0.034
Mean	1.939	1.545	0.490	0.306	0.241	0.211	0.092	0.031
Std	0.084	0.095	0.011	0.033	0.006	0.012	0.011	0.002
IR	□	0.203	0.747	0.842	0.876	0.891	0.953	0.984
IC50:	1.84047							
lower 95%:	1.84047							
upper 95%:	1.84047							
r:	1							

Table S118 Antitumor activity of **14e** on SW1990 cells

SW1990(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14e** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.817	1.713	0.533	0.41	0.248	0.154	0.026	0.013
(λ 570nm)	1.81	1.56	0.544	0.366	0.236	0.156	0.027	0.015
	1.784	1.674	0.51	0.372	0.255	0.153	0.03	0.017
□	1.869	1.412	0.52	0.367	0.258	0.153	0.032	0.012
Mean	1.836	1.590	0.527	0.379	0.249	0.154	0.029	0.014
Std	0.082	0.135	0.015	0.021	0.010	0.001	0.003	0.002
IR	□	0.134	0.713	0.794	0.864	0.916	0.984	0.992

IC50:	1.99187
lower 95%:	1.99187
upper 95%:	1.99187
r:	1

Table S119 Antitumor activity of **14f** on SW1990 cells

SW1990(20240328-0401)	□	□	□	□	□	□	
	DMSO	**14f** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	1.713	0.645	0.404	0.322	0.207	0.059	0.02
(λ 570nm)	1.898	1.617	0.514	0.373	0.277	0.17	0.028	0.013
	1.786	1.637	0.568	0.376	0.271	0.167	0.03	0.022
□	1.92	1.622	0.572	0.367	0.266	0.155	0.035	0.015
Mean	1.836	1.406	0.494	0.278	0.236	0.193	0.085	0.030
Std	0.082	0.045	0.054	0.016	0.026	0.022	0.014	0.004
IR	□	0.234	0.731	0.849	0.871	0.895	0.954	0.984
IC50:	1.82073							
lower 95%:	1.82073							
upper 95%:	1.82073							
r:	1							

Table S120 Antitumor activity of **Tub A** on SW1990 cells

SW1990(20240625-28)	□	□	□	□	□	□	
	DMSO	**Tub A** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	1.089	0.76	0.73	0.624	0.545	0.434	0.223	0.438
(λ 570nm)	0.951	0.69	0.649	0.595	0.429	0.391	0.303	0.244
	0.932	0.759	0.658	0.524	0.44	0.34	0.301	0.231
□	0.797	0.685	0.662	0.575	0.446	0.361	0.302	0.23
Mean	0.977	0.724	0.675	0.580	0.465	0.382	0.282	0.286
Std	0.189	0.042	0.037	0.042	0.054	0.041	0.040	0.102
IR	□	0.259	0.309	0.407	0.524	0.610	0.711	0.708
IC50:	8.88205							
lower 95%:	8.12126							
upper 95%:	9.71412							
r:	0.99714							

Table S121 Antitumor activity of **12a** on HEK-293T cells

HEK-293T(20240628-0701)	□	□	□	□	□	□	
	DMSO	**12a** (μmol/L)					
□	0.0008	1.25	2.5	5	10	20	40	80

□	0.993	0.882	0.684	0.513	0.455	0.573	0.532	0.62
	0.999	0.867	0.684	0.683	0.55	0.495	0.599	0.437
	0.995	0.797	0.692	0.516	0.695	0.43	0.547	0.688
□	1.243	1.062	0.787	0.784	0.683	0.505	0.643	0.522
Mean	1.039	0.902	0.712	0.624	0.596	0.501	0.580	0.567
Std	0.116	0.113	0.050	0.133	0.115	0.059	0.051	0.110
IR	□	0.132	0.315	0.399	0.427	0.518	0.442	0.455
IC50:	18.33162							
lower 95%:	11.25066							
upper 95%:	29.86921							
r:	0.95772							

Table S122 Antitumor activity of **12b** on HEK-293T cells

HEK-293T(2024013-0816)	□	□	□	□	□	□		
	DMSO	**12b** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	1.221	0.943	0.42	0.344	0.329	0.357	0.27
(λ 570nm)	1.148	0.995	0.958	0.369	0.288	0.308	0.304	0.233
	1.031	1.005	0.774	0.36	0.323	0.317	0.316	0.212
□	1.096	0.935	0.684	0.352	0.349	0.316	0.313	0.201
Mean	1.133	1.039	0.840	0.375	0.326	0.318	0.323	0.229
Std	0.142	0.125	0.133	0.031	0.028	0.009	0.024	0.030
IR	□	0.083	0.259	0.669	0.712	0.720	0.715	0.798
IC50:	3.76369							
lower 95%:	3.39626							
upper 95%:	4.17087							
r:	0.99720							

Table S123 Antitumor activity of **13a** on HEK-293T cells

HEK-293T(20240628-0701)	□	□	□	□	□	□		
	DMSO	**13a** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.955	0.707	0.542	0.421	0.519	0.504	0.429	0.343
(λ 570nm)	0.946	0.841	0.544	0.459	0.46	0.456	0.551	0.387
	0.989	0.787	0.557	0.426	0.607	0.454	0.498	0.571
□	0.97	0.86	0.656	0.449	0.539	0.583	0.547	0.347
Mean	1.039	0.799	0.575	0.439	0.531	0.499	0.506	0.412
Std	0.116	0.069	0.055	0.018	0.061	0.060	0.057	0.108
IR	□	0.231	0.447	0.578	0.489	0.519	0.513	0.603
IC50:	3.49589							
lower 95%:	2.78618							
upper 95%:	4.38637							

r:	0.98486

Table S124 Antitumor activity of **13b** on HEK-293T cells

HEK-293T(20240628-0701) □								
	DMSO	**13b** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	□	1.161	0.909	0.604	0.618	0.571	0.579	0.463
(λ 570nm)	1.288	1.053	0.519	0.54	0.457	0.455	0.472	0.354
	0.996	0.857	0.646	0.397	0.45	0.419	0.423	0.327
□	1.054	0.857	0.651	0.354	0.465	0.451	0.433	0.32
Mean	1.039	0.982	0.681	0.474	0.498	0.474	0.477	0.366
Std	0.116	0.151	0.164	0.118	0.081	0.067	0.071	0.066
IR	□	0.055	0.344	0.544	0.521	0.544	0.541	0.648
IC50:	4.15020							
lower 95%:	2.80492							
upper 95%:	6.1407							
r:	0.96709							

Table S125 Antitumor activity of **13c** on HEK-293T cells

HEK-293T(20240628-0701) □								
	DMSO	**13c** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
□	0.718	0.505	0.285	0.287	0.346	0.324	0.341	0.304
	0.638	0.433	0.388	0.351	0.413	0.481	0.48	0.327
	0.766	0.538	0.317	0.428	0.4	0.369	0.349	0.268
□	1.092	0.65	0.512	0.531	0.494	0.651	0.373	0.488
Mean	0.742	0.532	0.376	0.399	0.413	0.456	0.386	0.347
Std	0.131	0.090	0.101	0.105	0.061	0.146	0.064	0.097
IR	□	0.284	0.494	0.462	0.443	0.385	0.480	0.533
IC50:	55.09943							
lower 95%:	44.40565							
upper 95%:	68.36849							
r:	0.98597							

Table S126 Antitumor activity of **13d** on HEK-293T cells

HEK-293T(20240628-0701) □								
	DMSO	**13d** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.685	0.58	0.419	0.352	0.498	0.472	0.259	0.254
(λ 570nm)	0.662	0.532	0.433	0.418	0.357	0.479	0.217	0.311
	0.662	0.545	0.359	0.341	0.451	0.345	0.345	0.283

□	0.678	0.515	0.398	0.391	0.361	0.32	0.335	0.257
Mean	0.742	0.543	0.402	0.376	0.417	0.404	0.289	0.276
Std	0.131	0.028	0.032	0.036	0.069	0.083	0.061	0.027
IR	□	0.268	0.458	0.494	0.438	0.456	0.611	0.628
IC50:	20.47515							
lower 95%:	13.20362							
upper 95%:	31.75129							
r:	0.93571							

Table S127 Antitumor activity of **13e** on HEK-293T cells

HEK-293T(20240628-0701)	□	□	□	□	□	□		
	DMSO	**13e** (μmol/L)						
□	0.0012	1.25	2.5	5	10	20	40	80
□	0.713	0.623	0.497	0.442	0.42	0.444	0.424	0.299
	0.73	0.664	0.452	0.397	0.399	0.402	0.423	0.274
	0.894	0.68	0.441	0.475	0.43	0.484	0.389	0.313
□	□	□	□	□	□	□	□	□
Mean	0.798	0.656	0.463	0.438	0.416	0.443	0.412	0.295
Std	0.135	0.029	0.030	0.039	0.016	0.041	0.020	0.020
IR	□	0.178	0.419	0.451	0.478	0.444	0.484	0.630
IC50:	34.48148							
lower 95%:	23.56488							
upper 95%:	50.45526							
r:	0.94908							

Table S128 Antitumor activity of **13f** on HEK-293T cells

HEK-293T(20240628-0701)	□	□	□	□	□	□		
	DMSO	**13f** (μmol/L)						
□	0.0008	1.25	2.5	5	10	20	40	80
A 值	0.702	0.569	0.368	0.442	0.421	0.425	0.338	0.277
(λ 570nm)	0.787	0.523	0.419	0.388	0.444	0.453	0.447	0.294
	0.818	0.539	0.472	0.396	0.422	0.438	0.334	0.265
□	0.655	0.47	0.444	0.348	0.402	0.46	0.327	0.221
Mean	0.798	0.525	0.426	0.394	0.422	0.444	0.362	0.264
Std	0.135	0.041	0.044	0.039	0.017	0.016	0.057	0.031
IR	□	0.342	0.466	0.507	0.471	0.444	0.547	0.669
IC50:	4.19001							
lower 95%:	2.67242							
upper 95%:	6.56939							
r:	0.95796							

Table S129 Antitumor activity of **13g** on HEK-293T cells

HEK-293T(2024013-0816)	□	□	□	□	□	□
DMSO	**13g** (μmol/L)					
□ 0.0008	1.25	2.5	5	10	20	40	80
A 值 □	0.91	0.576	0.464	0.456	0.434	0.362	0.287
(λ 570nm) 1.244	0.758	0.625	0.417	0.363	0.453	0.362	0.197
1.31	0.826	0.544	0.468	0.422	0.38	0.345	0.192
□ 1.189	0.762	0.432	0.385	0.438	0.427	0.352	0.211
Mean 1.178	0.814	0.544	0.434	0.420	0.424	0.355	0.222
Std 0.120	0.071	0.082	0.040	0.040	0.031	0.008	0.044
IR □	0.309	0.538	0.632	0.644	0.640	0.698	0.812
IC50: 2.59776							
lower 95%: 1.98063							
upper 95%: 3.40717							
r: 0.97151							

Table S130 Antitumor activity of **13h** on HEK-293T cells

HEK-293T(20240628-0701)	□	□	□	□	□	□
DMSO	**13h** (μmol/L)					
FE4 (μmol/L+B176:J177) 0.0012	1.25	2.5	5	10	20	40	80
□ 0.708	0.622	0.43	0.453	0.474	0.444	0.321	0.332
0.863	0.684	0.591	0.501	0.483	0.478	0.377	0.287
0.937	0.565	0.572	0.511	0.517	0.522	0.326	0.391
□ 1.186	1.001	0.808	0.646	0.746	0.794	0.461	0.456
Mean 0.959	0.718	0.600	0.528	0.555	0.560	0.371	0.367
Std 0.152	0.195	0.156	0.083	0.129	0.160	0.065	0.073
IR □	0.251	0.374	0.450	0.421	0.417	0.613	0.618
IC50: 26.78618							
lower 95%: 26.78618							
upper 95%: 26.78618							
r: 1							

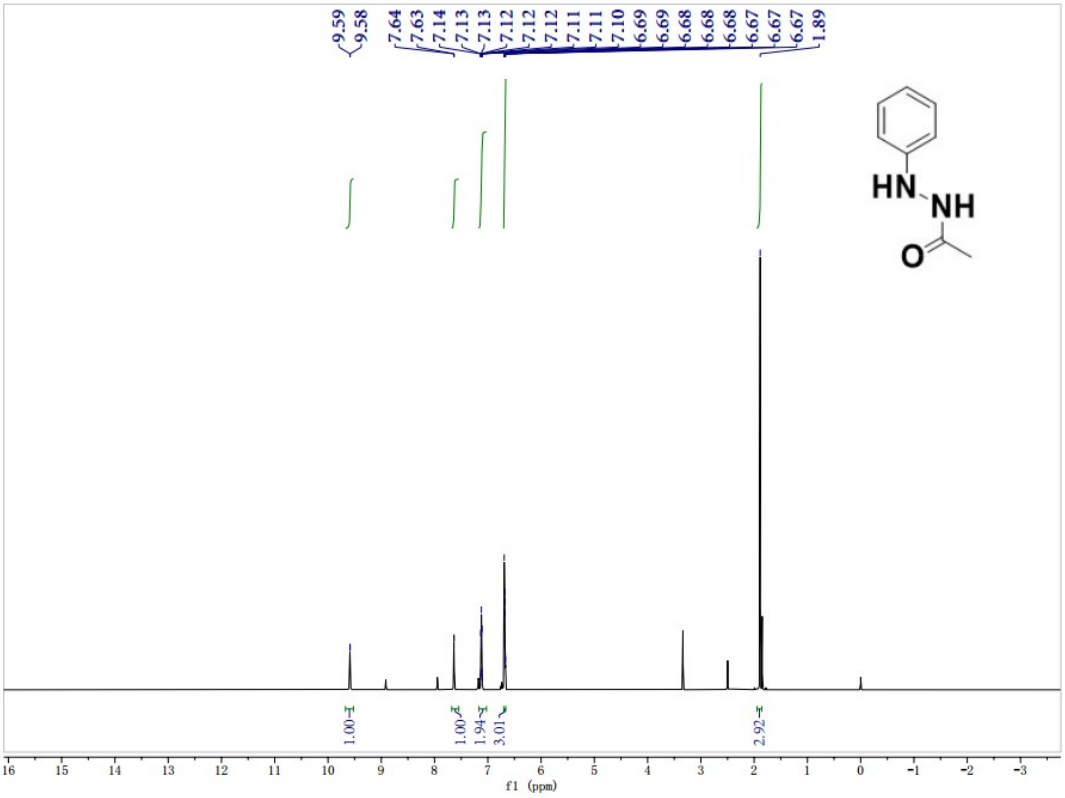
Table S131 Antitumor activity of **Tub A** on HEK-293T cells

HEK-293T(20240628-0701)	□	□	□	□	□	□
DMSO	**Tub A** (μmol/L)					
□ 0.0008	1.25	2.5	5	10	20	40	80
A 值 1.067	0.735	0.671	0.625	0.619	0.623	0.742	0.526
(λ 570nm) 1.097	0.583	0.639	0.55	0.503	0.566	0.627	0.737
0.876	0.687	0.558	0.496	0.479	0.523	0.531	0.707
□ 0.939	0.645	0.53	0.486	0.369	0.505	0.587	0.604
Mean 0.959	0.663	0.600	0.539	0.493	0.554	0.622	0.644

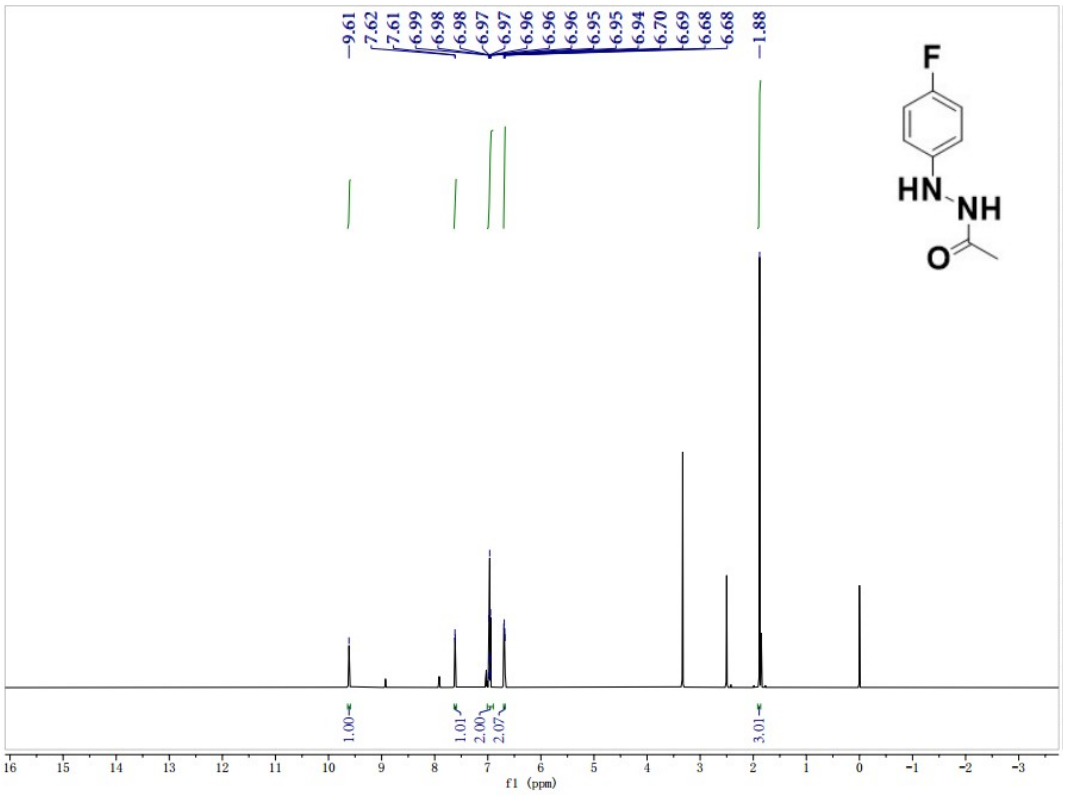
Std	0.152	0.065	0.066	0.064	0.103	0.052	0.089	0.097
IR	□	0.309	0.375	0.438	0.486	0.422	0.352	0.329

IC50:	10.8359
lower 95%:	9.12707
upper 95%:	12.86467
r:	0.99589

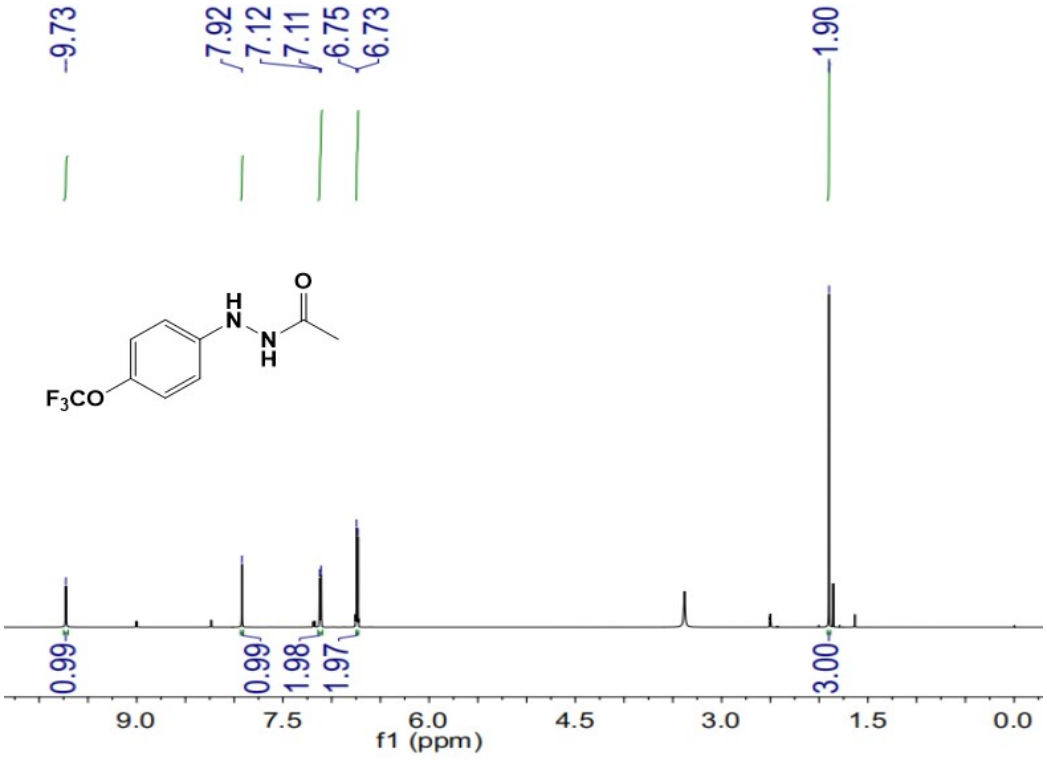
Copies of ^{1}H NMR, ^{19}F NMR and ^{13}C NMR of Products



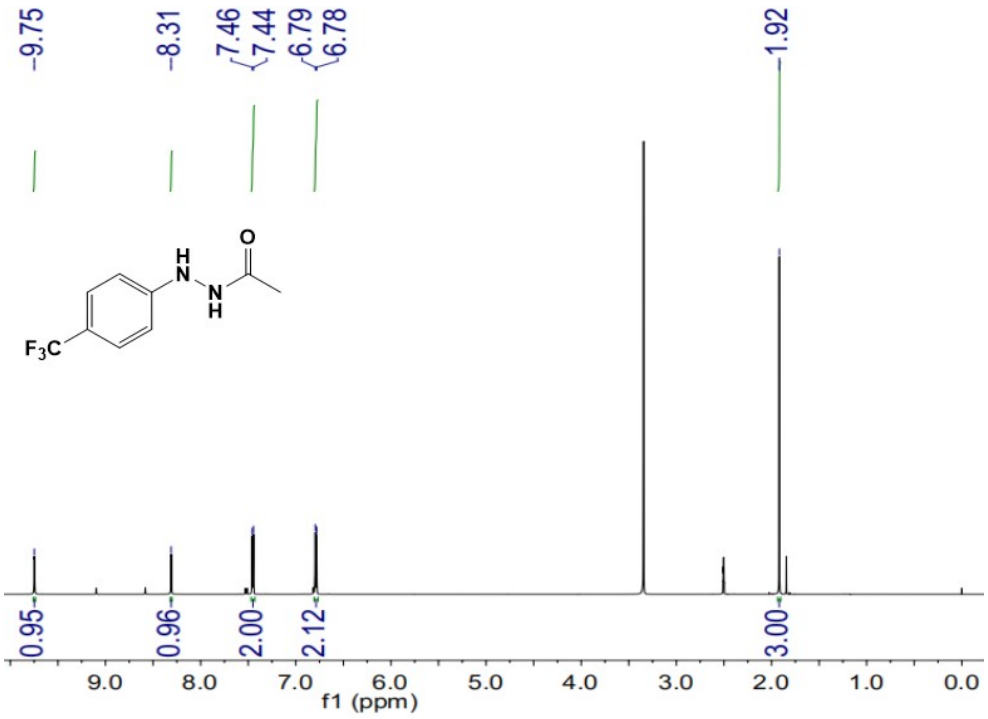
^{1}H NMR spectrum of compound **2a** (600 MHz, DMSO-d_6)



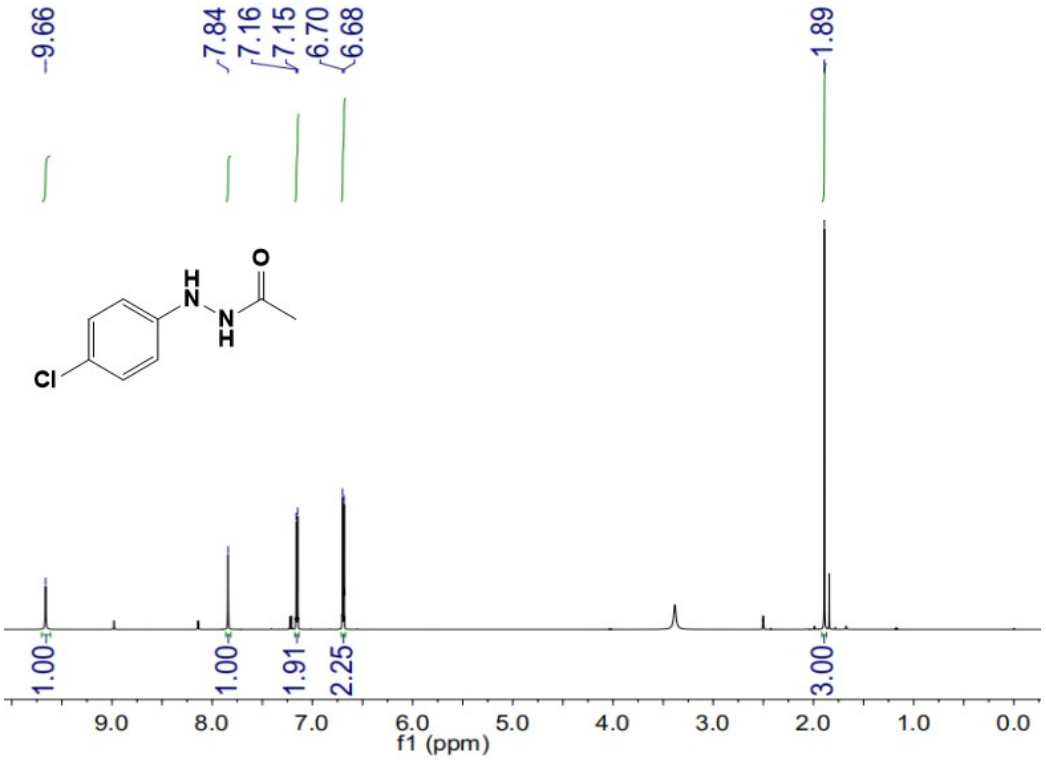
^{1}H NMR spectrum of compound **2b** (600 MHz, DMSO-d_6)



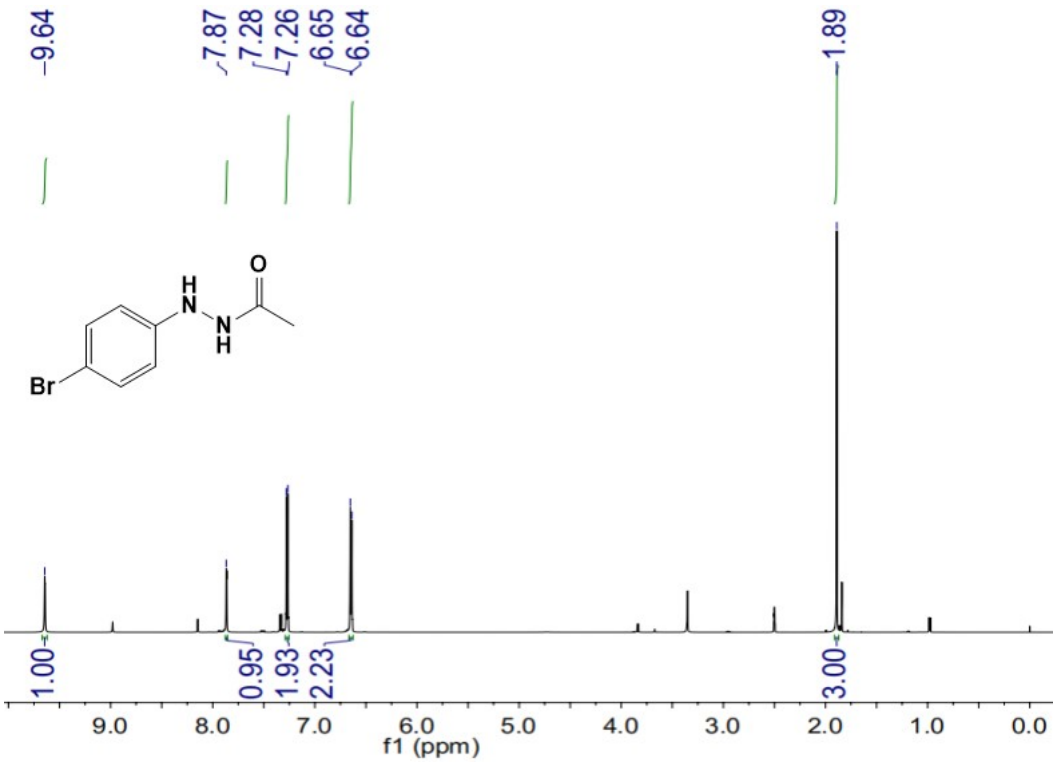
^{1}H NMR spectrum of compound **2c** (600 MHz, DMSO-d_6)



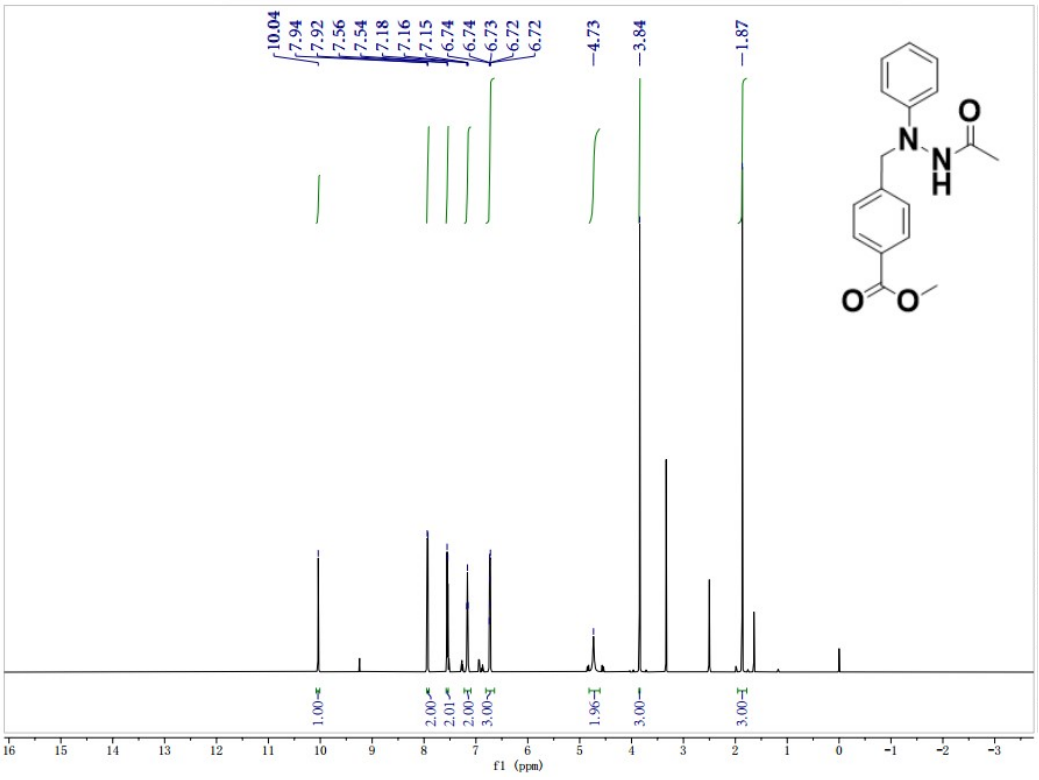
^{1}H NMR spectrum of compound **2d** (600 MHz, DMSO-d_6)



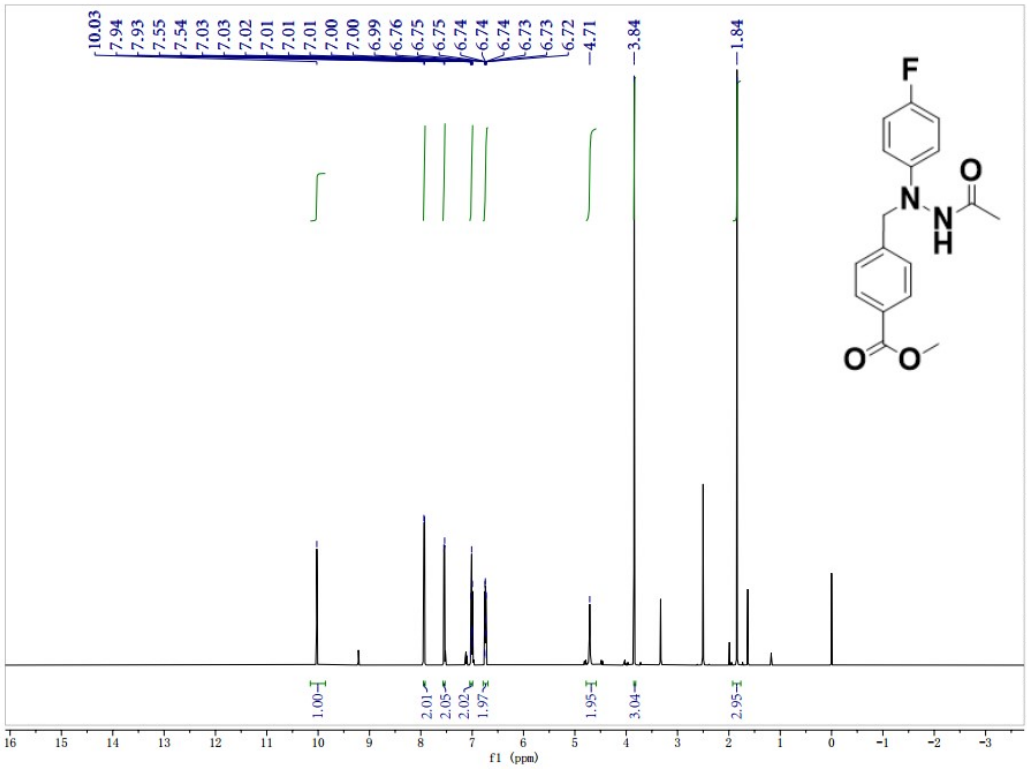
^{1}H NMR spectrum of compound **2e** (600 MHz, DMSO-d_6)



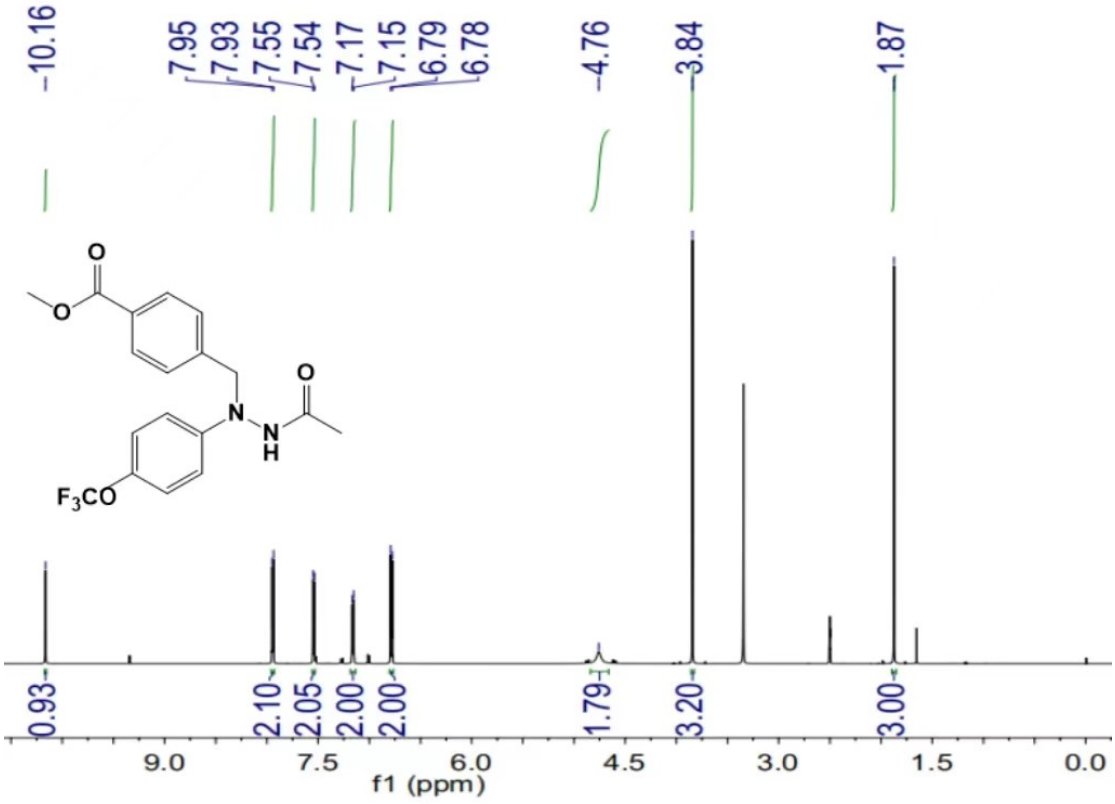
^{1}H NMR spectrum of compound **2f** (600 MHz, DMSO-d_6)



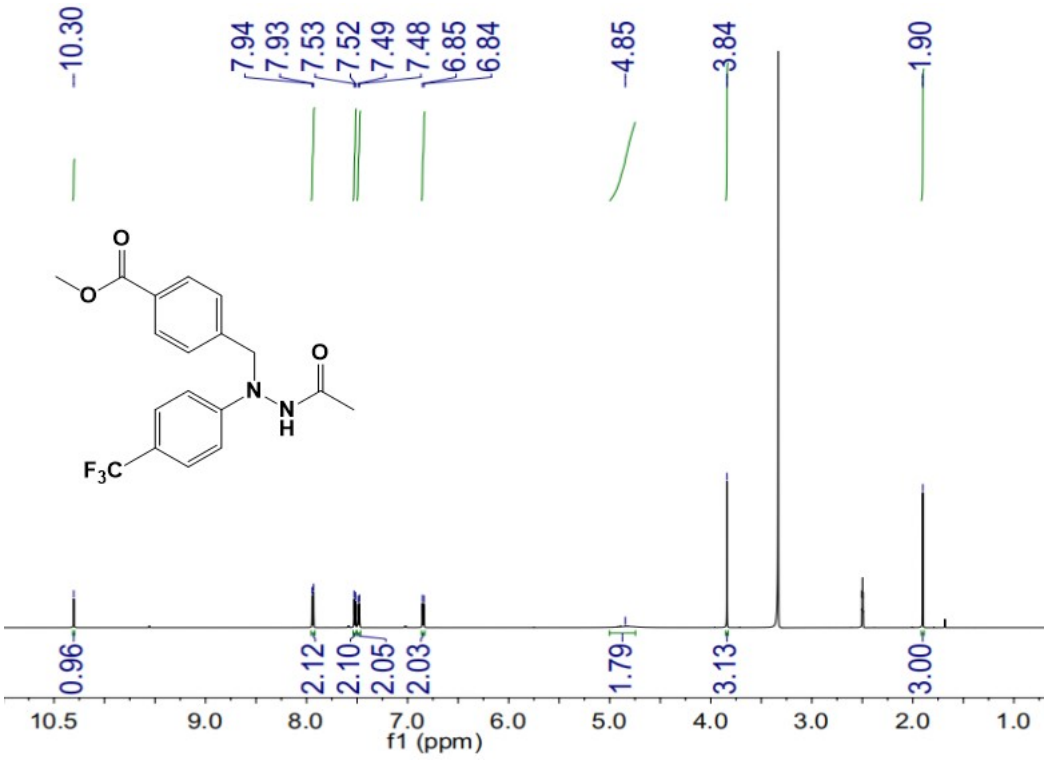
^{1}H NMR spectrum of compound **4a** (600 MHz, DMSO-d_6)



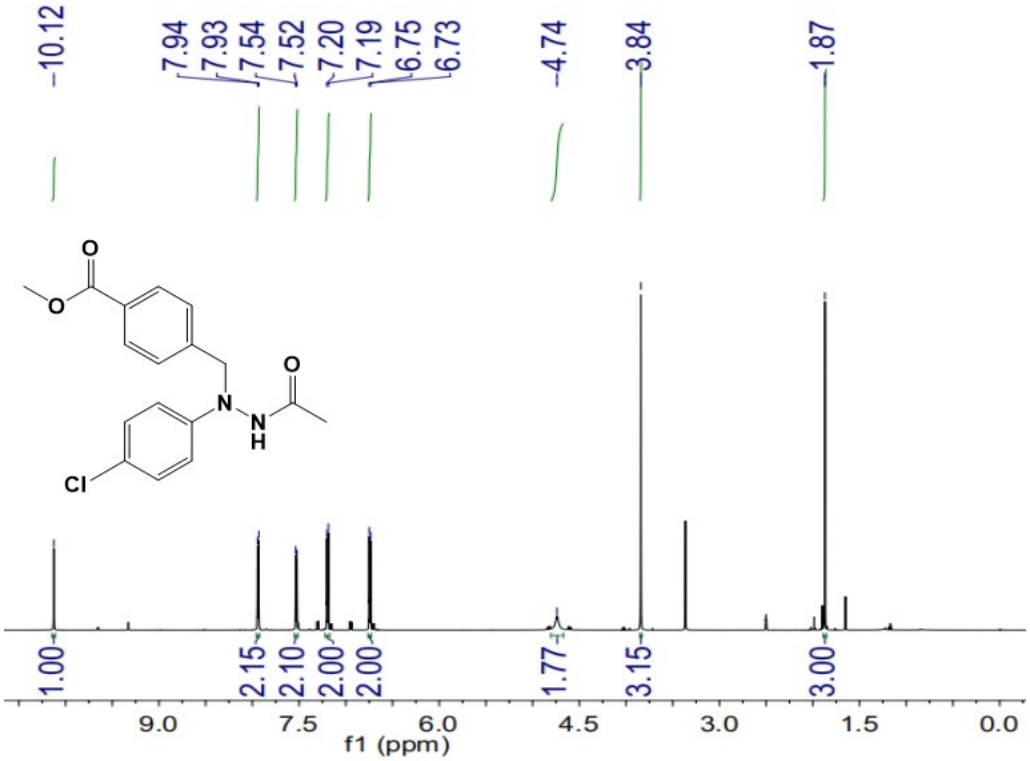
^{1}H NMR spectrum of compound **4b** (600 MHz, DMSO-d_6)



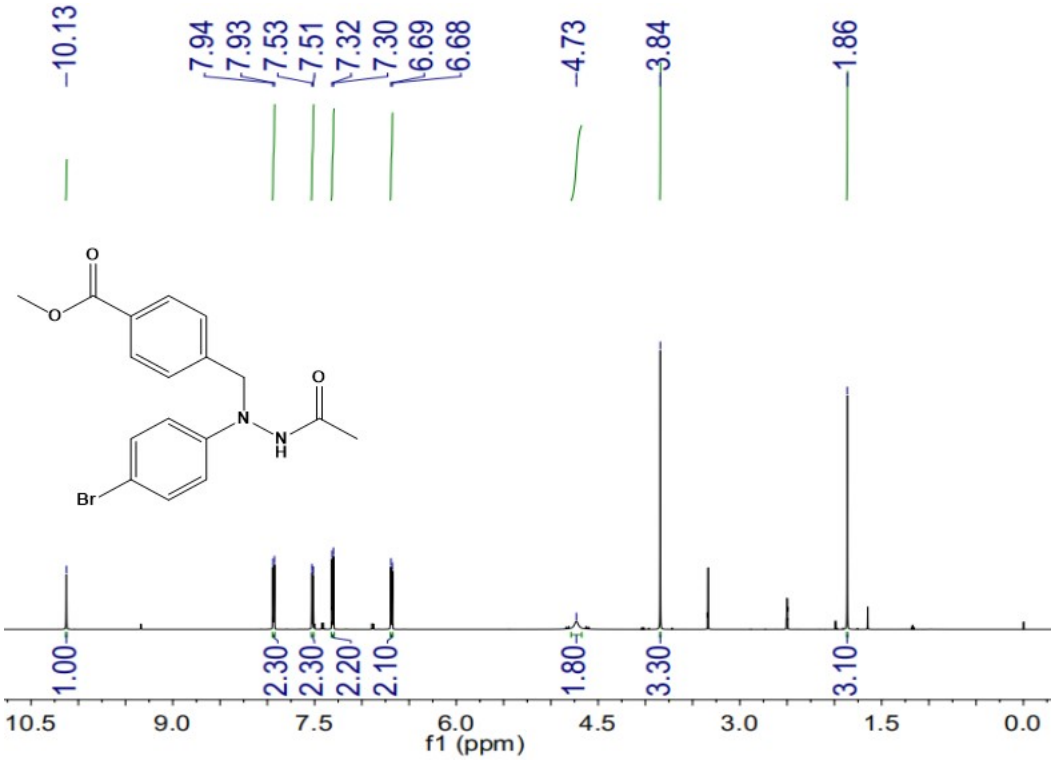
^{1}H NMR spectrum of compound **4c** (600 MHz, DMSO-d_6)



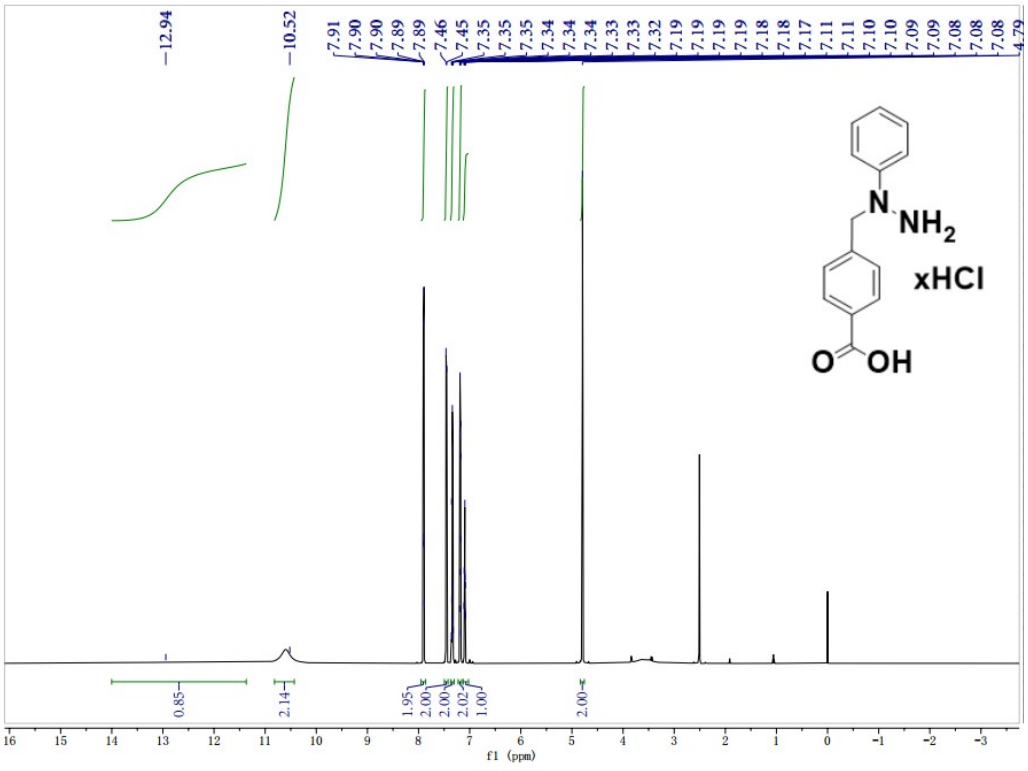
^{1}H NMR spectrum of compound **4d** (600 MHz, DMSO-d_6)



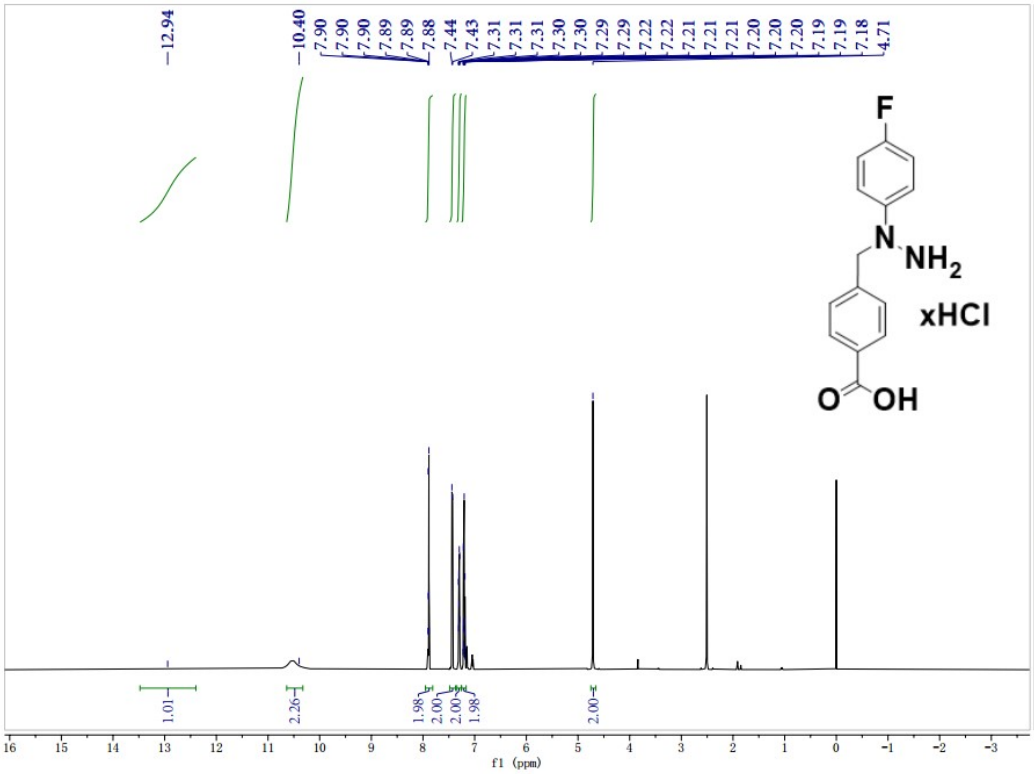
^{1}H NMR spectrum of compound **4e** (600 MHz, DMSO-d_6)



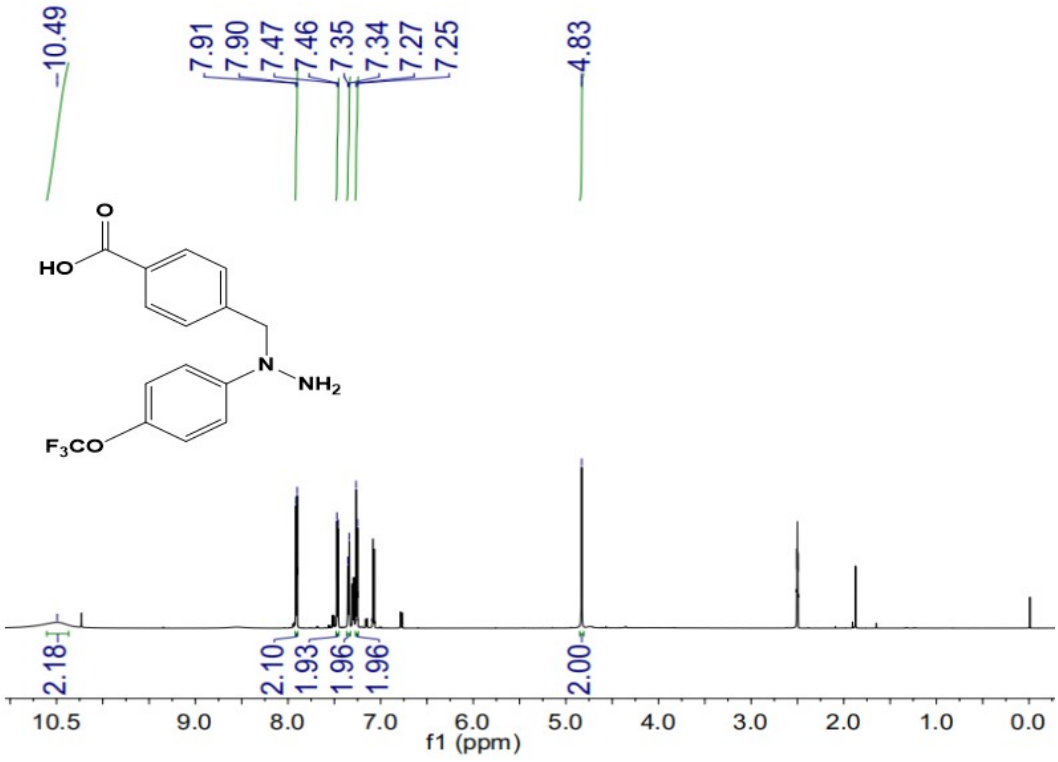
^{1}H NMR spectrum of compound **4f** (600 MHz, DMSO-d_6)



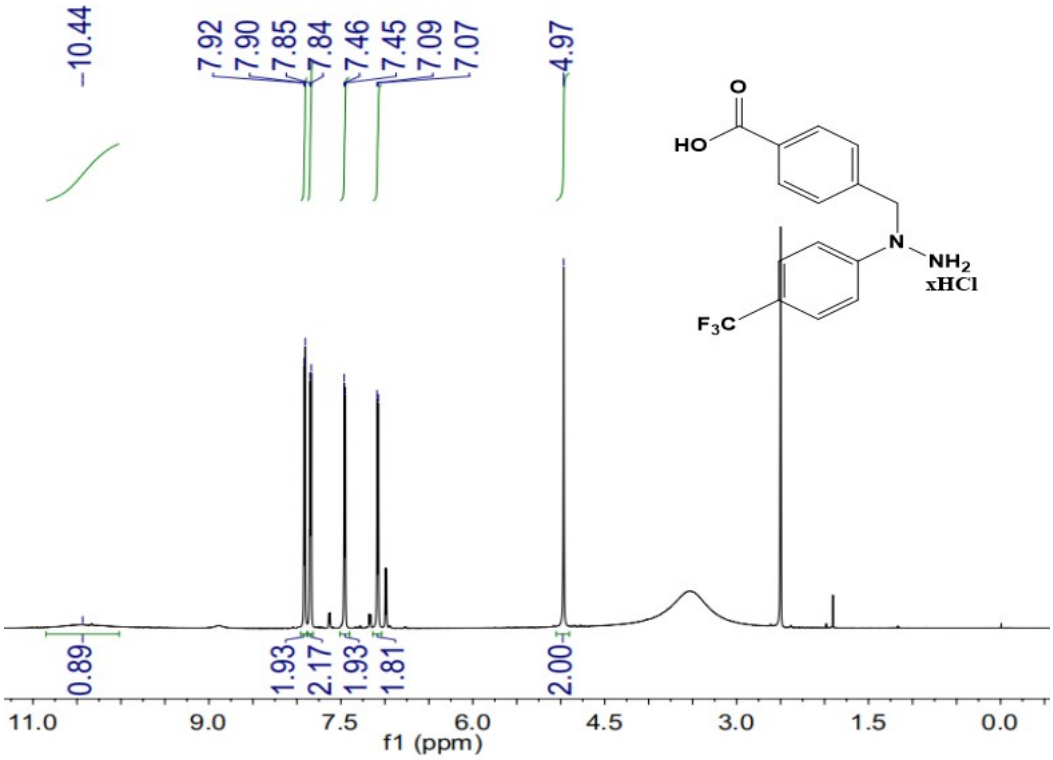
^{1}H NMR spectrum of compound **5a** (600 MHz, DMSO-d_6)



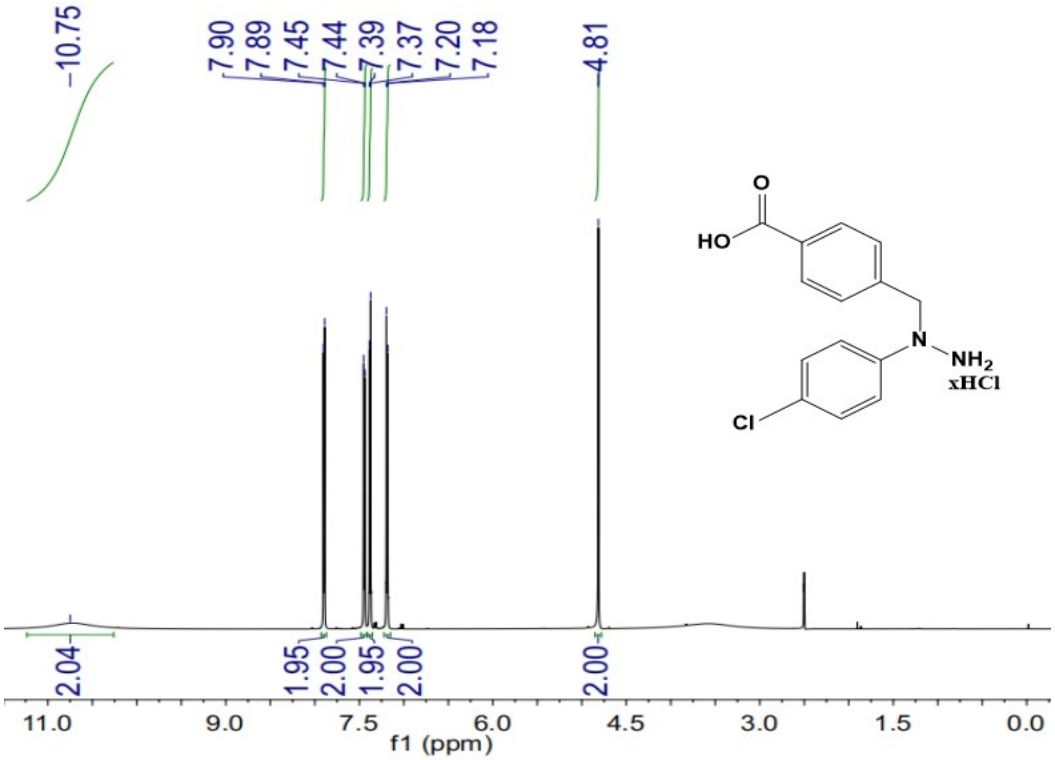
^{1}H NMR spectrum of compound **5b** (600 MHz, DMSO-d_6)



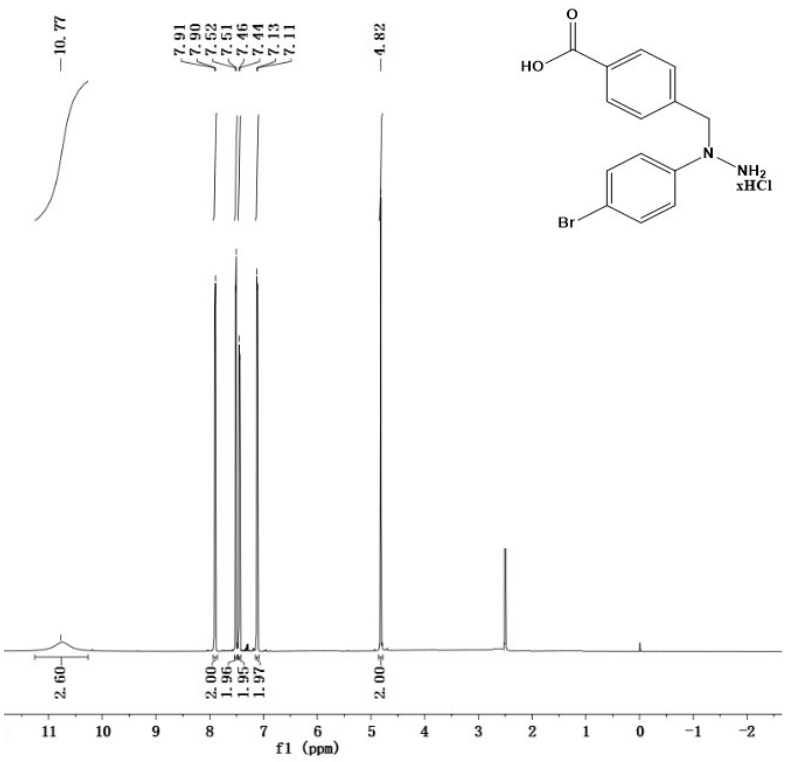
^{1}H NMR spectrum of compound **5c** (600 MHz, DMSO-d_6)



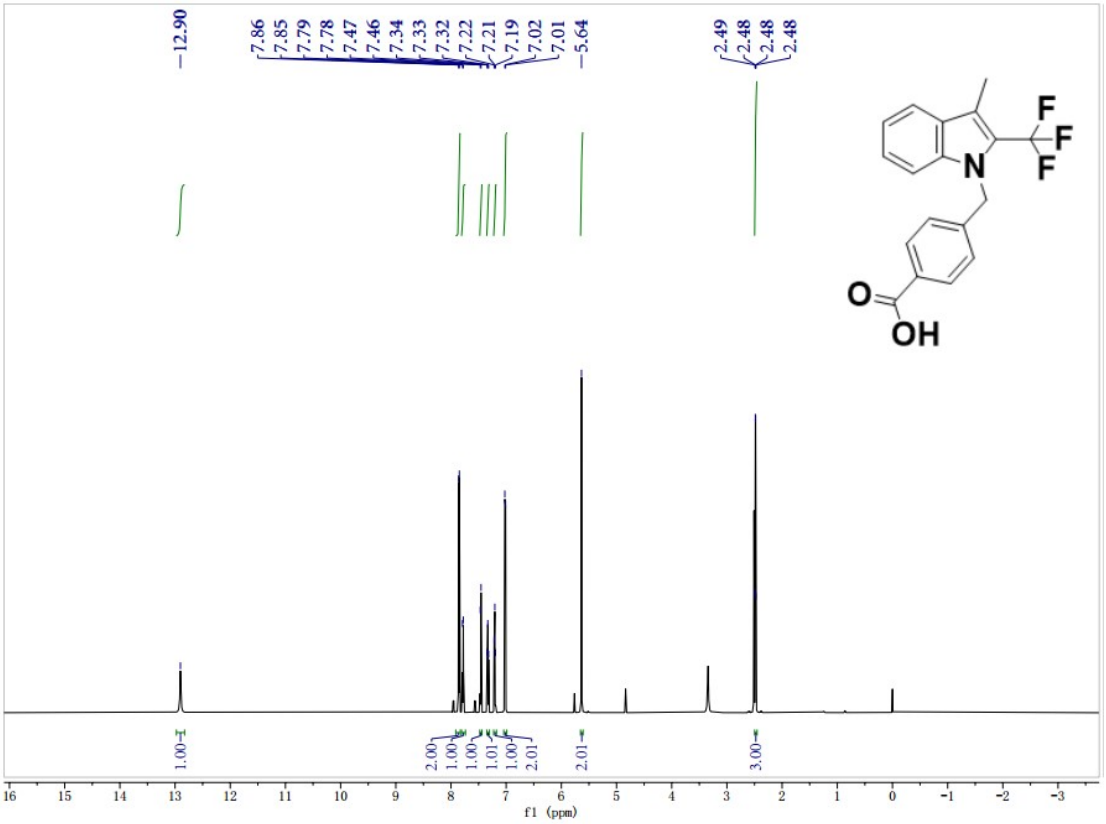
^{1}H NMR spectrum of compound **5d** (600 MHz, DMSO-d_6)



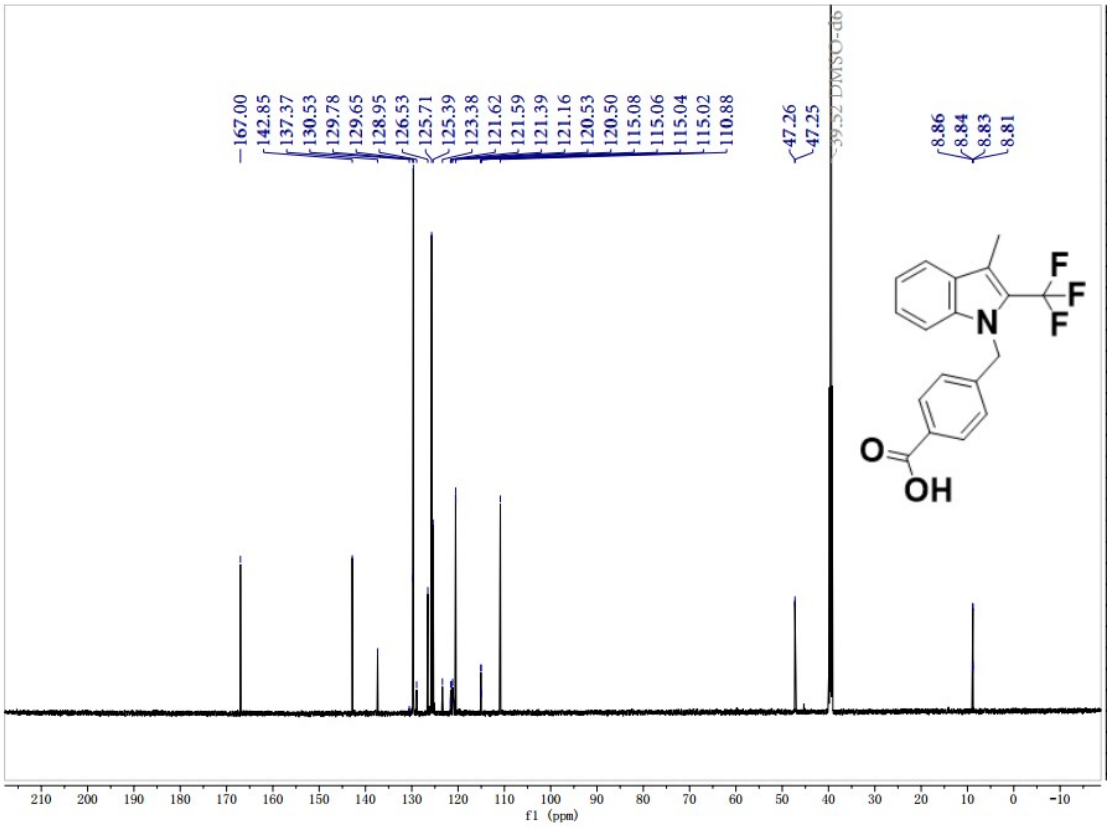
^{1}H NMR spectrum of compound **5e** (600 MHz, DMSO-d_6)



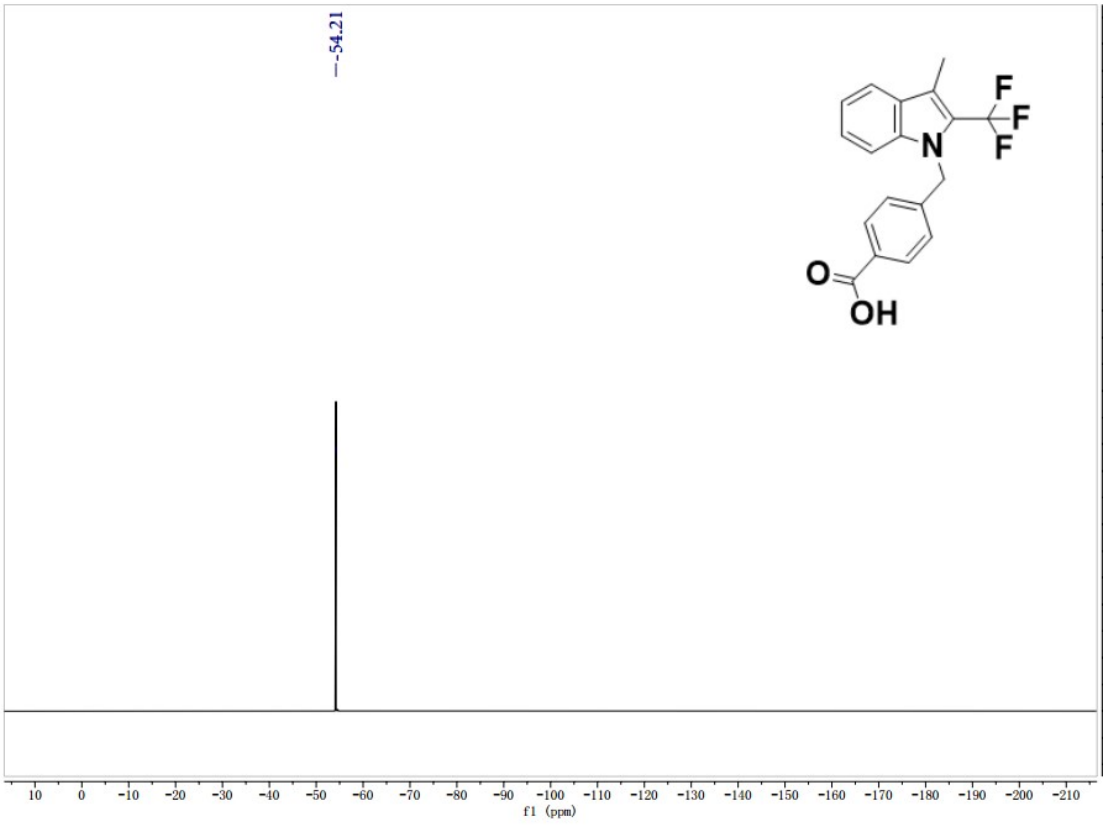
^{1}H NMR spectrum of compound **5f** (600 MHz, DMSO-d_6)



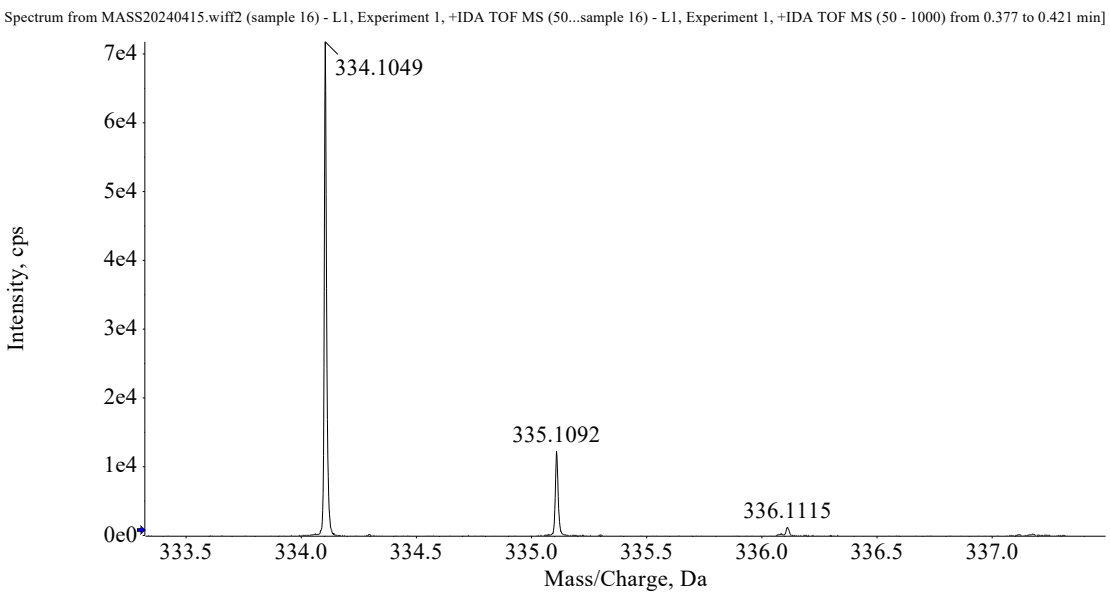
^{1}H NMR spectrum of compound **9a** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **9a** (151 MHz, DMSO-d_6)

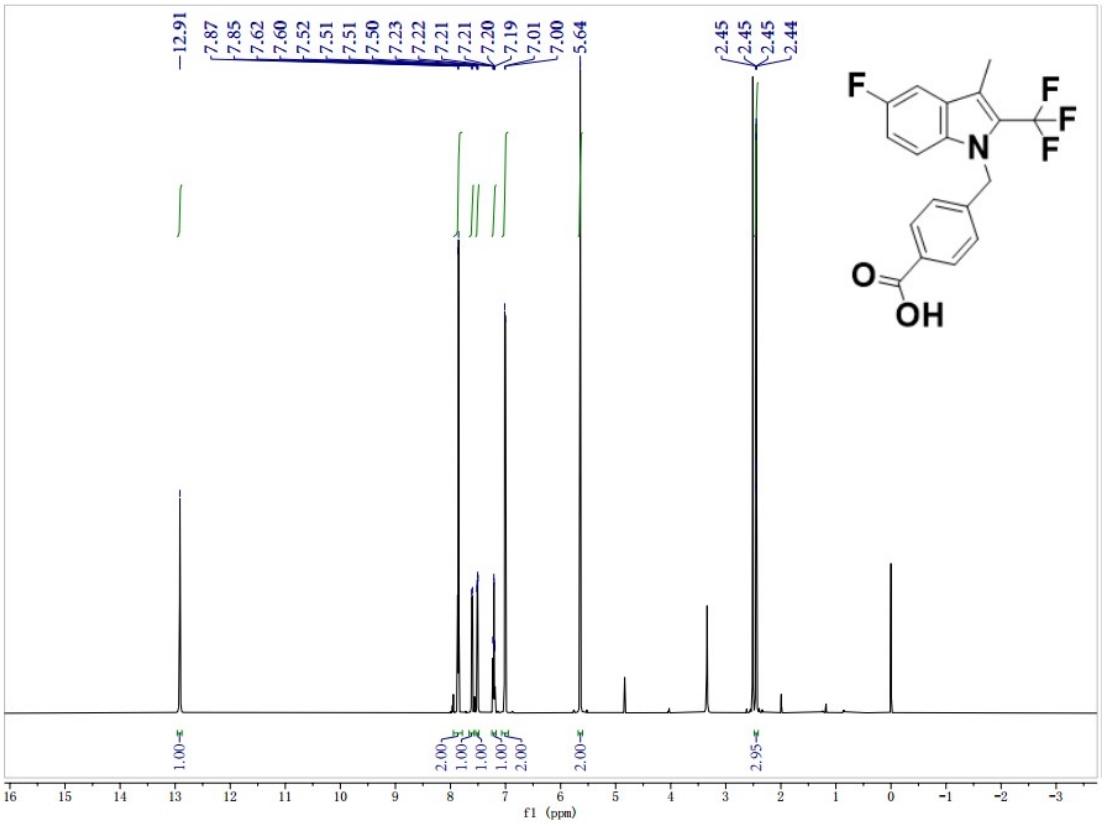


^{19}F NMR spectrum of compound **9a** (564 MHz, DMSO-d_6)

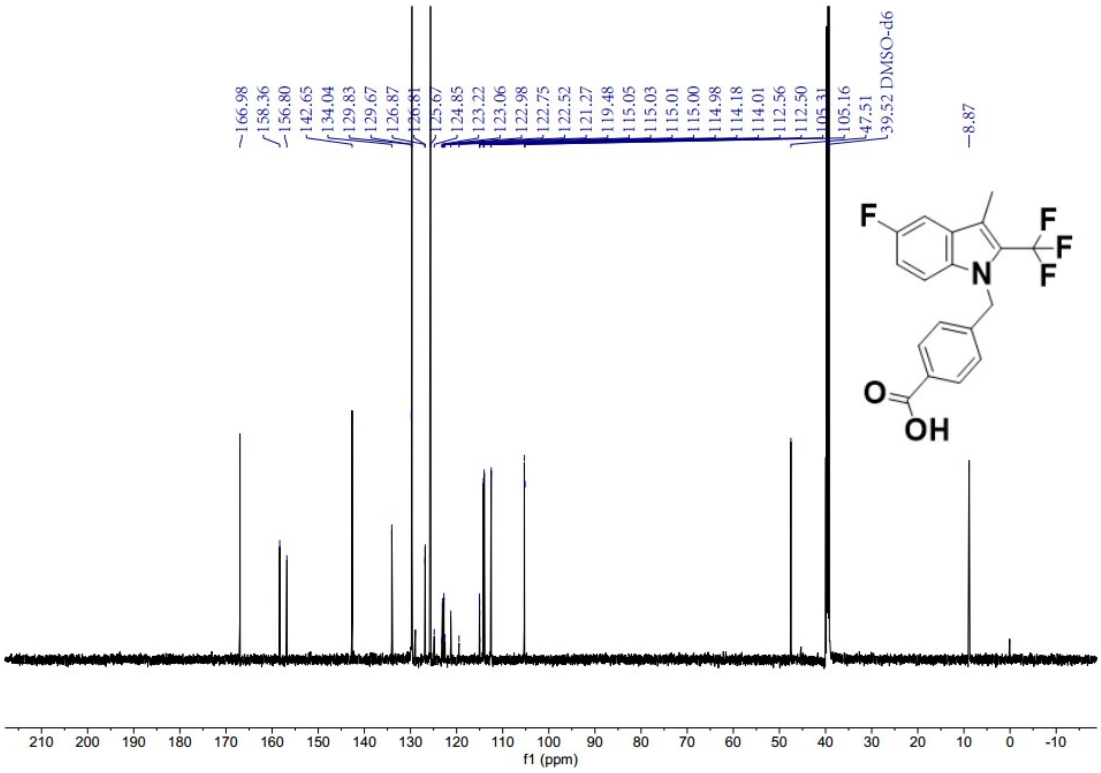


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C18H14F3NO2	334.1049	11.0	-0.1	1			NA/NA

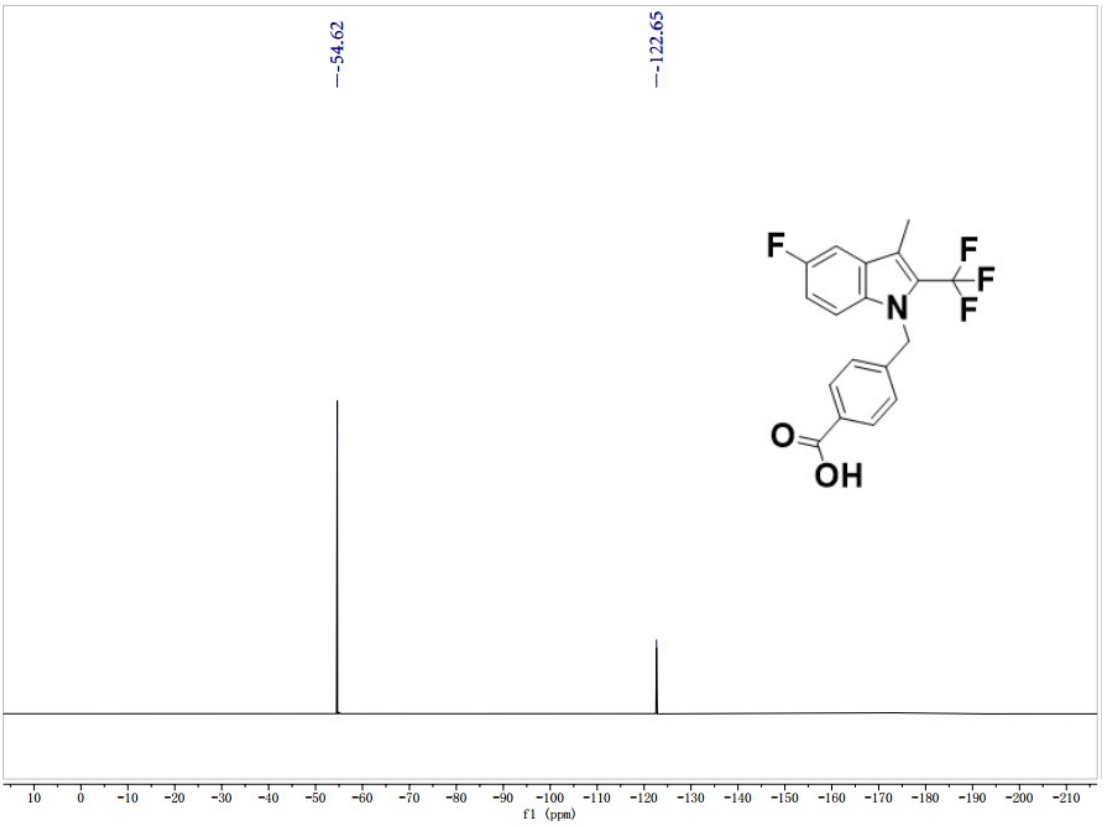
HRMS of compound **9a**



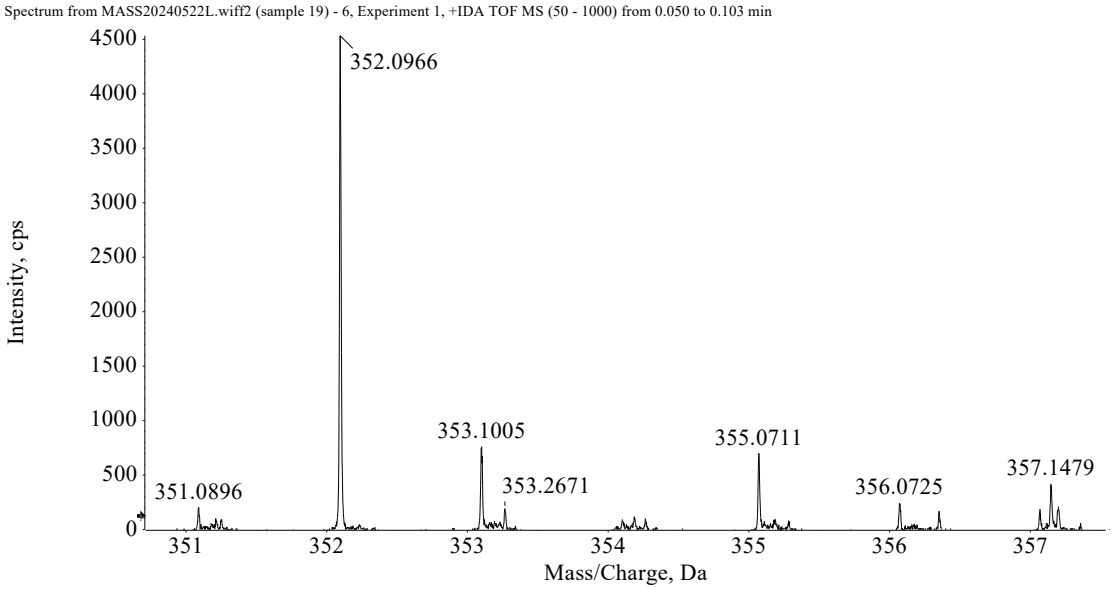
^{1}H NMR spectrum of compound **9b** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **9b** (151 MHz, DMSO-d_6)

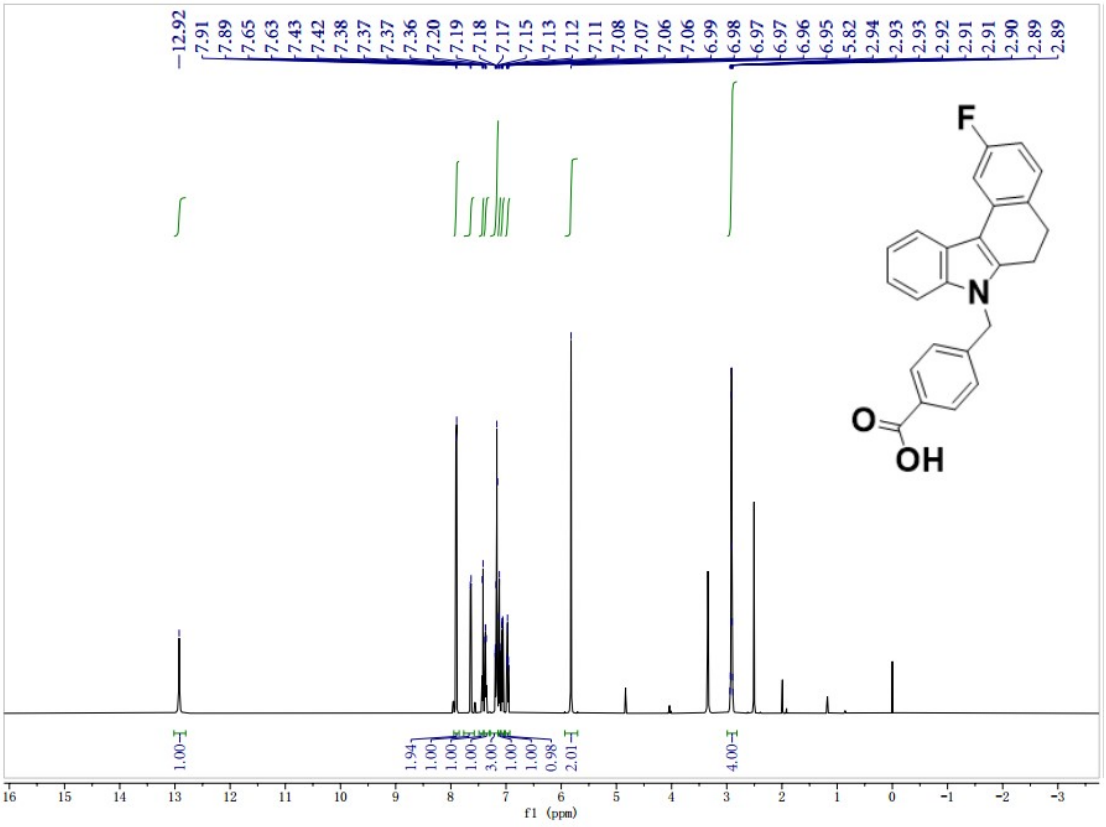


^{19}F NMR spectrum of compound **9b** (564 MHz, DMSO-d_6)

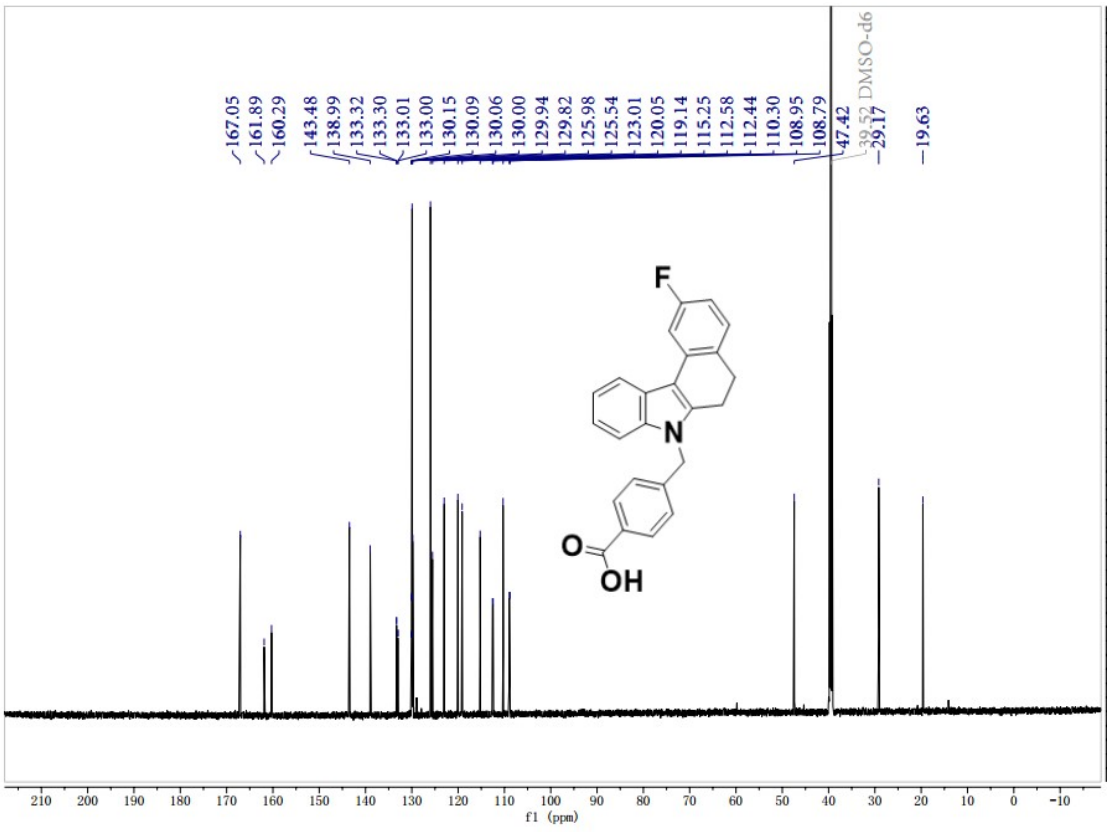


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C18H13F4NO2	352.0955	11.0	3.1	1			NA/NA

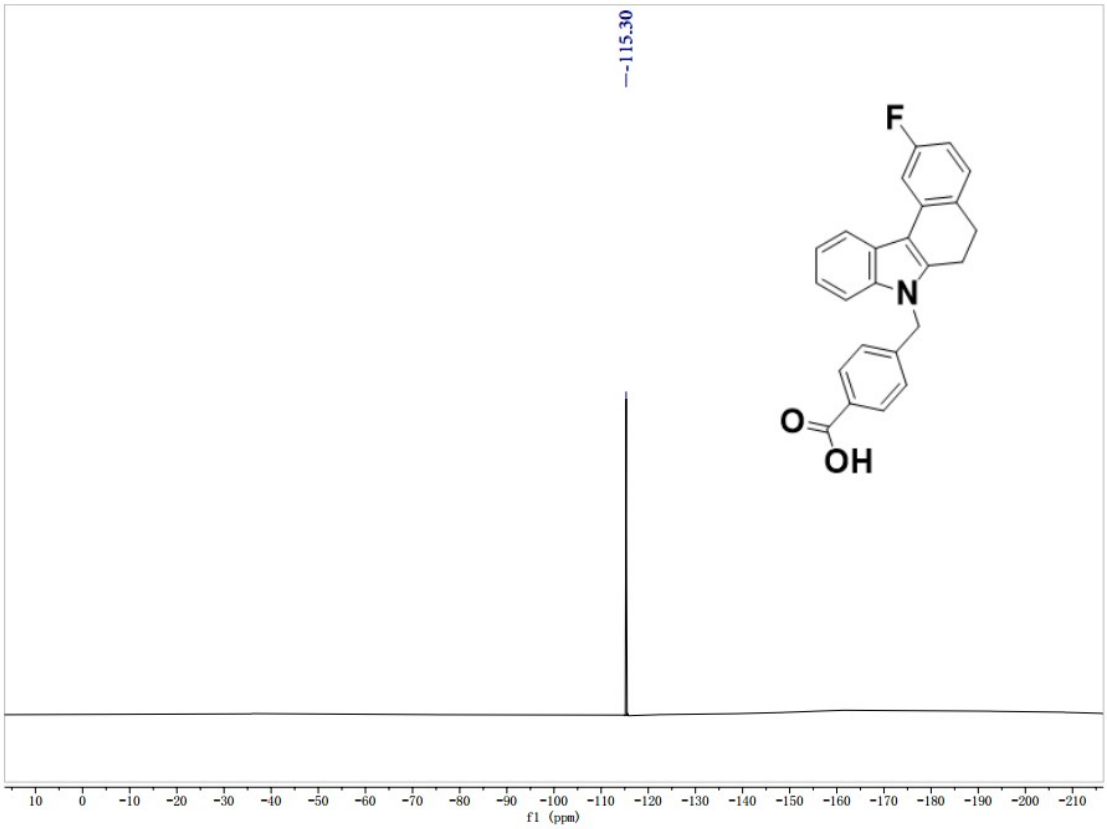
HRMS of compound **9b**



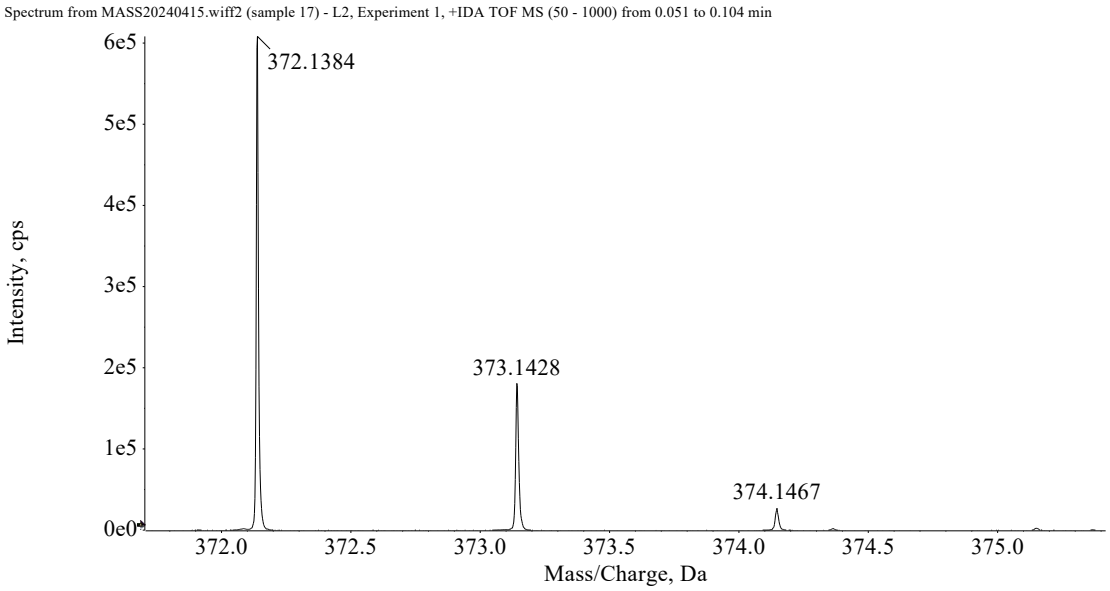
^{1}H NMR spectrum of compound **10a** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10a** (151 MHz, DMSO-d_6)

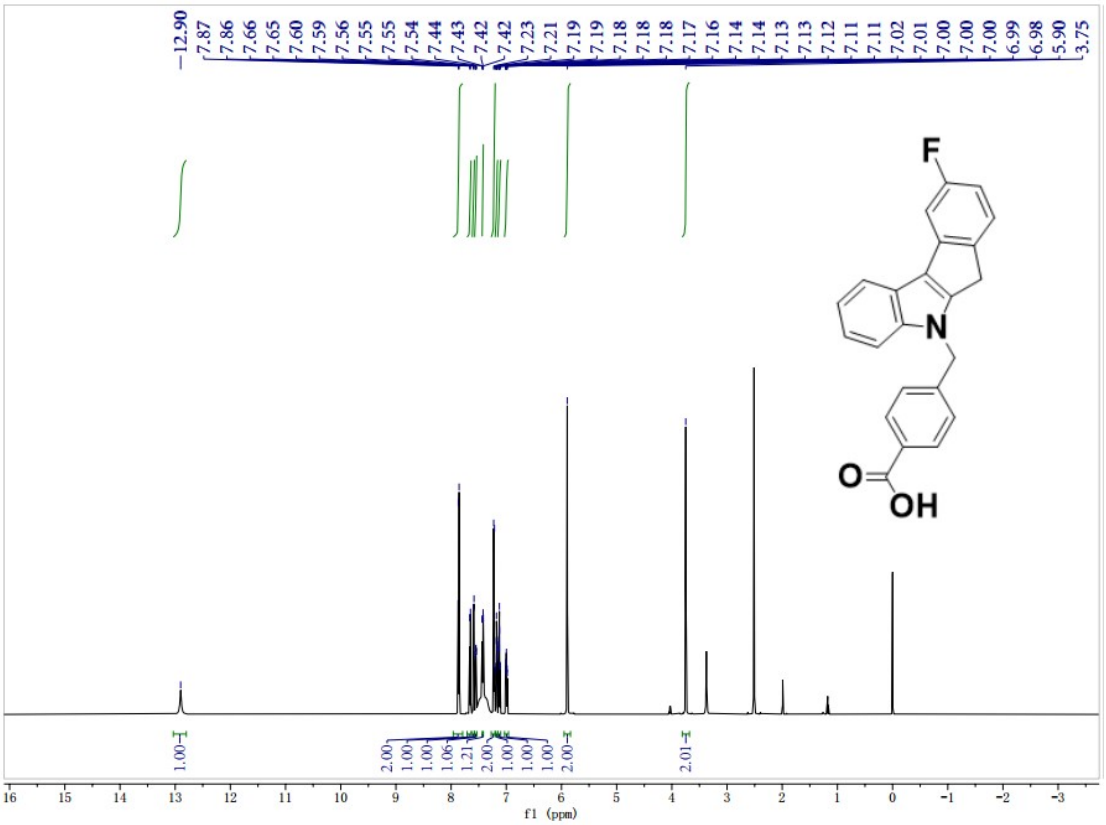


^{19}F NMR spectrum of compound **10a** (564 MHz, DMSO-d_6)

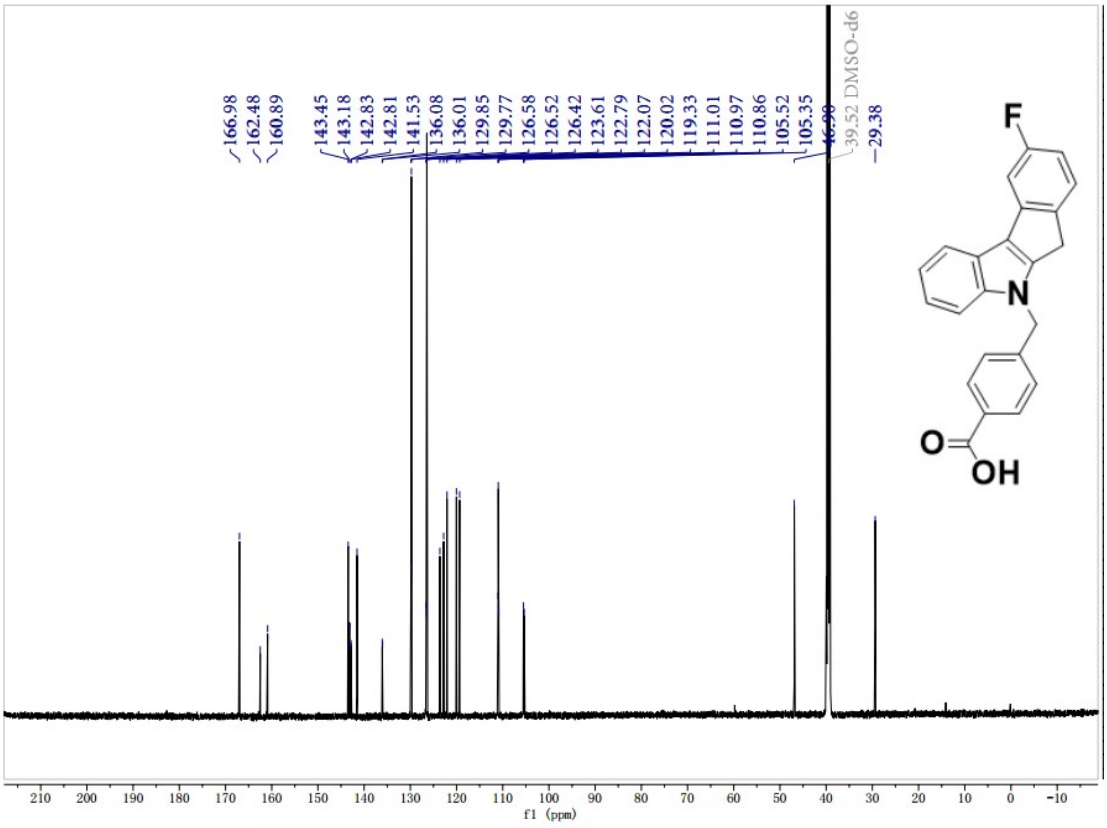


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C24H18FNO2	372.1394	16.0	-2.8	1			NA/NA

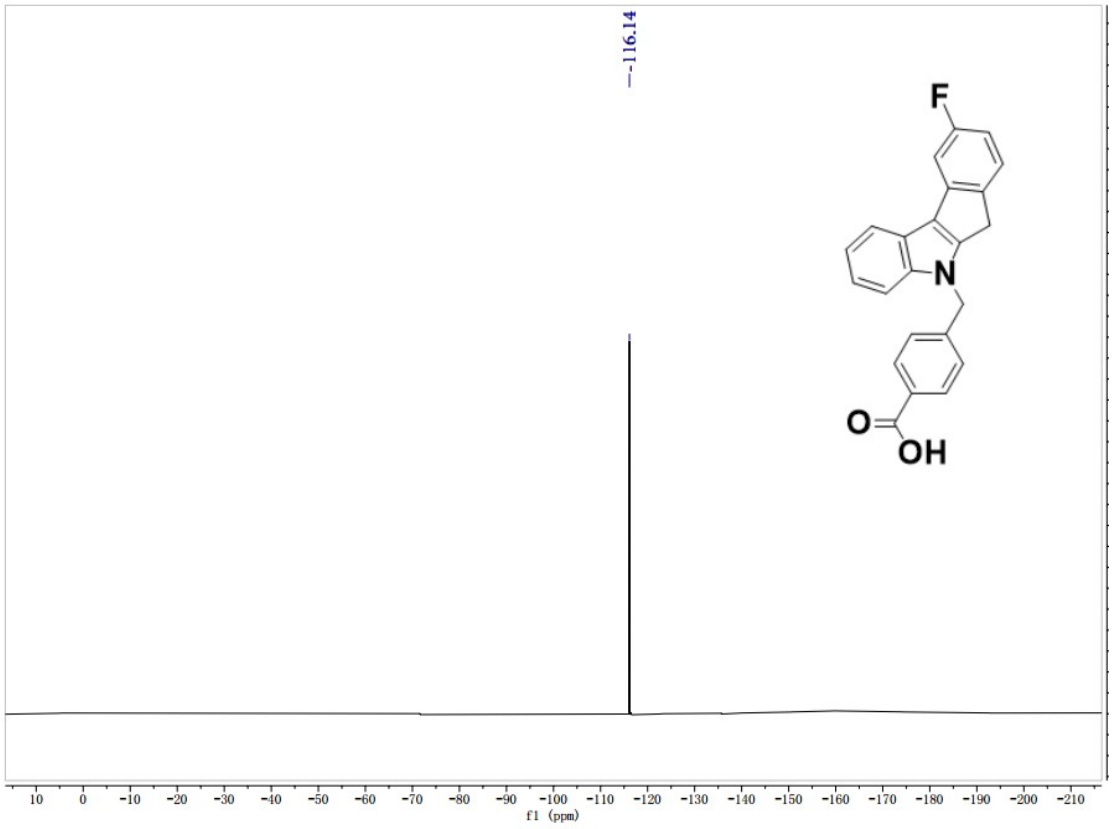
HRMS of compound **10a**



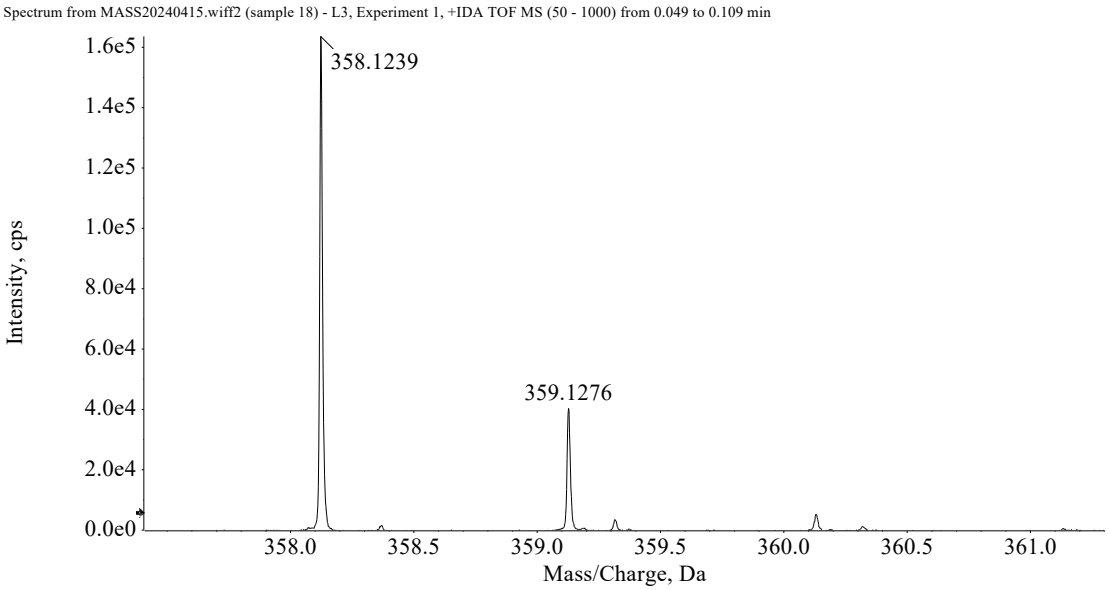
^{1}H NMR spectrum of compound **10b** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10b** (151 MHz, DMSO-d_6)

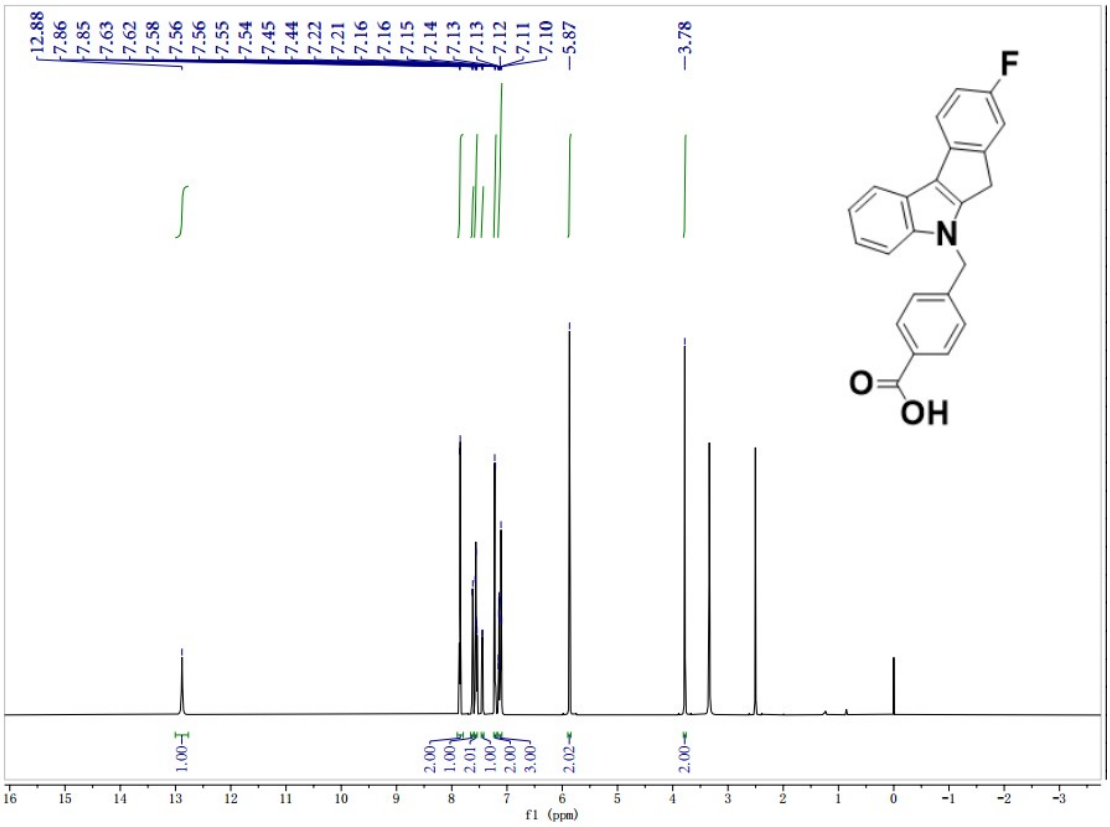


^{19}F NMR spectrum of compound **10b** (564 MHz, DMSO-d_6)

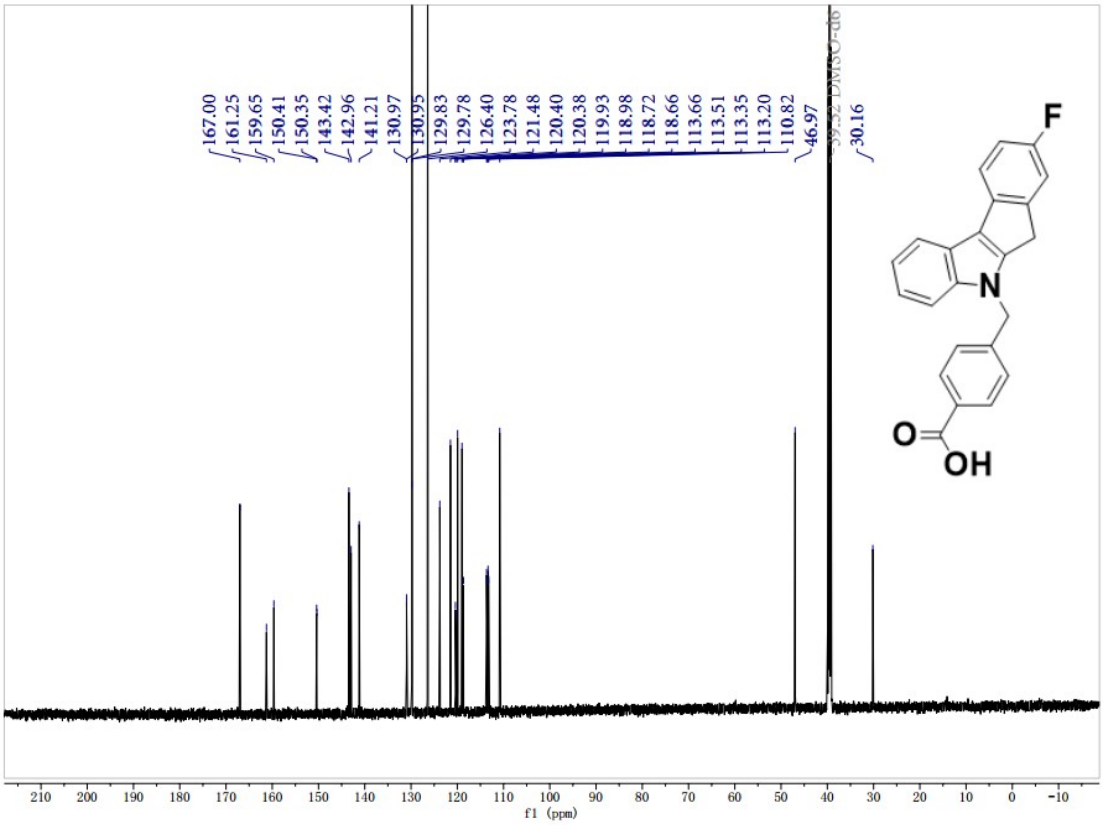


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H16FNO2	358.1238	16.0	0.3	1			NA/NA

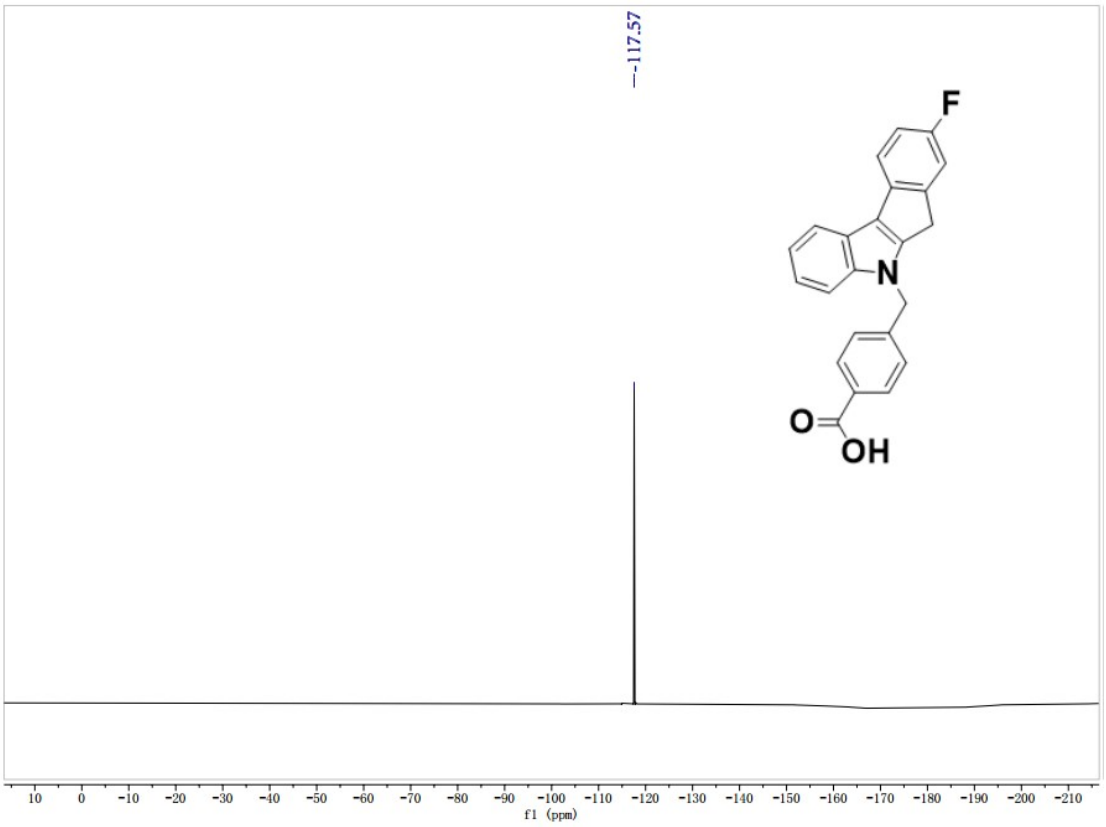
HRMS of compound **10b**



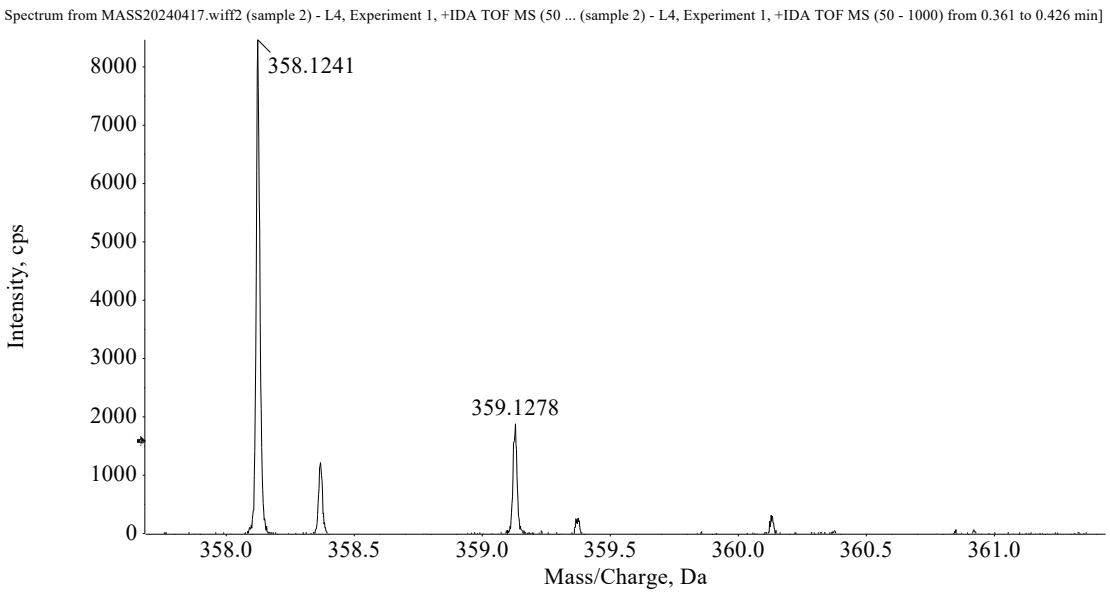
^{1}H NMR spectrum of compound **10c** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10c** (151 MHz, DMSO-d_6)

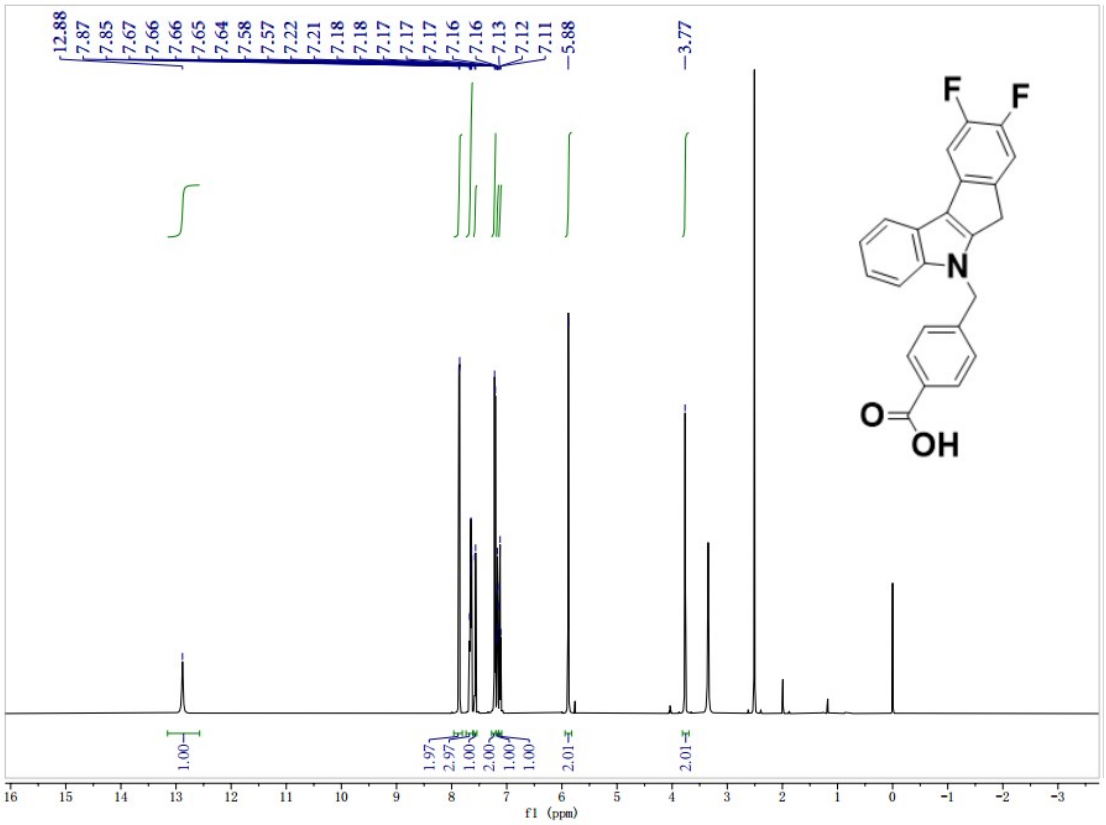


^{19}F NMR spectrum of compound **10c** (564 MHz, DMSO-d_6)

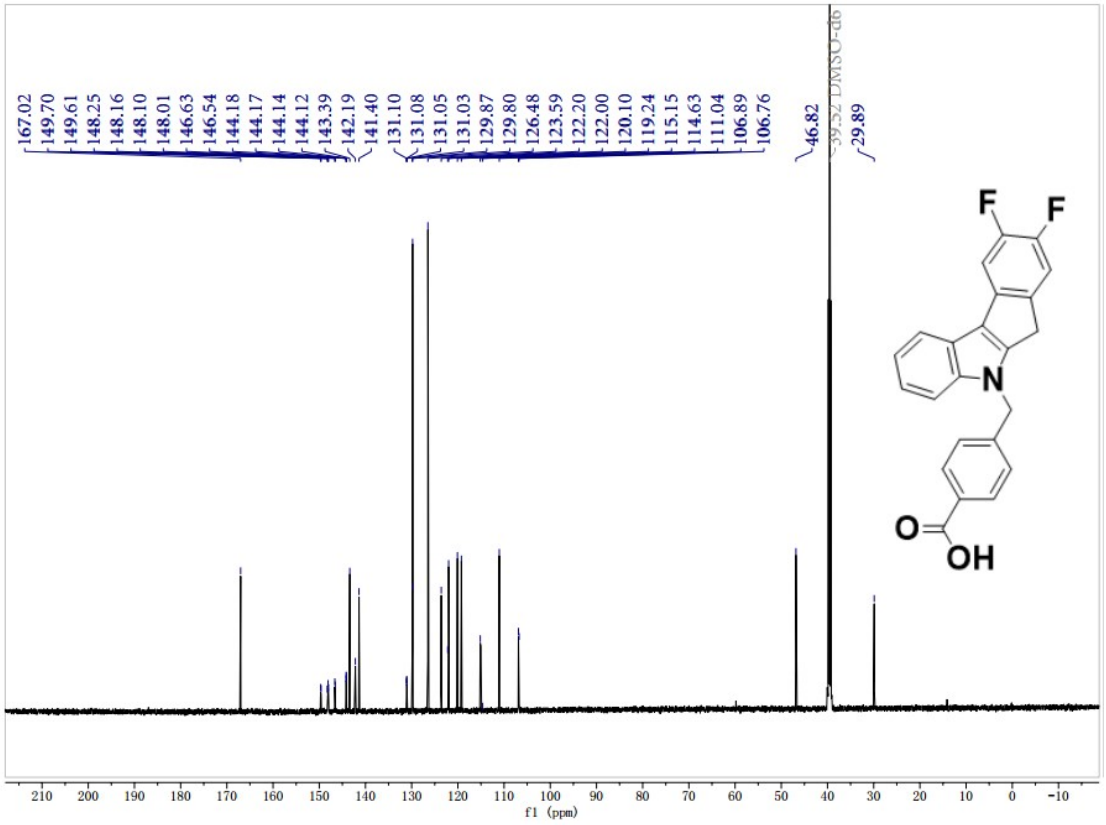


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H16FNO2	358.1238	16.0	0.9	1			NA/NA

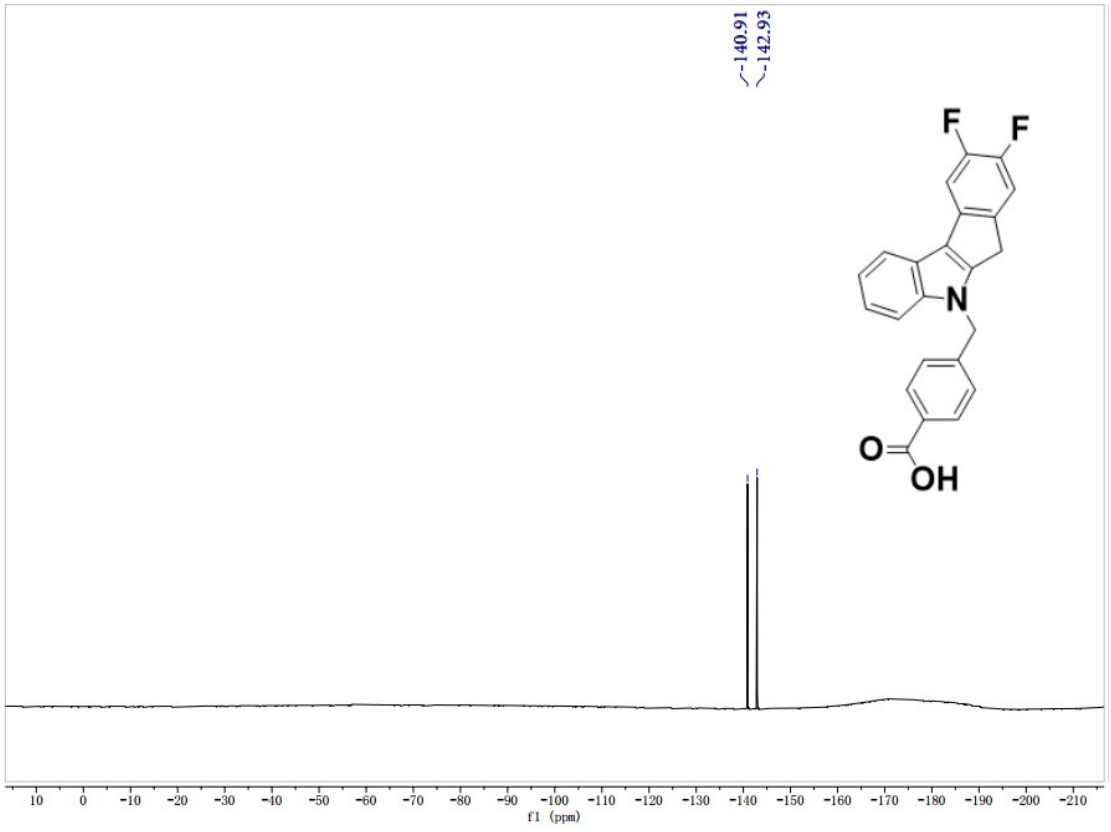
HRMS of compound **10c**



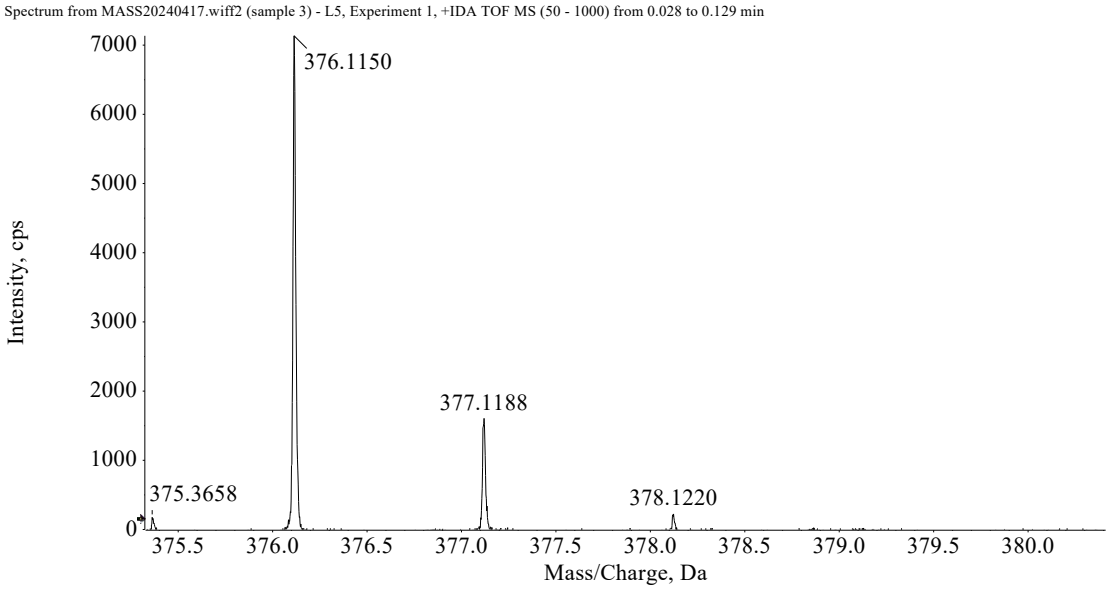
^{1}H NMR spectrum of compound **10d** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10d** (151 MHz, DMSO-d_6)

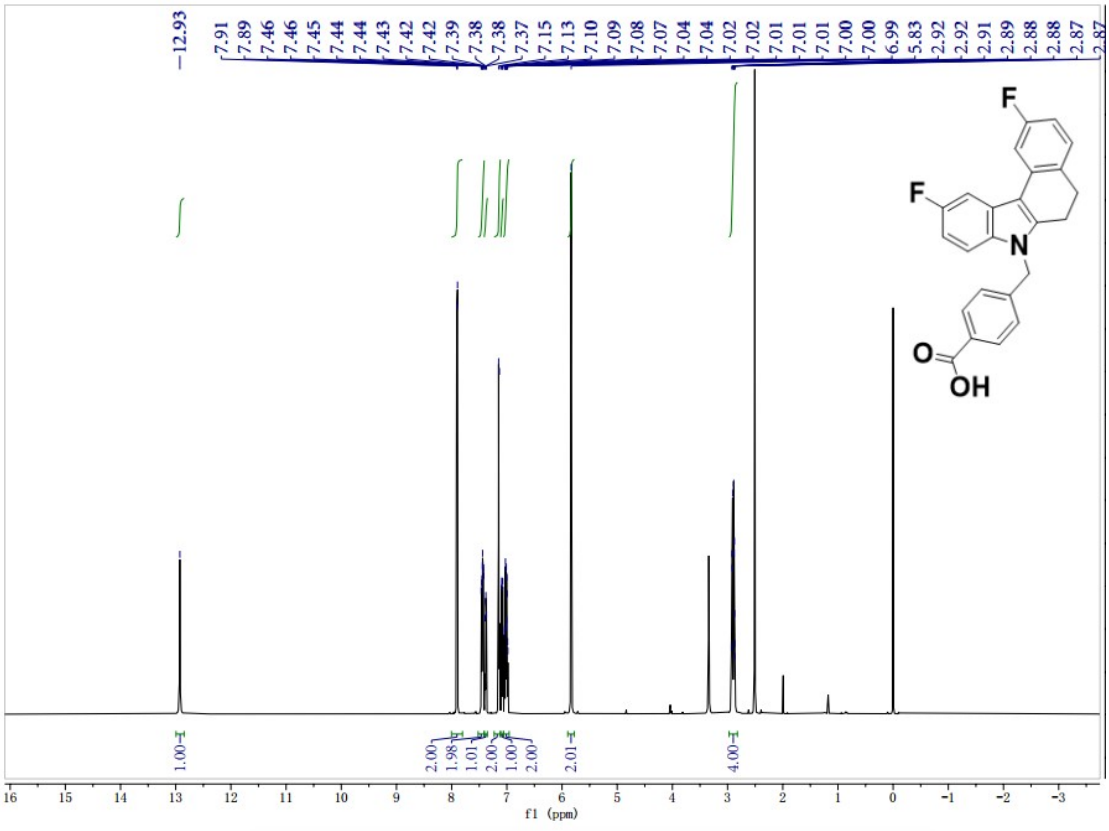


^{19}F NMR spectrum of compound **10d** (564 MHz, DMSO-d_6)

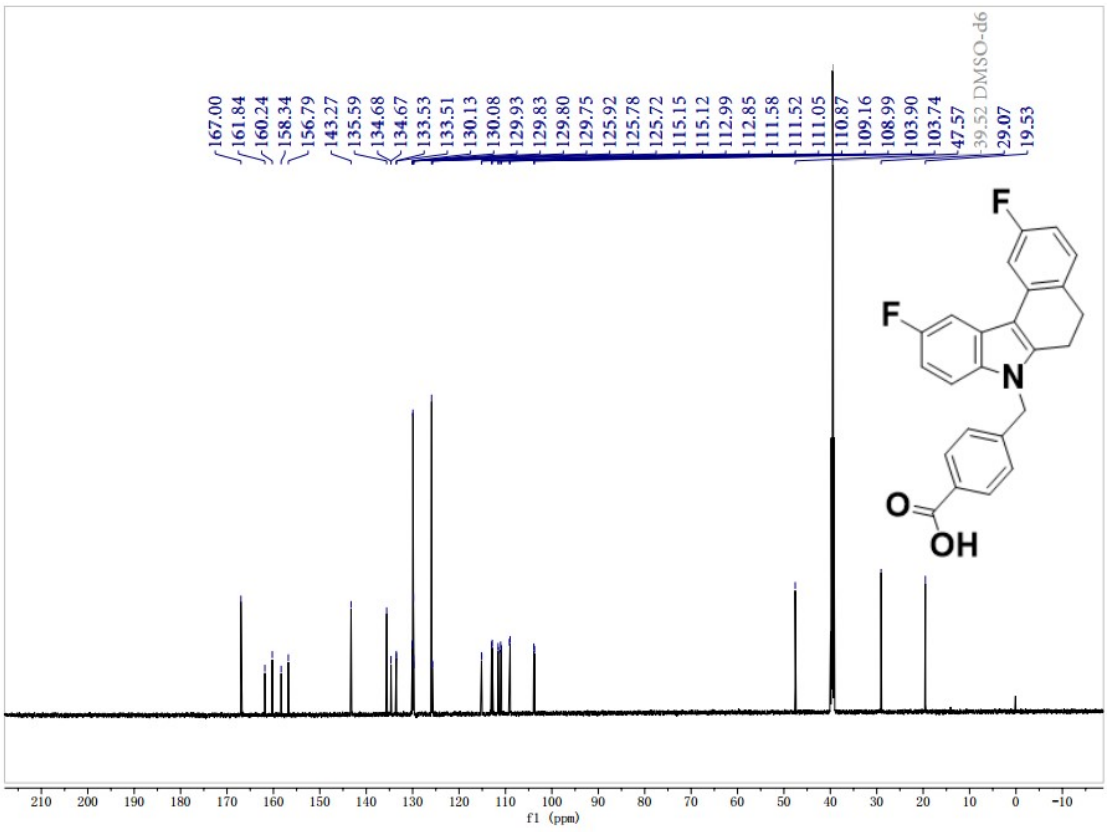


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H15F2NO2	376.1144	16.0	1.7	1			NA/NA

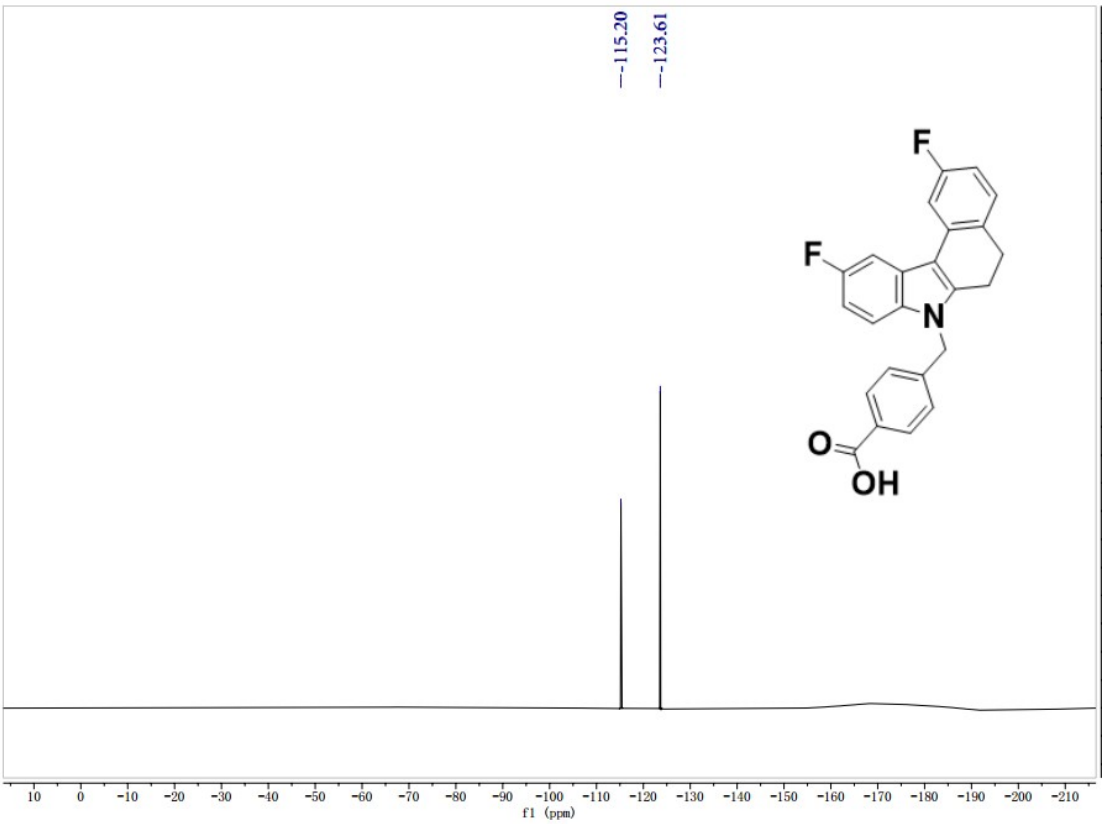
HRMS of compound **10d**



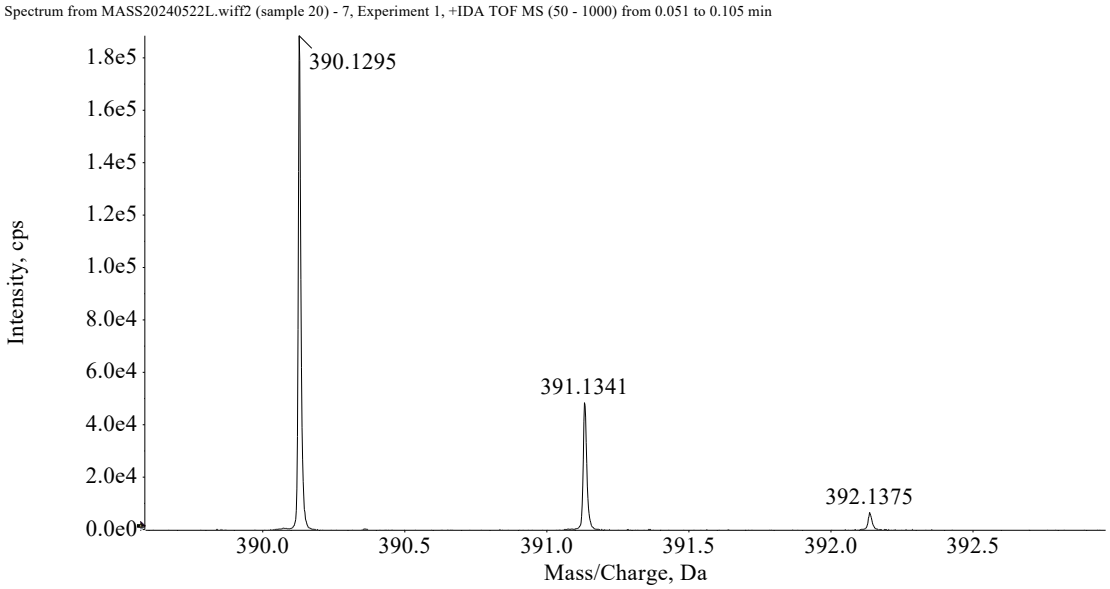
^{1}H NMR spectrum of compound **10e** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10e** (151 MHz, DMSO-d_6)

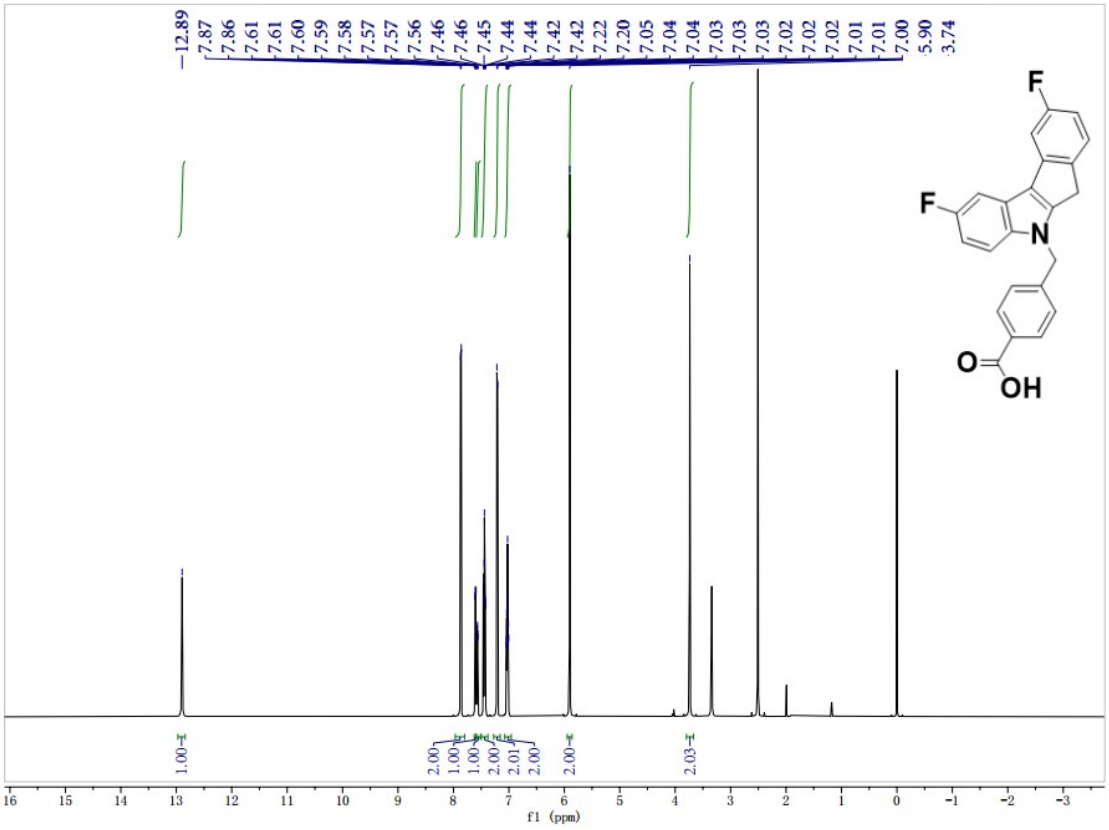


^{19}F NMR spectrum of compound **10e** (564 MHz, DMSO-d_6)

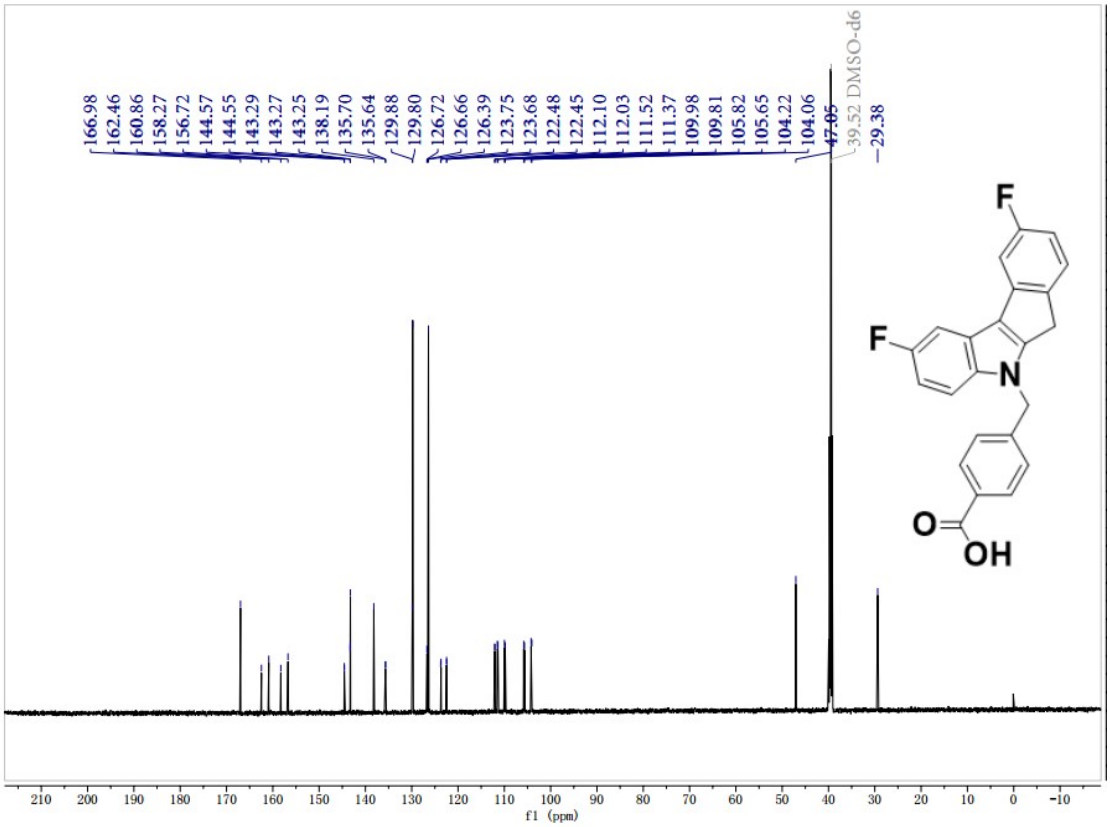


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C24H17F2NO2	390.1300	16.0	-1.3	1			NA/NA

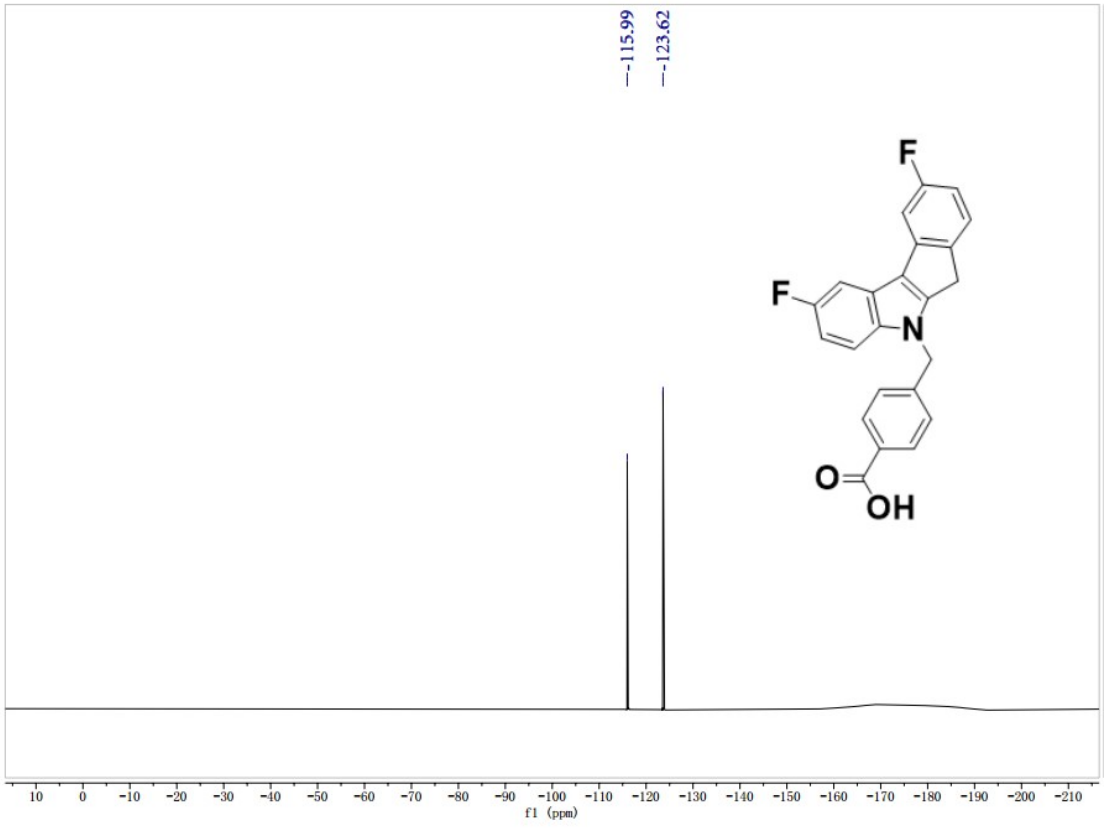
HRMS of compound **10e**



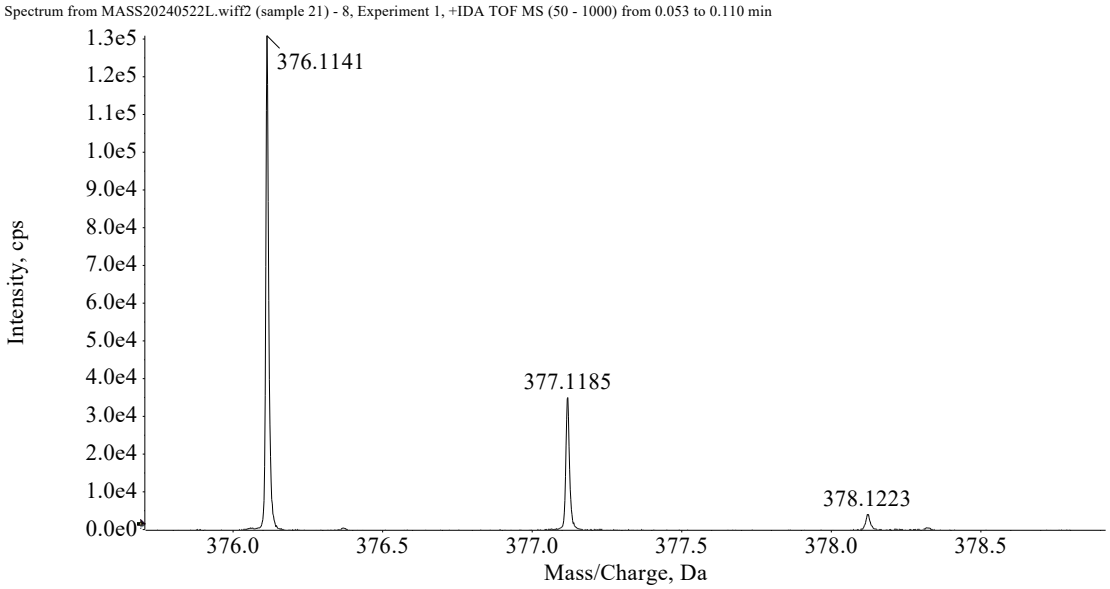
^{1}H NMR spectrum of compound **10f** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10f** (151 MHz, DMSO-d_6)

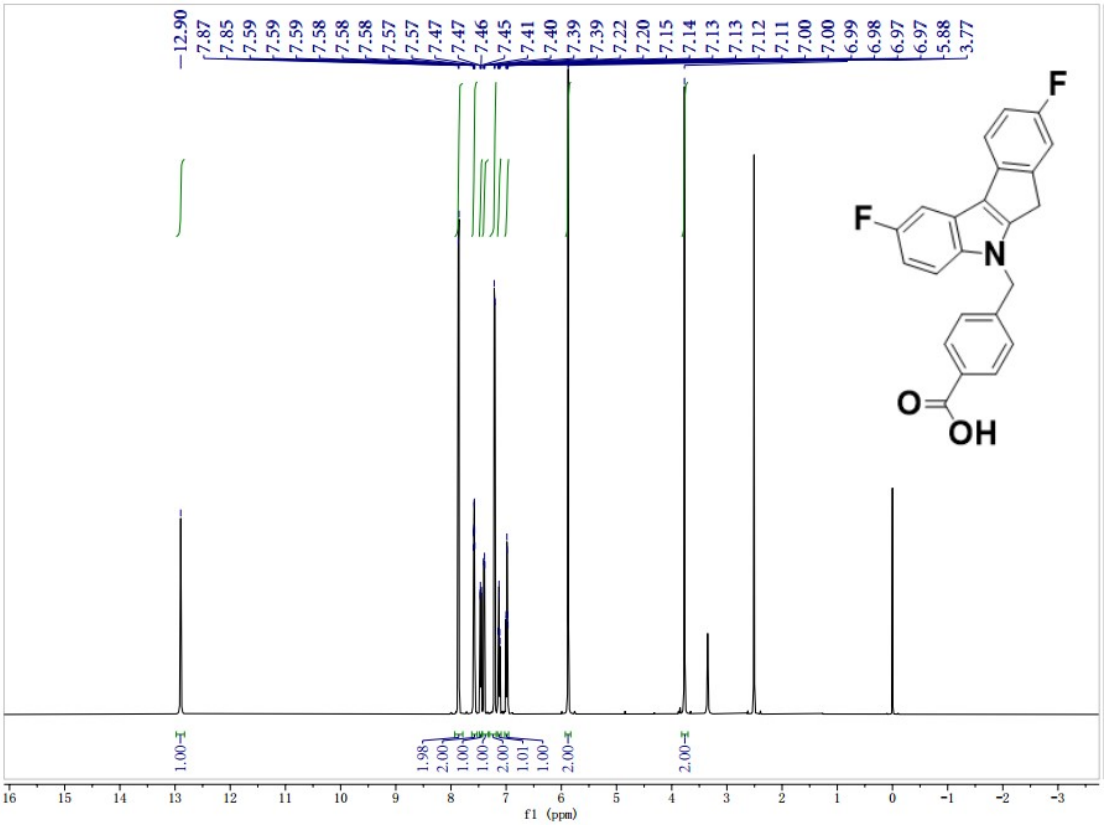


^{19}F NMR spectrum of compound **10f** (564 MHz, DMSO-d_6)

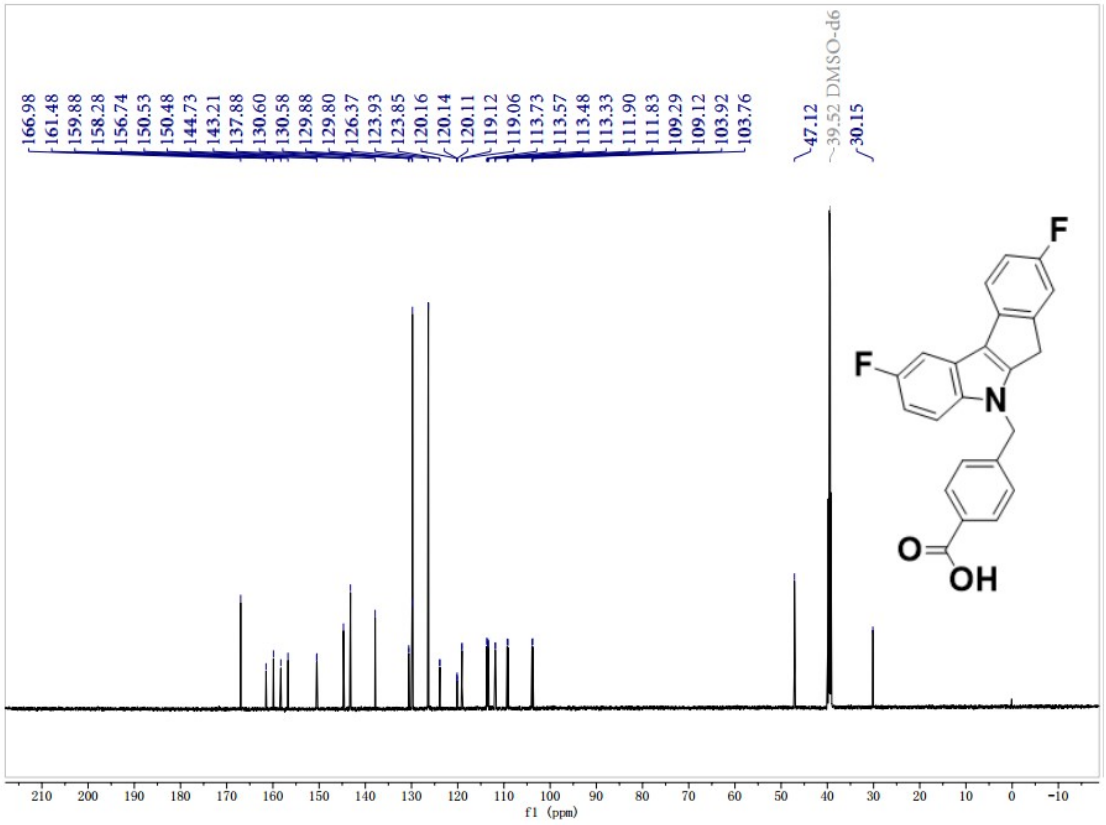


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H15F2NO2	376.1144	16.0	-0.7	1			NA/NA

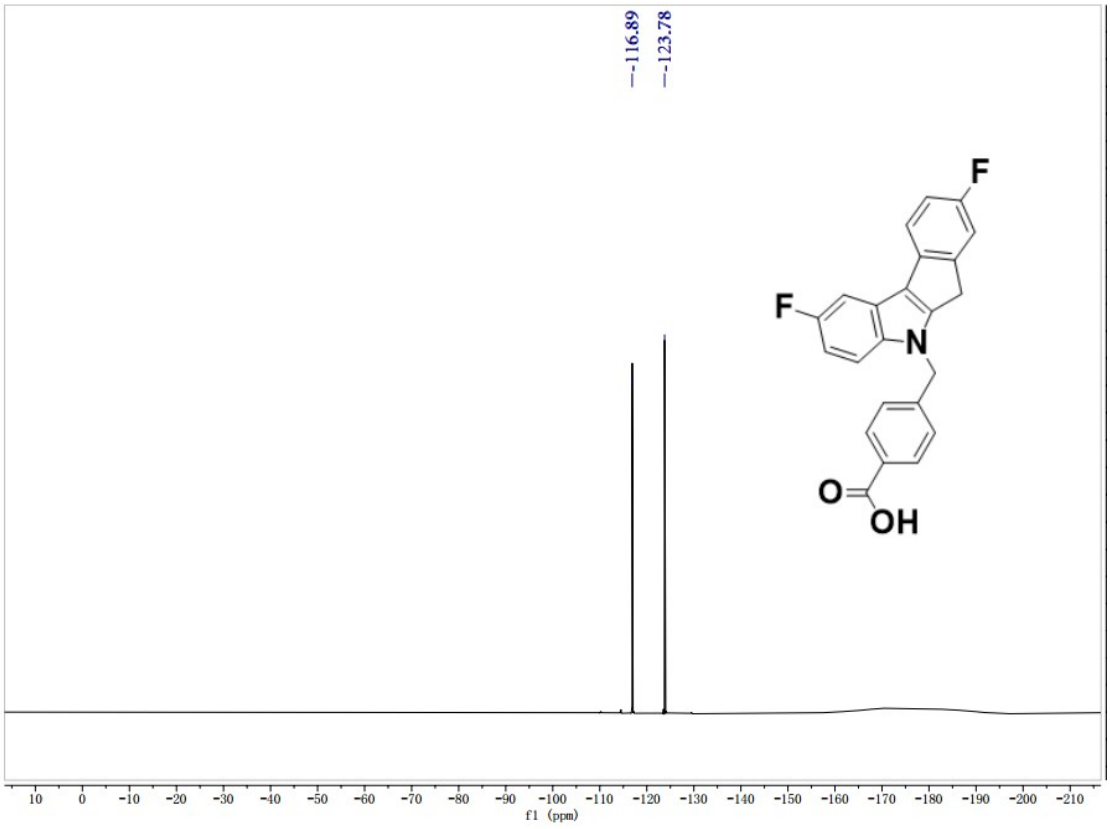
HRMS of compound **10f**



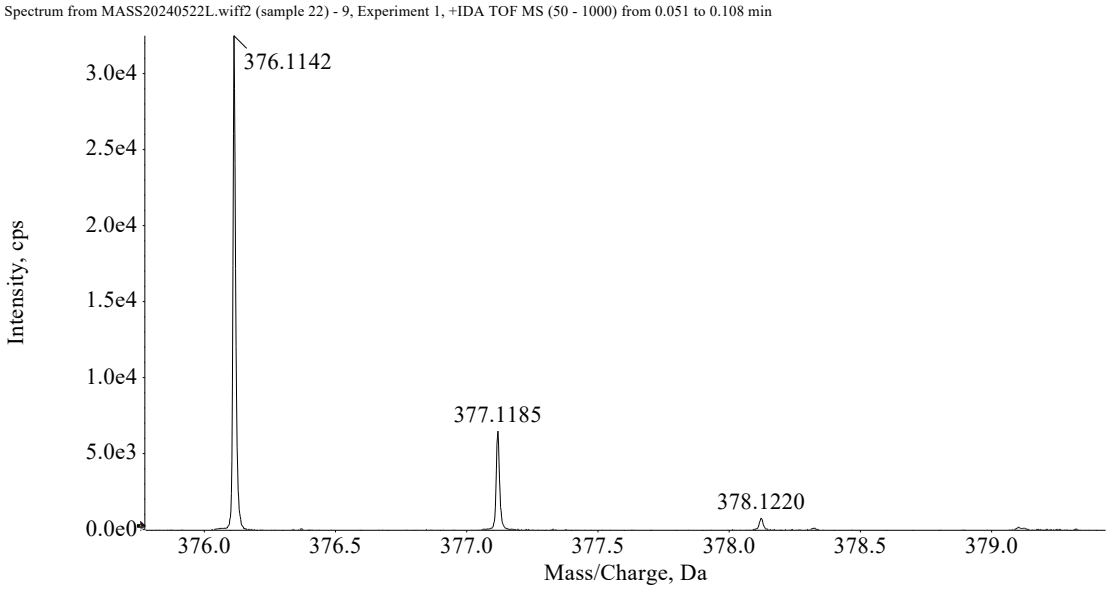
^{1}H NMR spectrum of compound **10g** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10g** (151 MHz, DMSO-d_6)

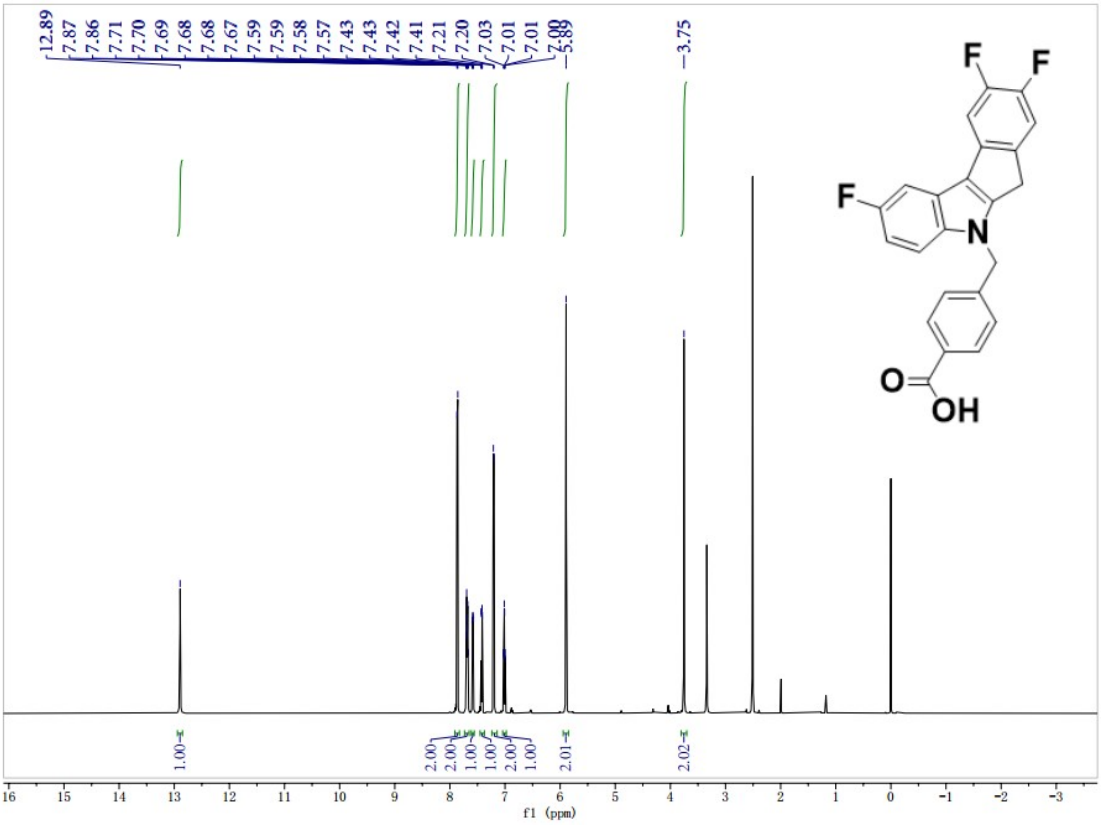


^{19}F NMR spectrum of compound **10g** (564 MHz, DMSO-d_6)

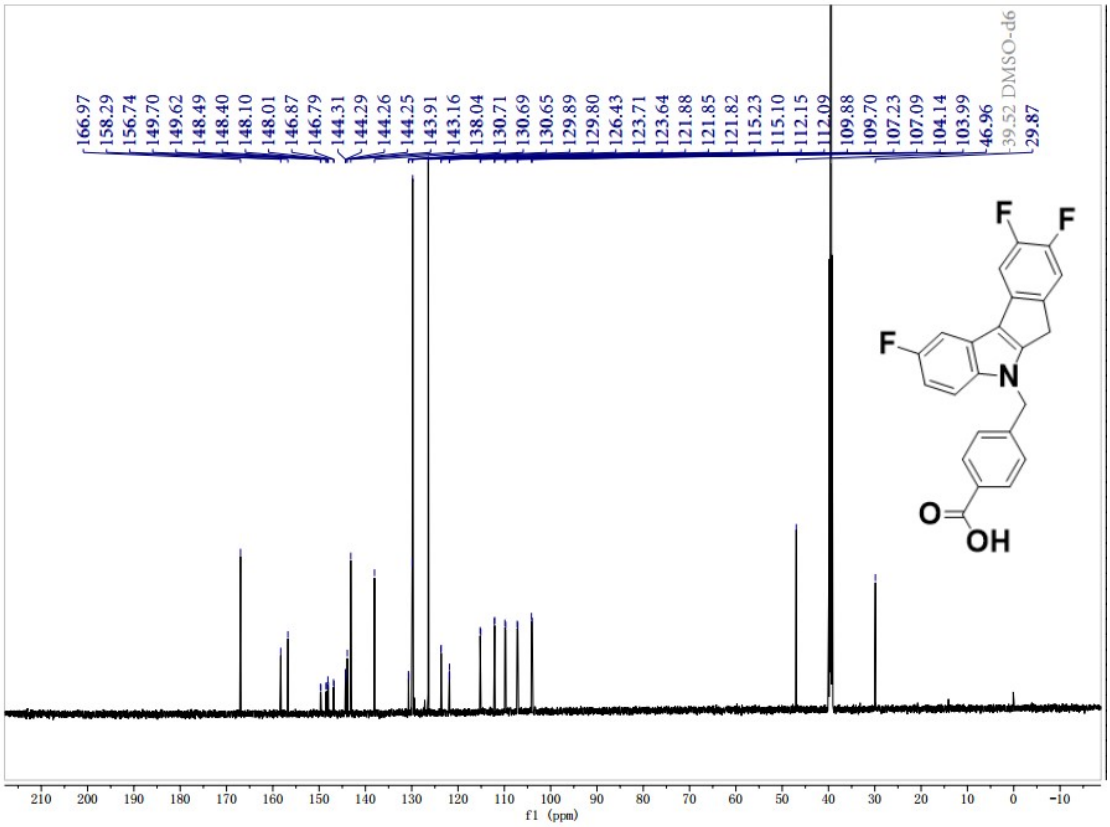


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H15F2NO2	376.1144	16.0	-0.4	1			NA/NA

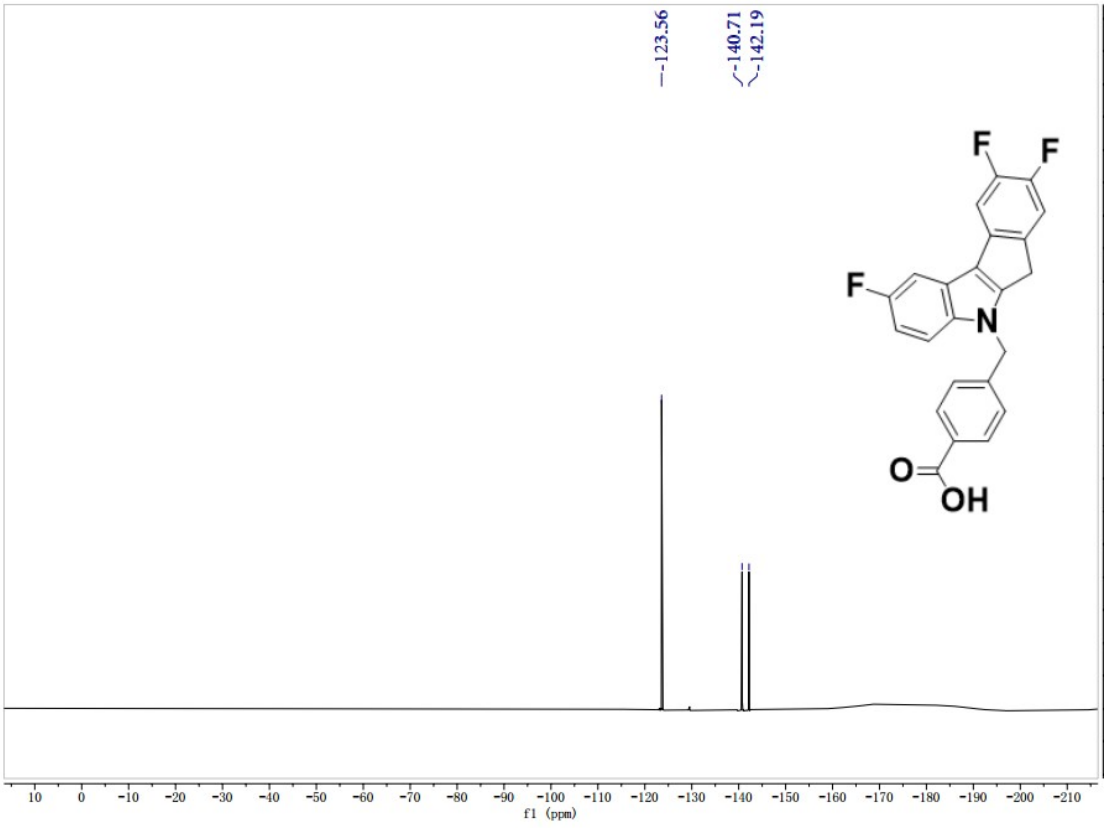
HRMS of compound **10g**



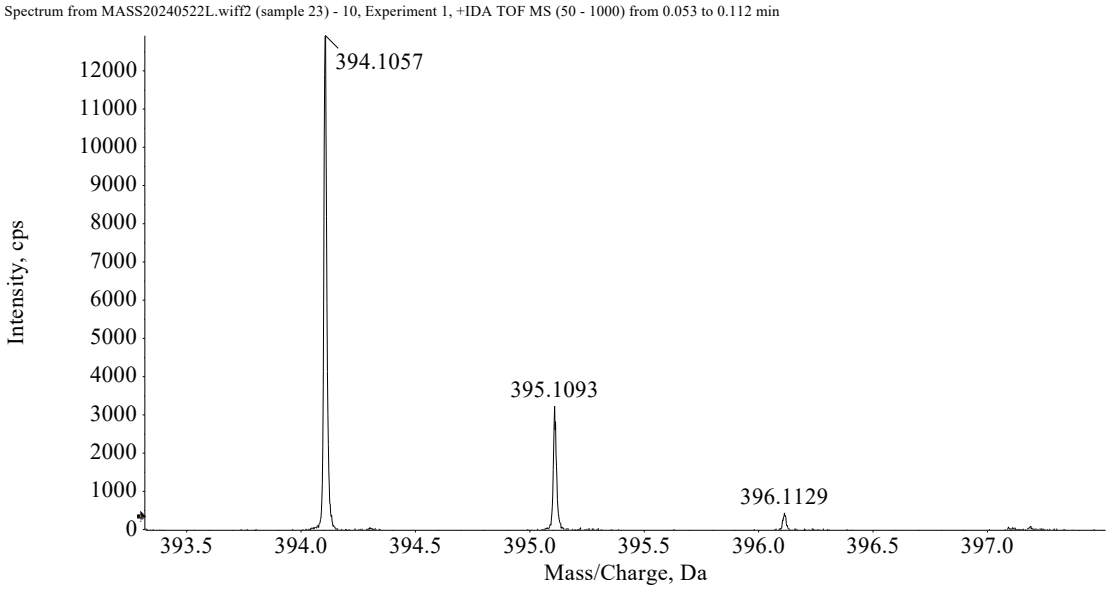
^{1}H NMR spectrum of compound **10h** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **10h** (151 MHz, DMSO-d_6)

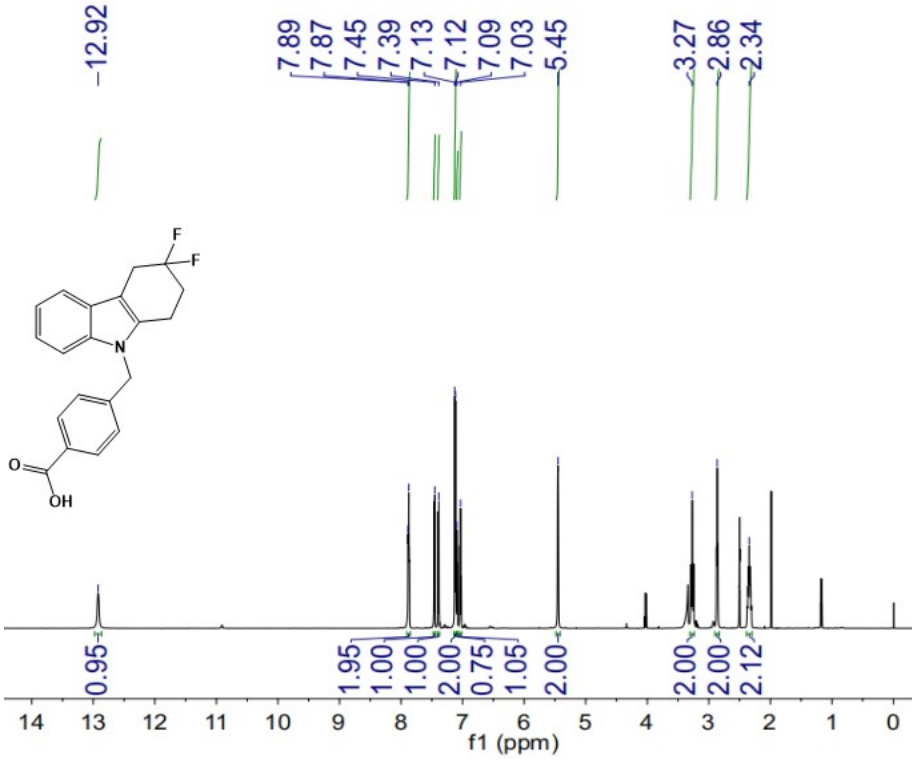


^{19}F NMR spectrum of compound **10h** (564 MHz, DMSO-d_6)

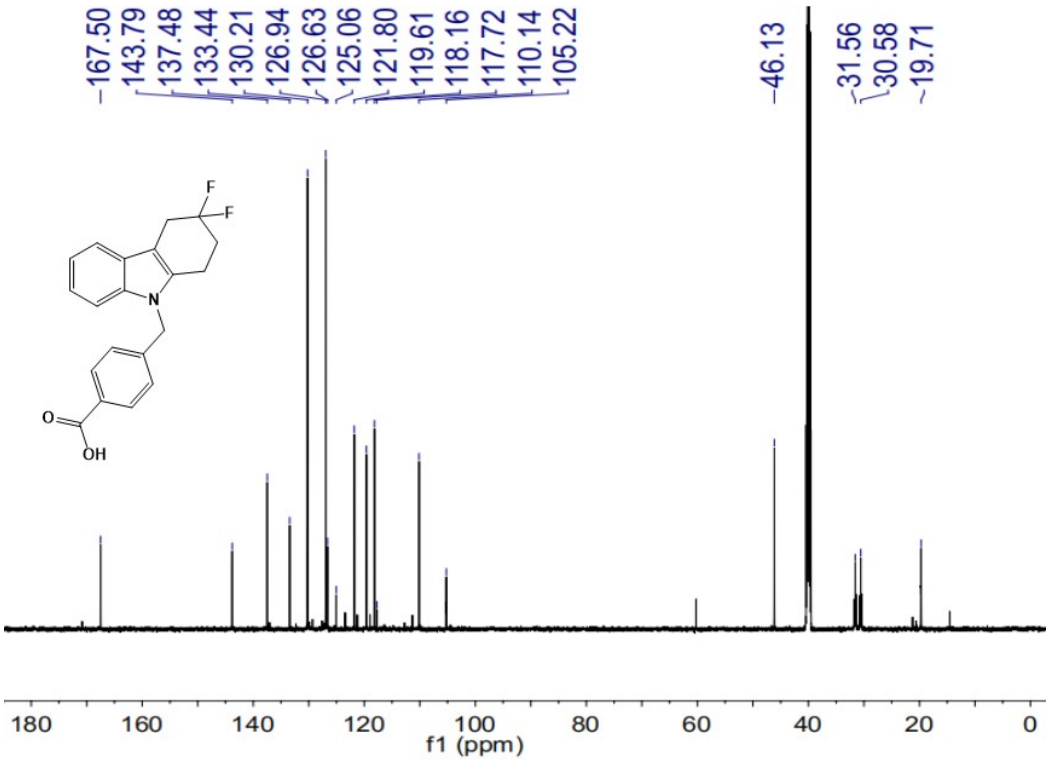


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H14F3NO2	394.1049	16.0	1.9	1			NA/NA

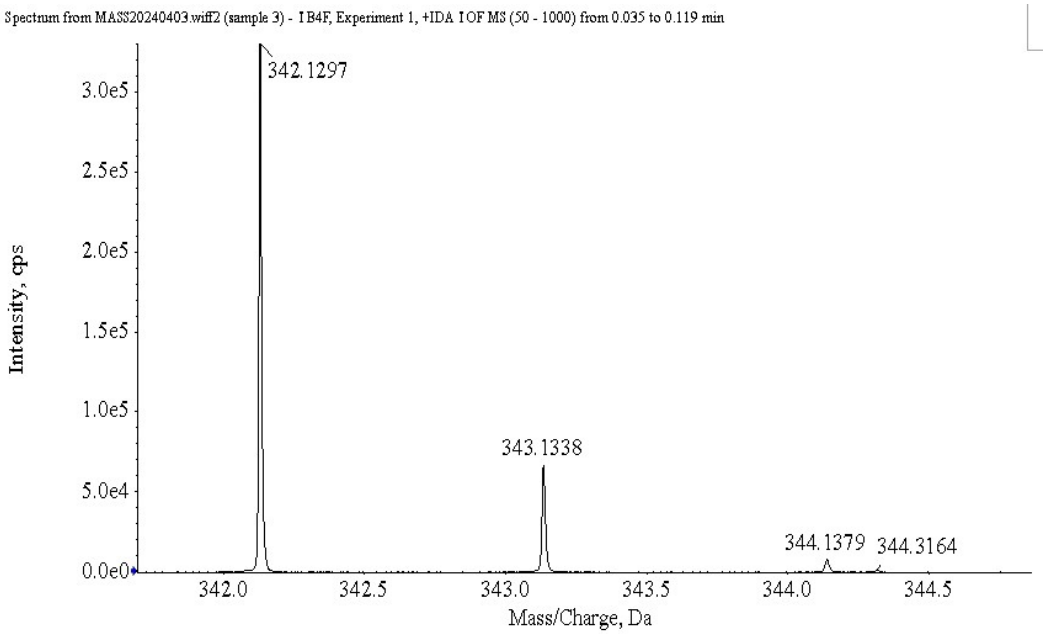
HRMS of compound **10h**



^{1}H NMR spectrum of compound **11a** (600 MHz, DMSO-d_6)

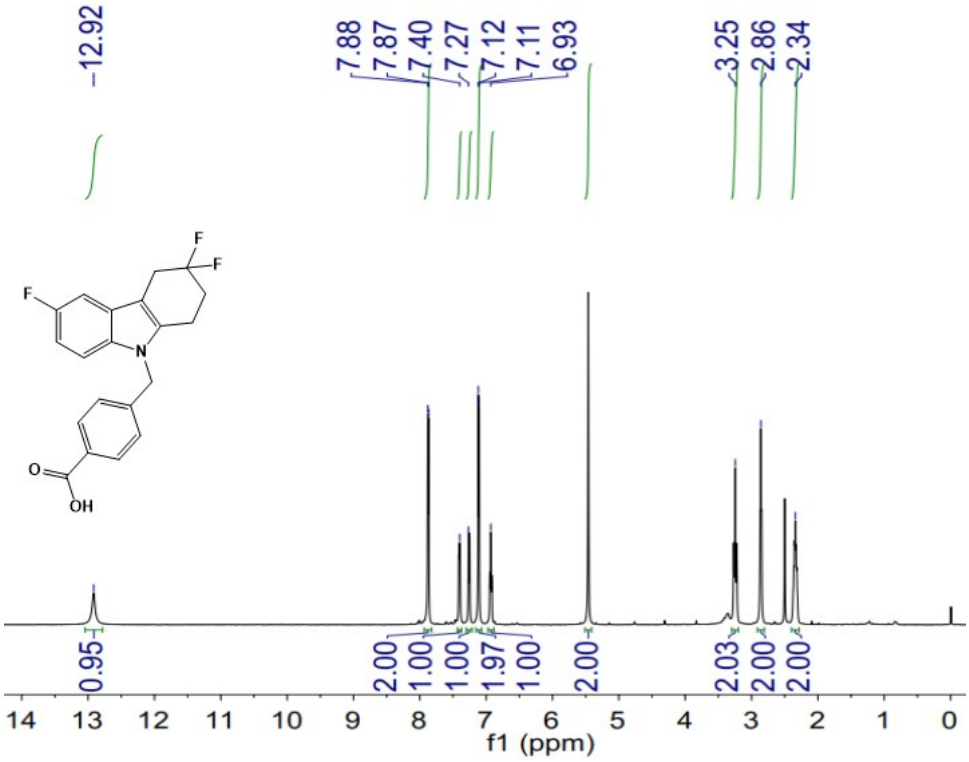


^{13}C NMR spectrum of compound **11a** (151 MHz, DMSO-d_6)

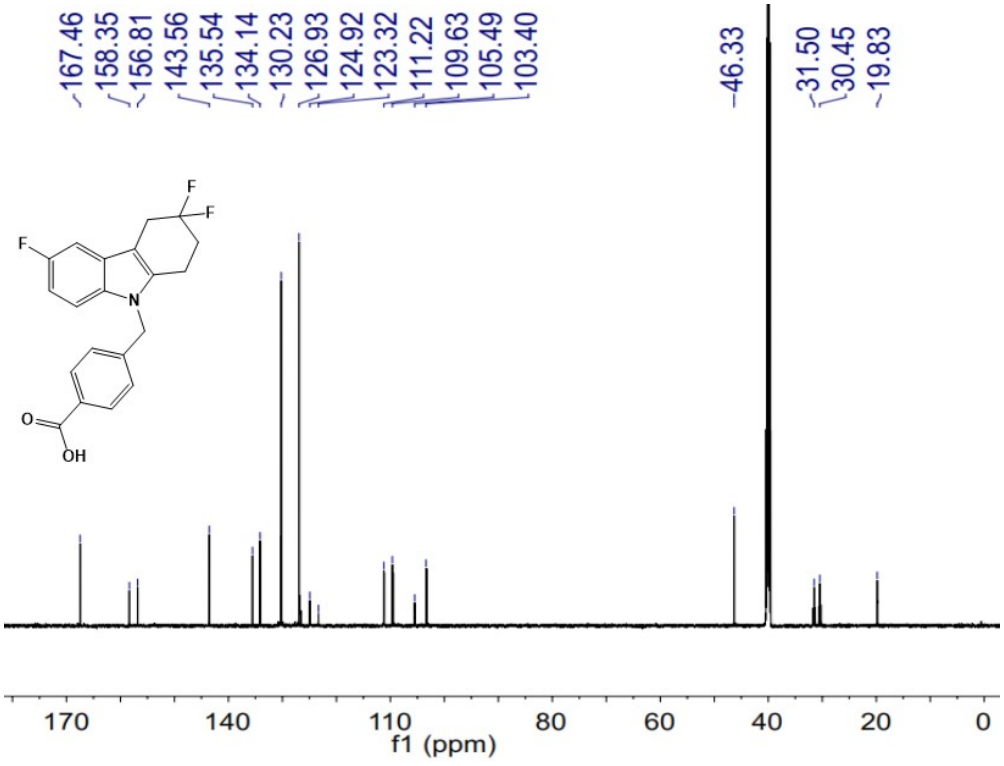


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{17}F_2NO_2$	342.1300	12.0	-0.9	1			NA/NA

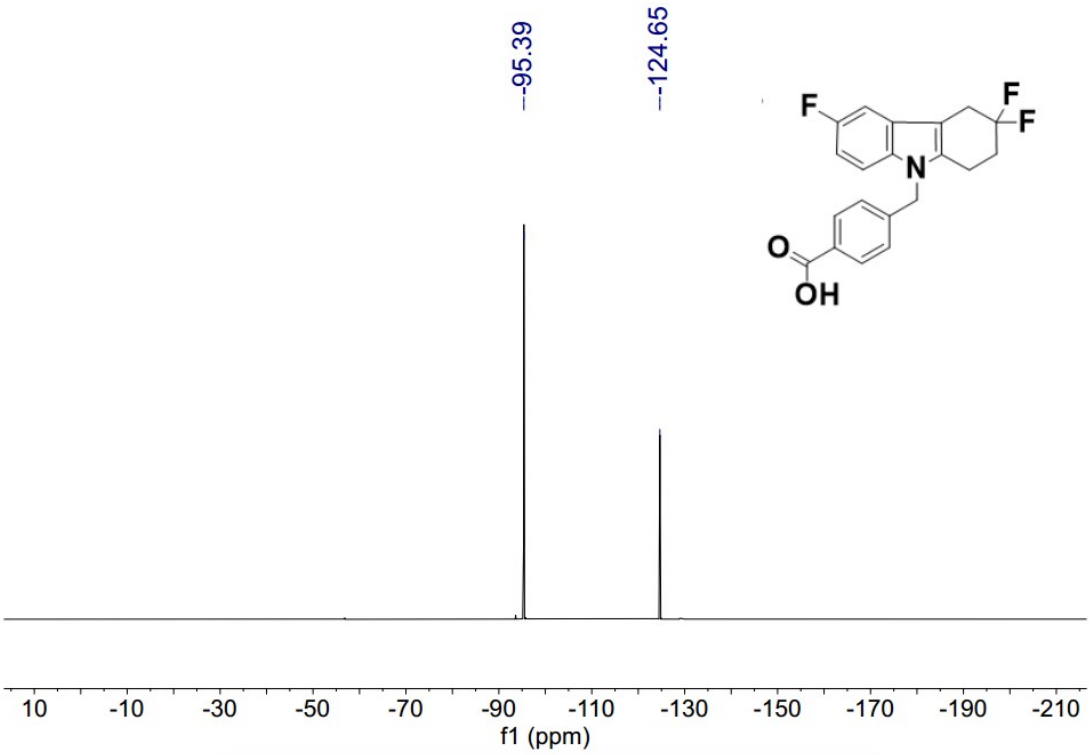
HRMS of compound **11a**



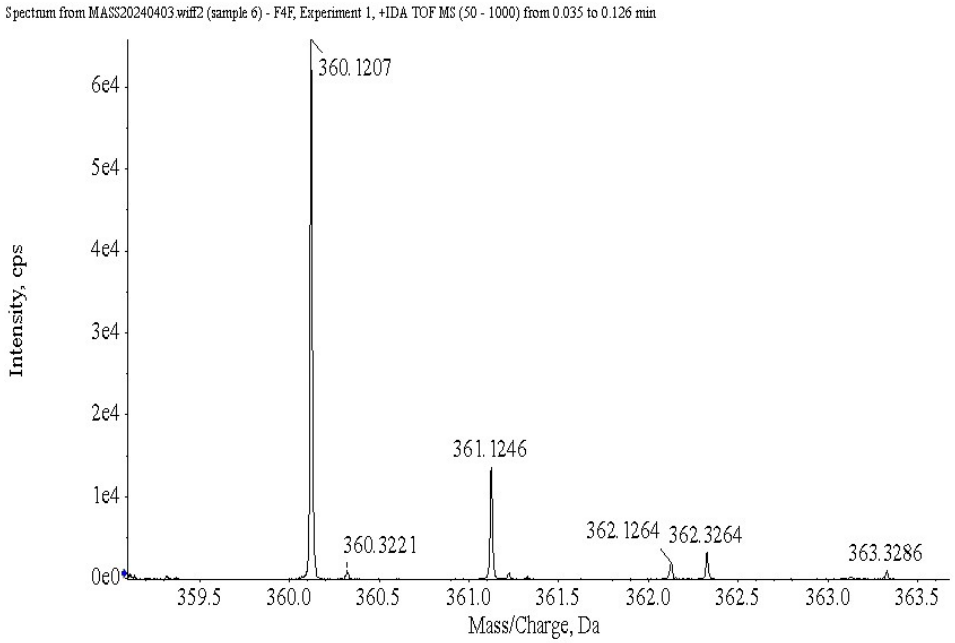
[1]H NMR spectrum of compound **11b** (600 MHz, DMSO-d_6)



[13]C NMR spectrum of compound **11b** (151 MHz, DMSO-d_6)

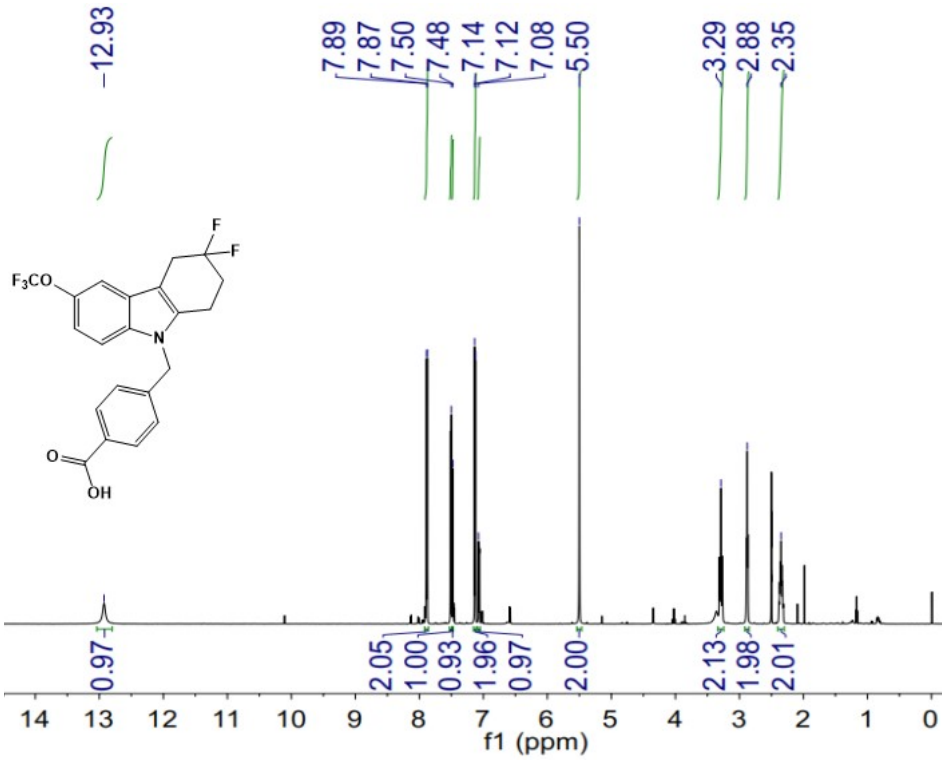


^{19}F NMR spectrum of compound **11b** (564 MHz, DMSO-d_6)

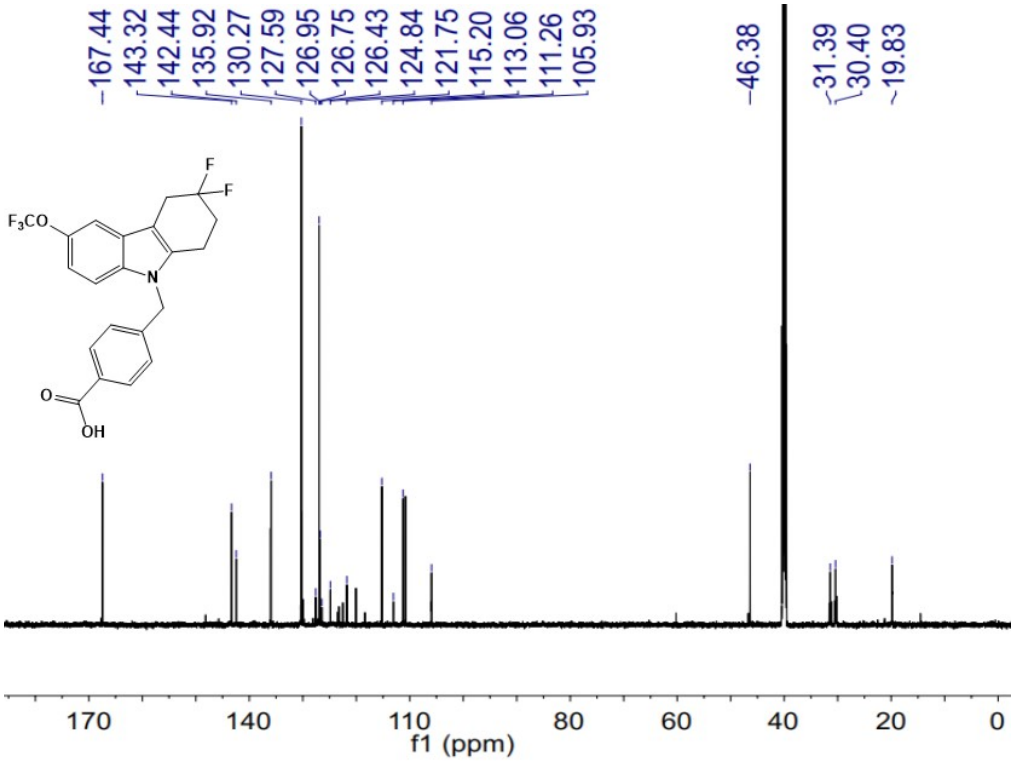


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{16}F_3NO_2$	360.1206	12.0	0.3	1			NA/NA

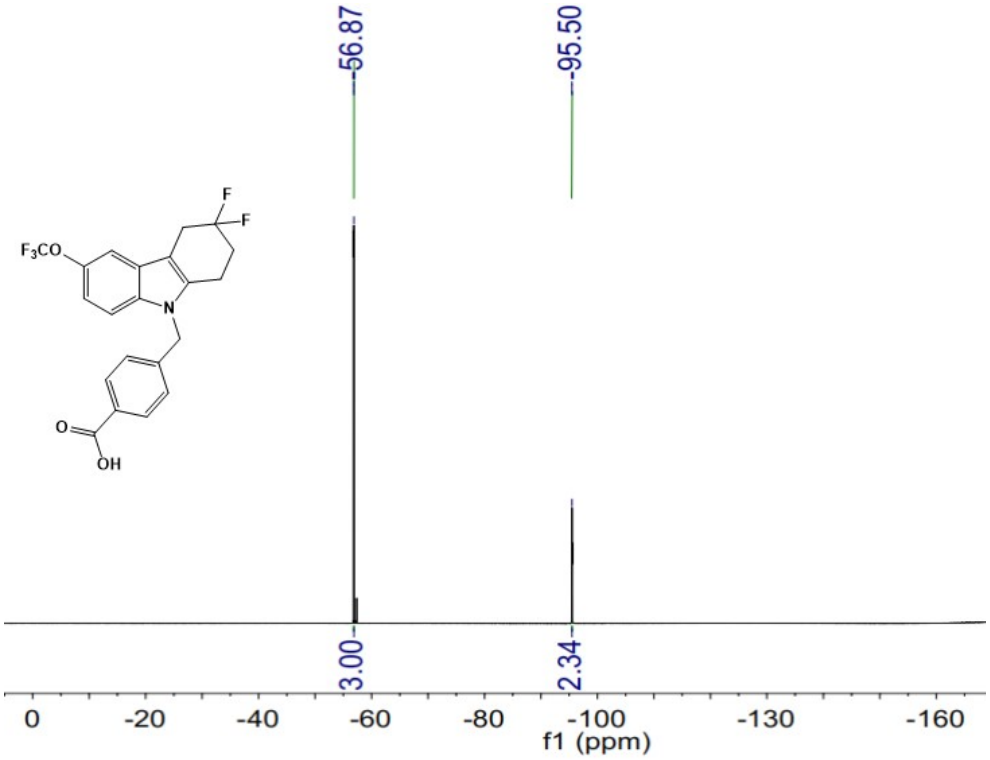
HRMS of compound **11b**



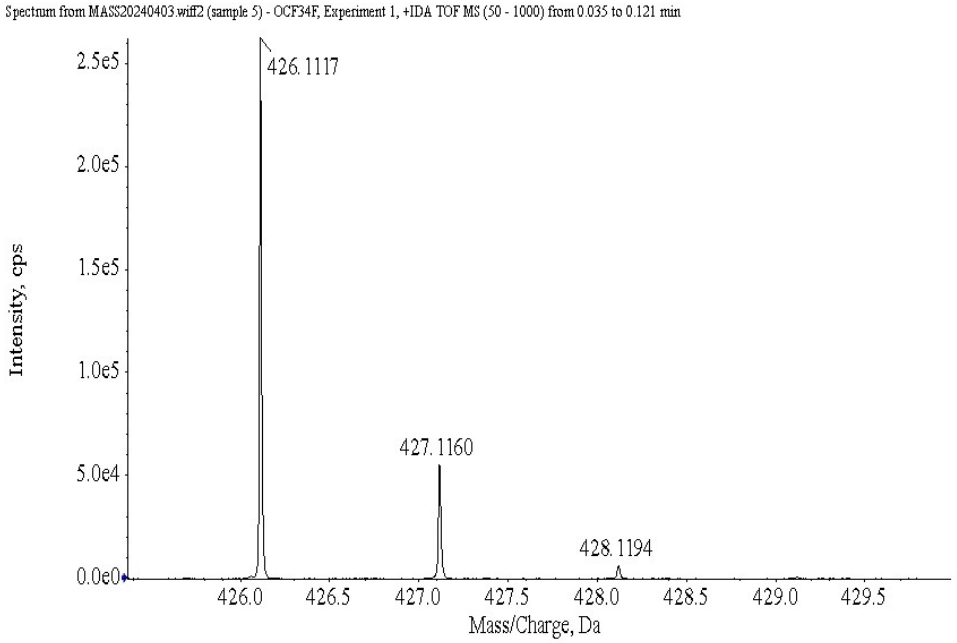
^{1}H NMR spectrum of compound **11c** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **11c** (151 MHz, DMSO-d_6)

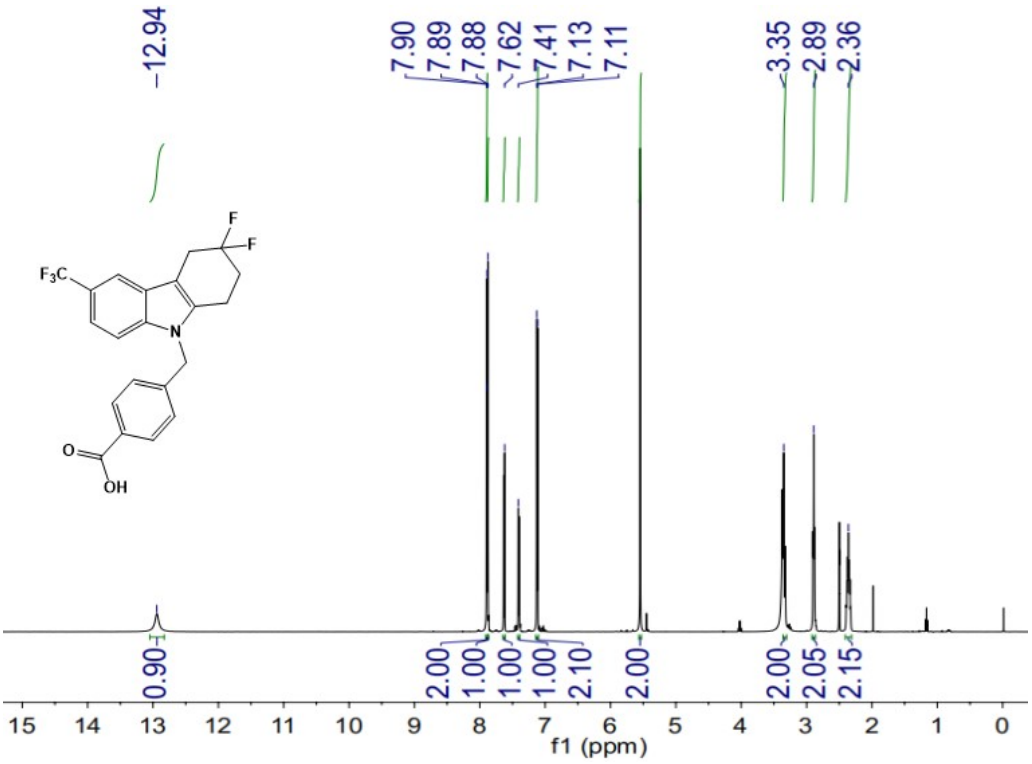


^{19}F NMR spectrum of compound **11c** (564 MHz, DMSO-d_6)

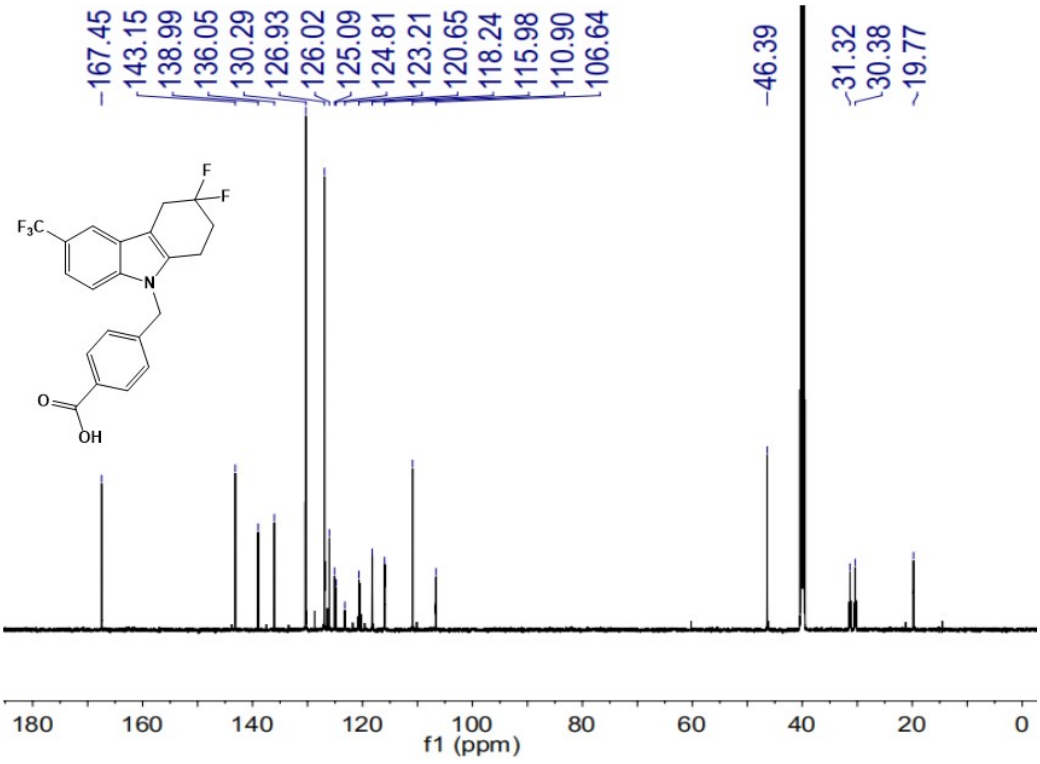


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{21}H_{16}F_5NO_3$	426.1123	12.0	-1.4	1			NA/NA

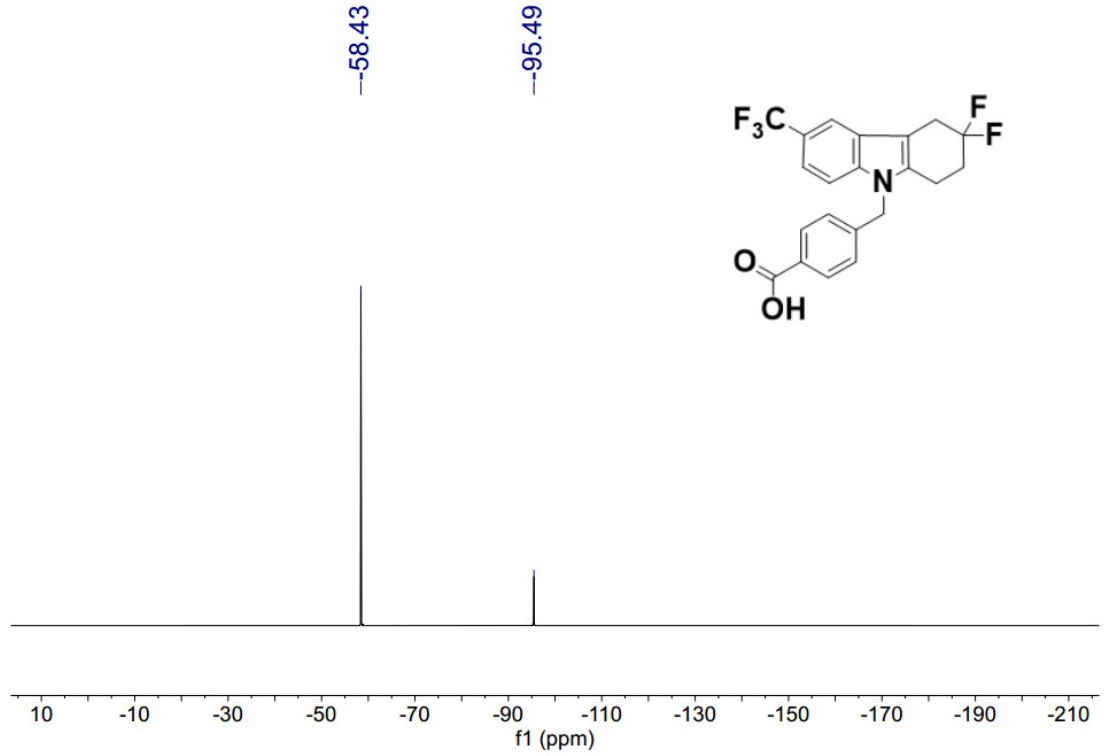
HRMS of compound **11c**



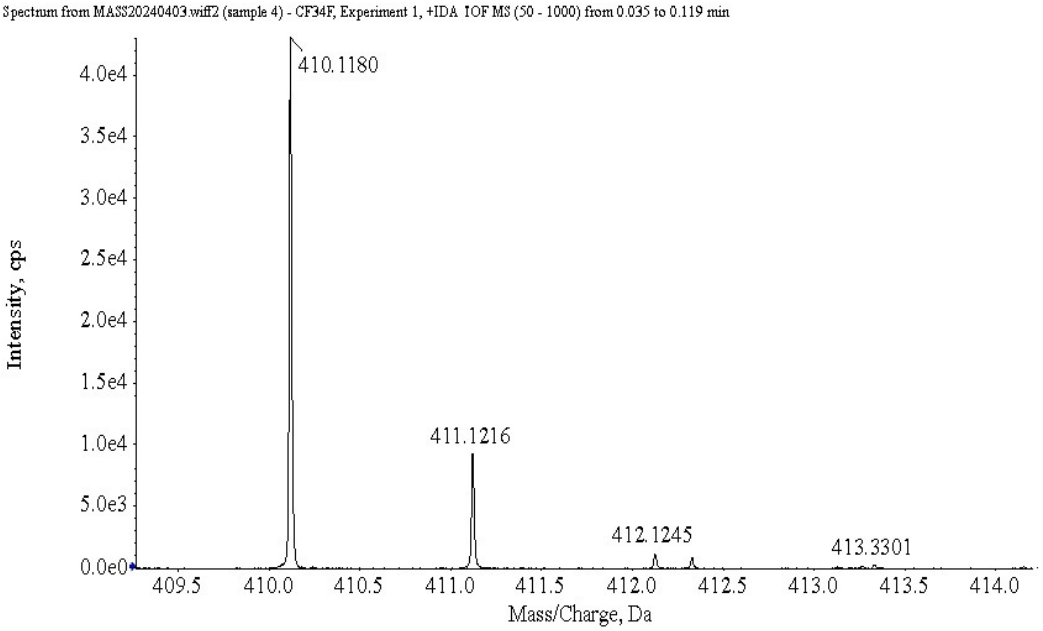
[1]H NMR spectrum of compound **11d** (600 MHz, DMSO-d_6)



[13]C NMR spectrum of compound **11d** (151 MHz, DMSO-d_6)

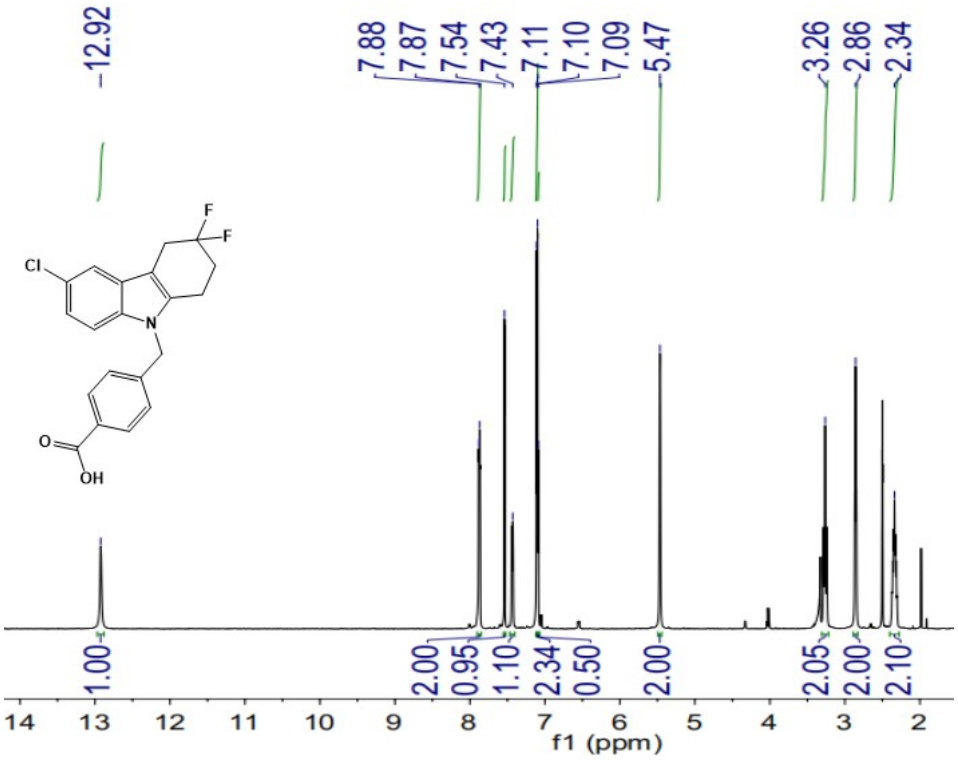


^{19}F NMR spectrum of compound **11d** (564 MHz, DMSO-d_6)

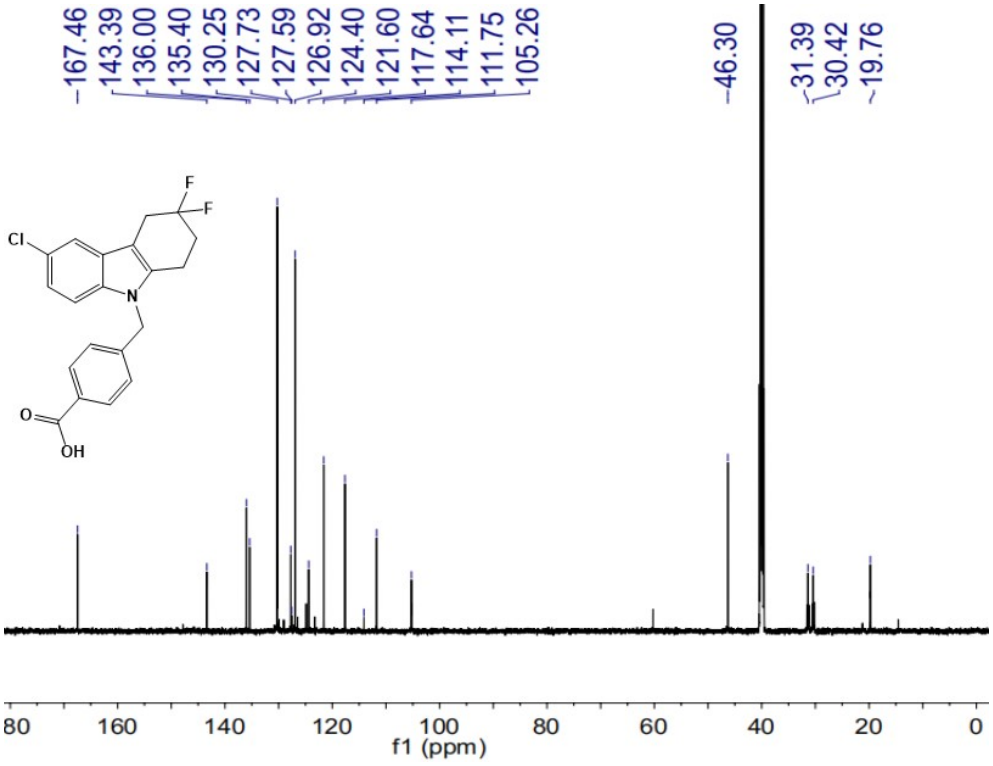


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{21}H_{16}F_5NO_2$	410.1174	12.0	1.5	1			NA/NA

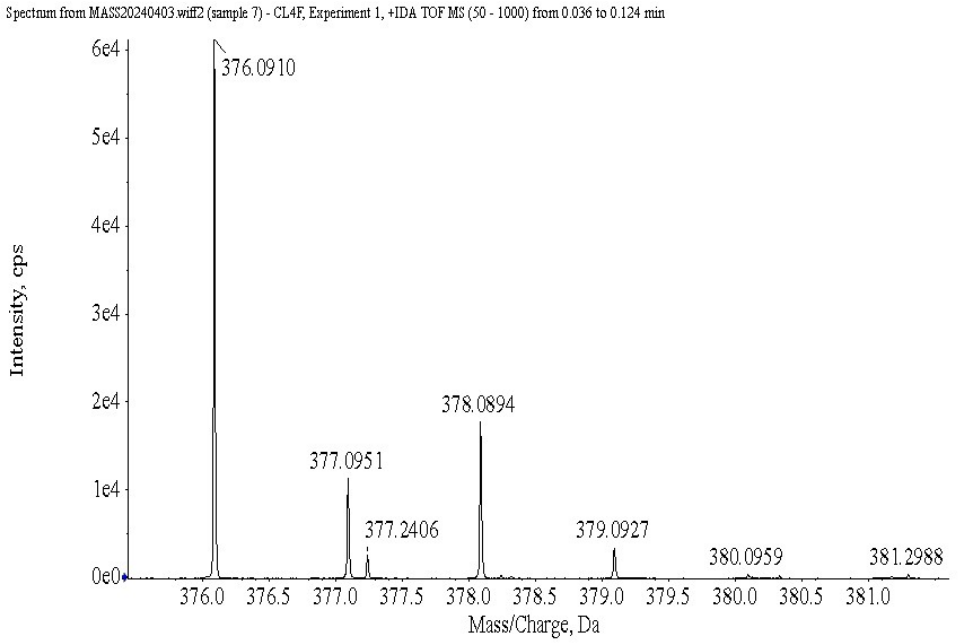
HRMS of compound **11d**



^{1}H NMR spectrum of compound **11e** (600 MHz, DMSO-d_6)

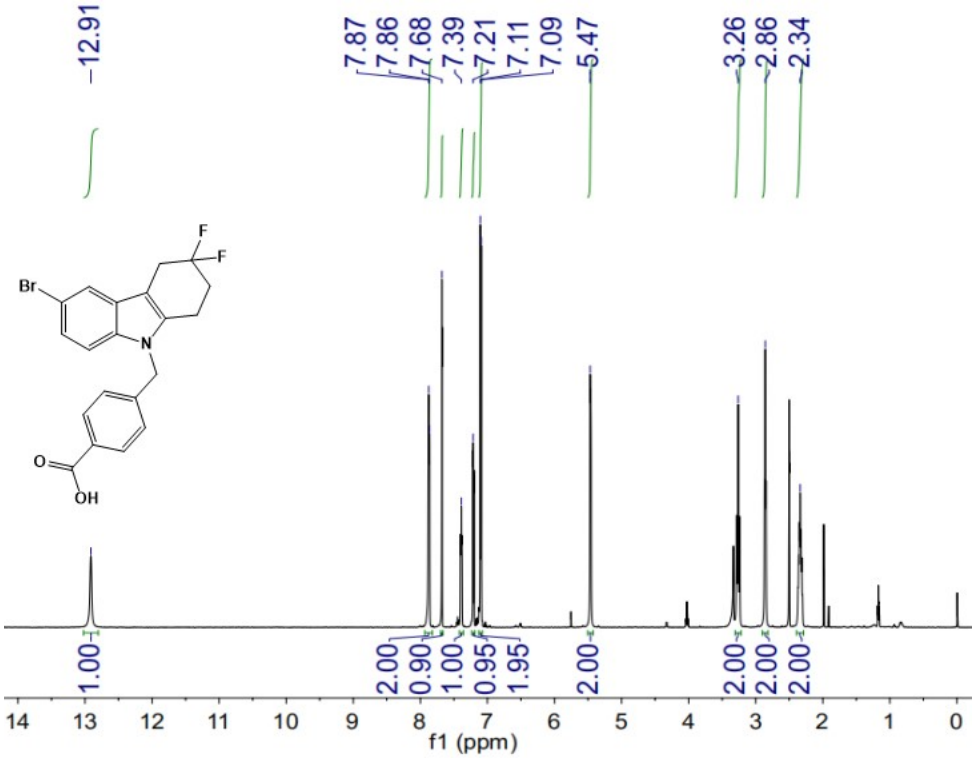


^{13}C NMR spectrum of compound **11e** (151 MHz, DMSO-d_6)

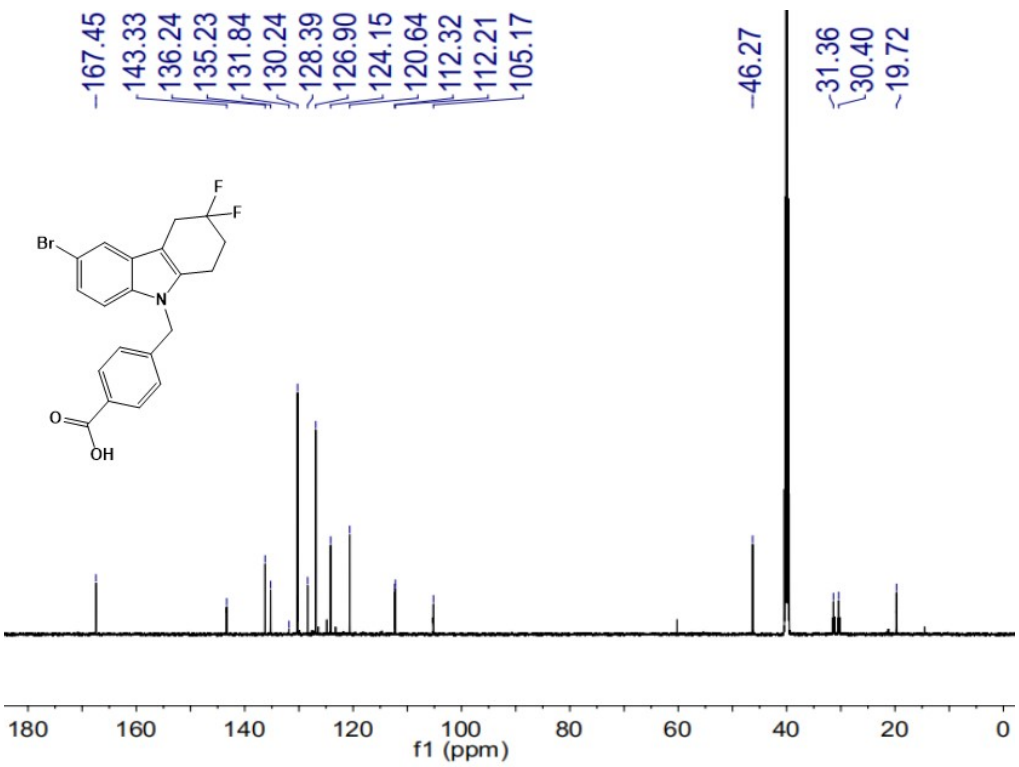


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{16}ClF_2NO_2$	376.0910	12.0	0.2	1			NA/NA

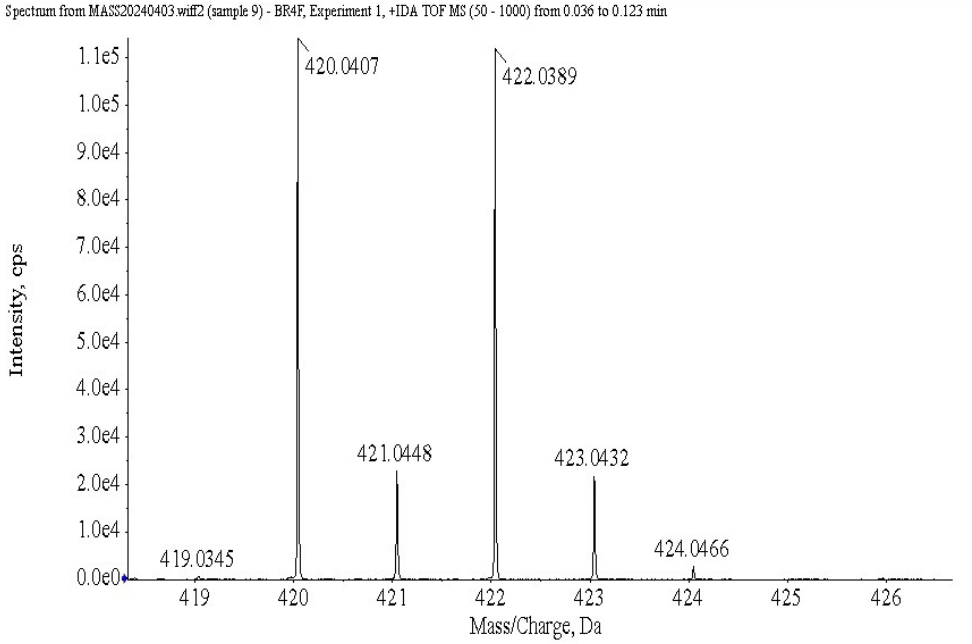
HRMS of compound **11e**



^{1}H NMR spectrum of compound **11f** (600 MHz, DMSO-d_6)

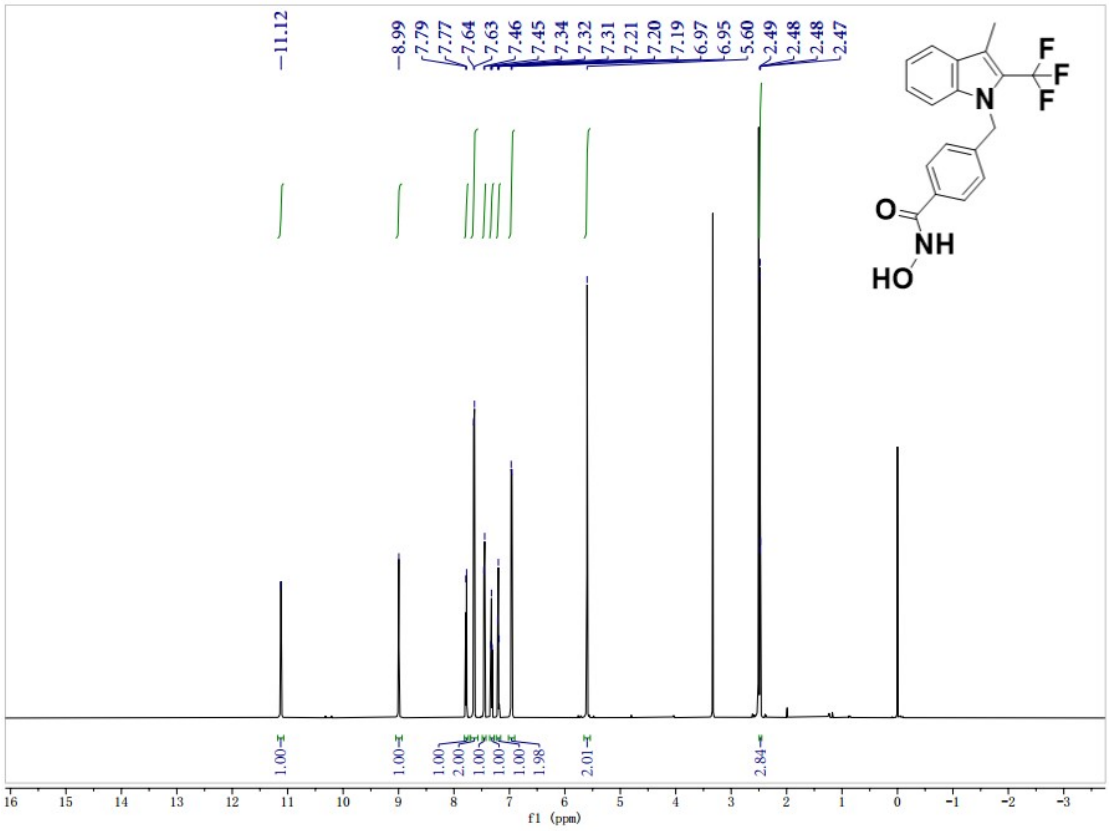


^{13}C NMR spectrum of compound **11f** (151 MHz, DMSO-d_6)

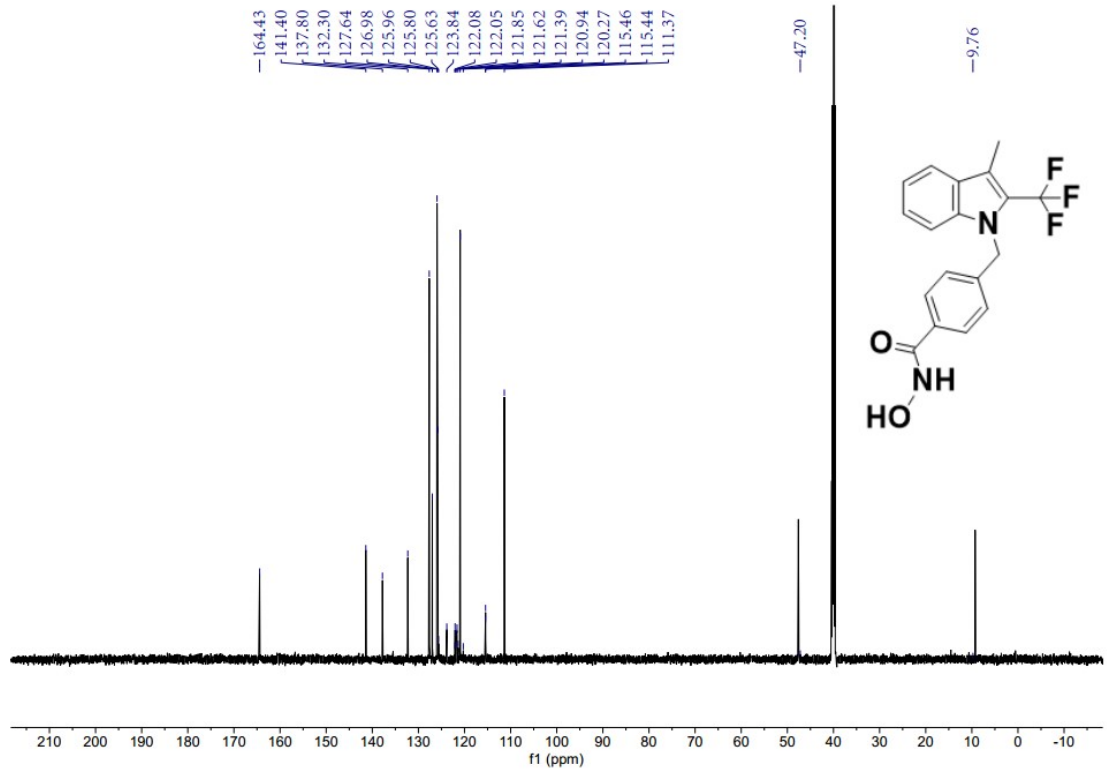


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{16}BrF_2NO_2$	420.0405	12.0	0.4	1			NA/NA

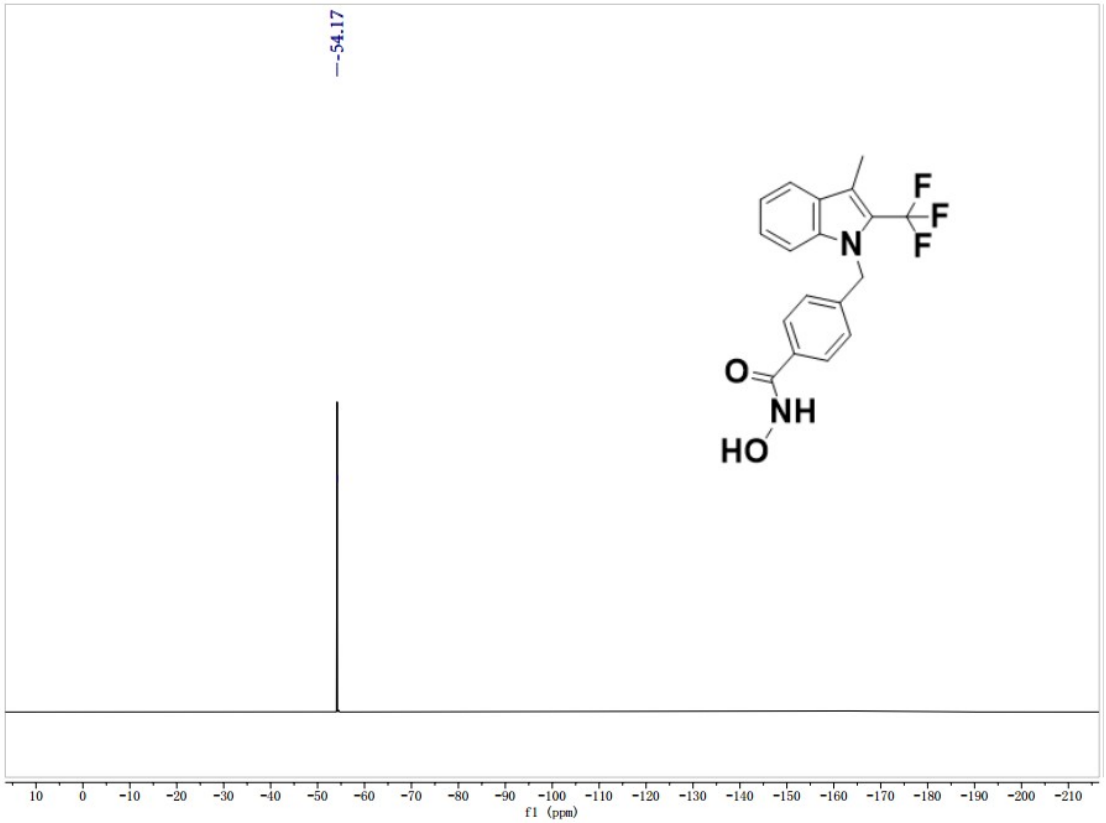
HRMS of compound **11f**



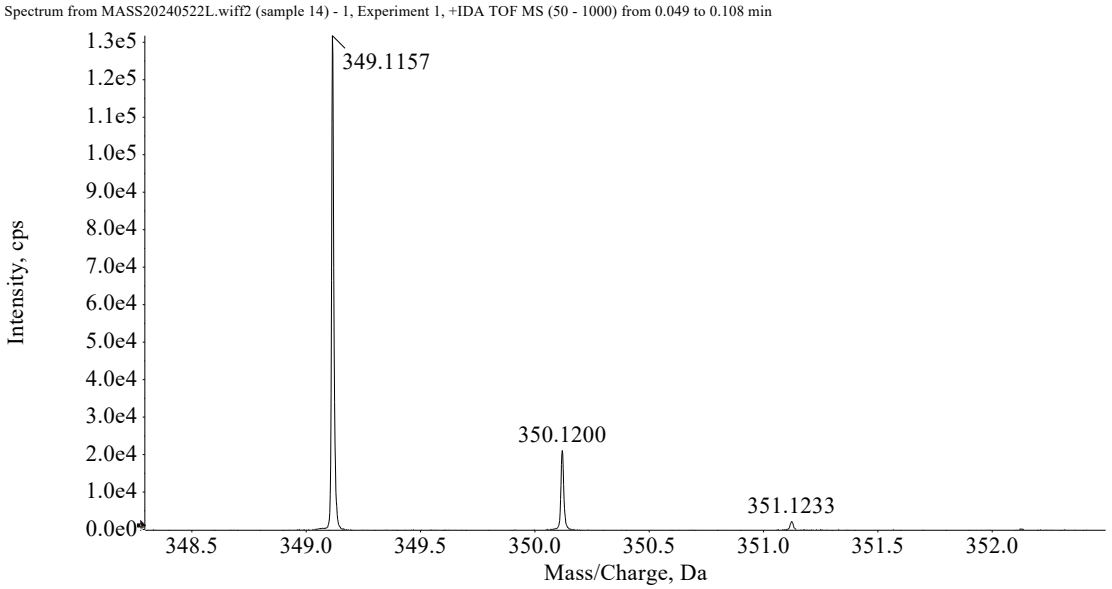
^{1}H NMR spectrum of compound **12a** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **12a** (151 MHz, DMSO-d_6)

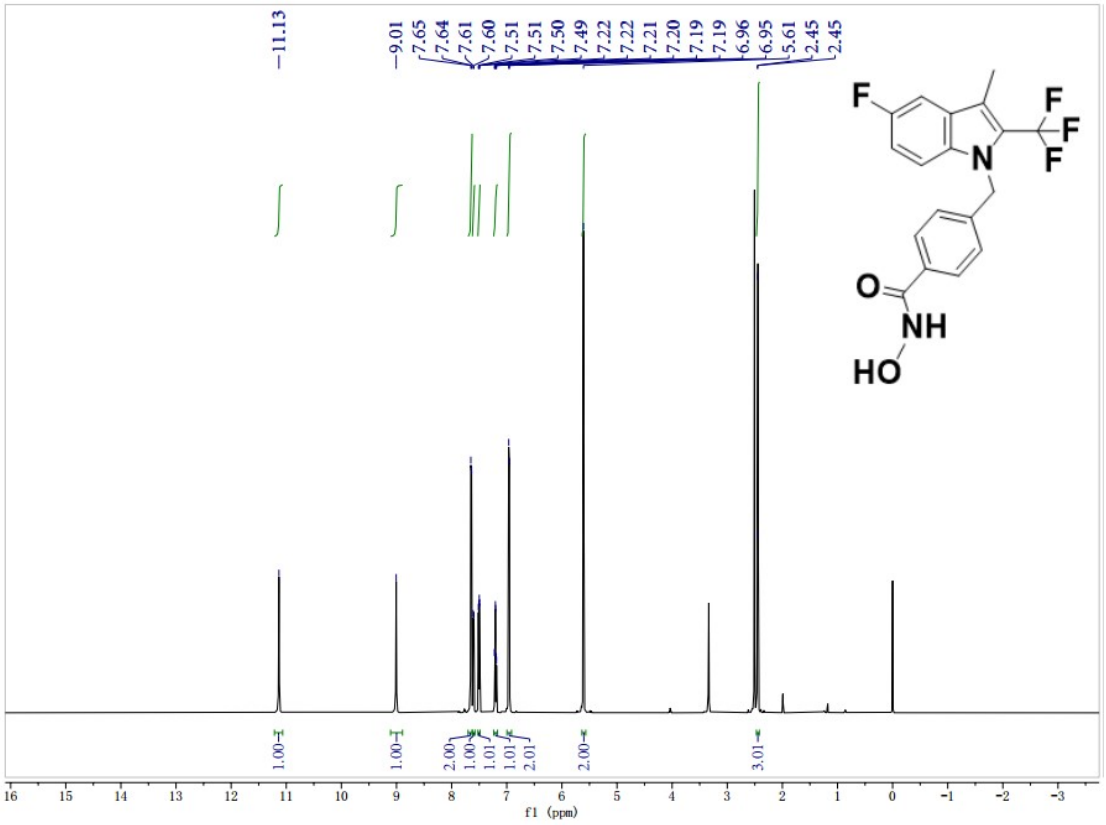


^{19}F NMR spectrum of compound **12a** (564 MHz, DMSO-d_6)

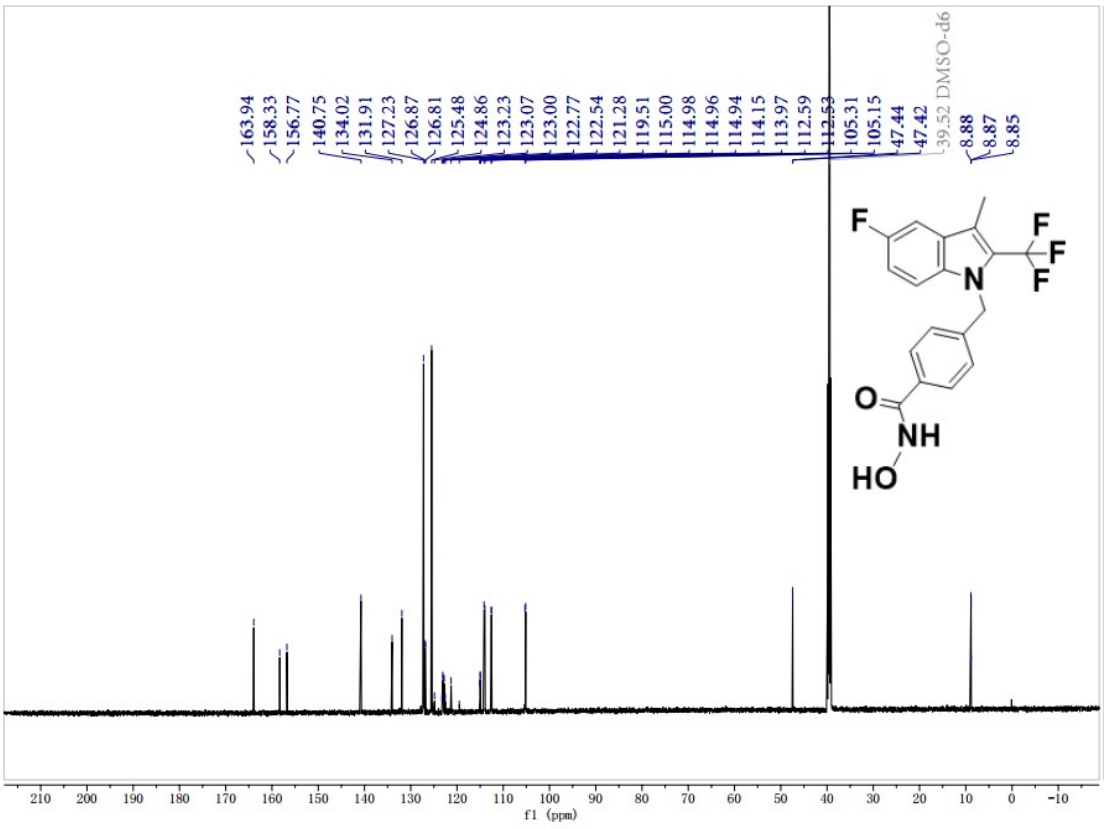


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C18H15F3N2O2	349.1158	11.0	-0.4	1			NA/NA

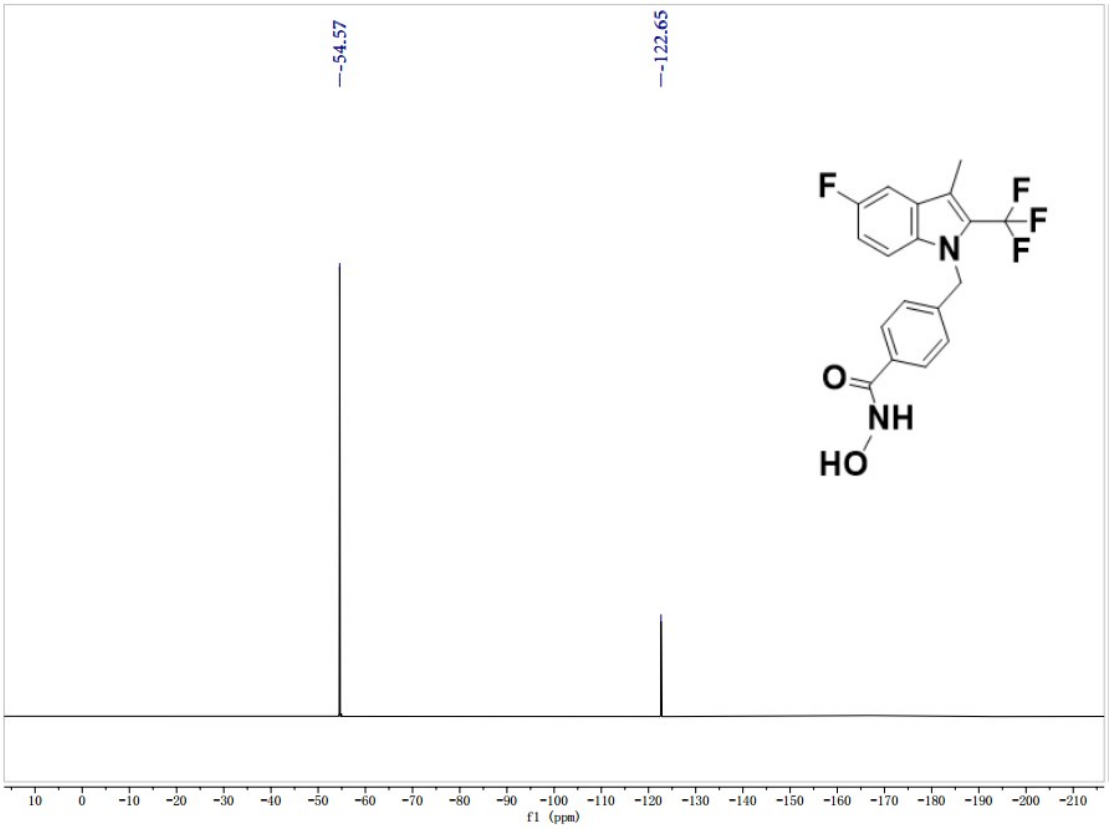
HRMS of compound **12a**



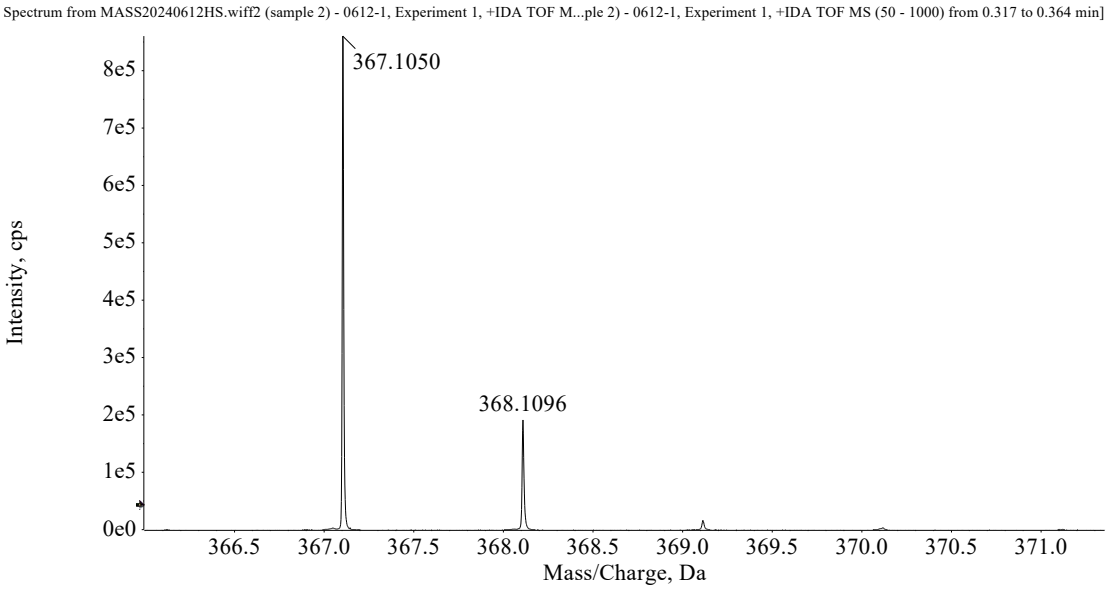
^{1}H NMR spectrum of compound **12b** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **12b** (151 MHz, DMSO-d_6)

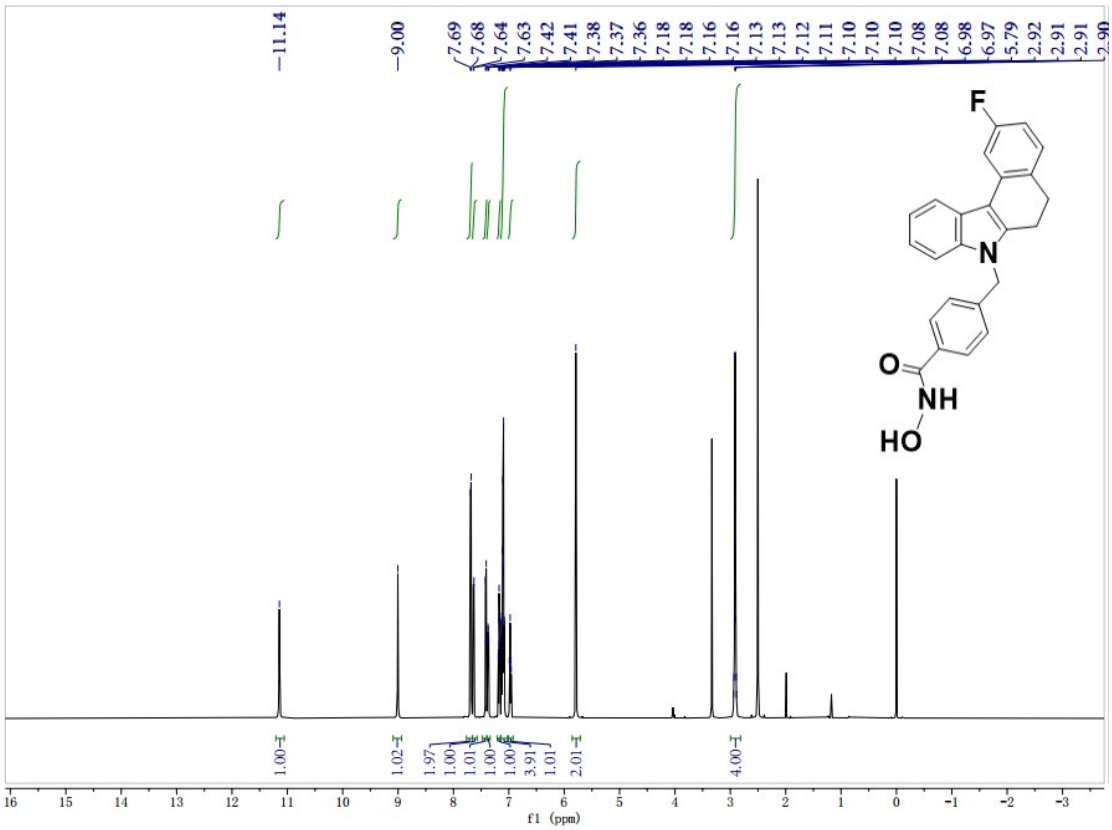


^{19}F NMR spectrum of compound **12b** (564 MHz, DMSO-d_6)

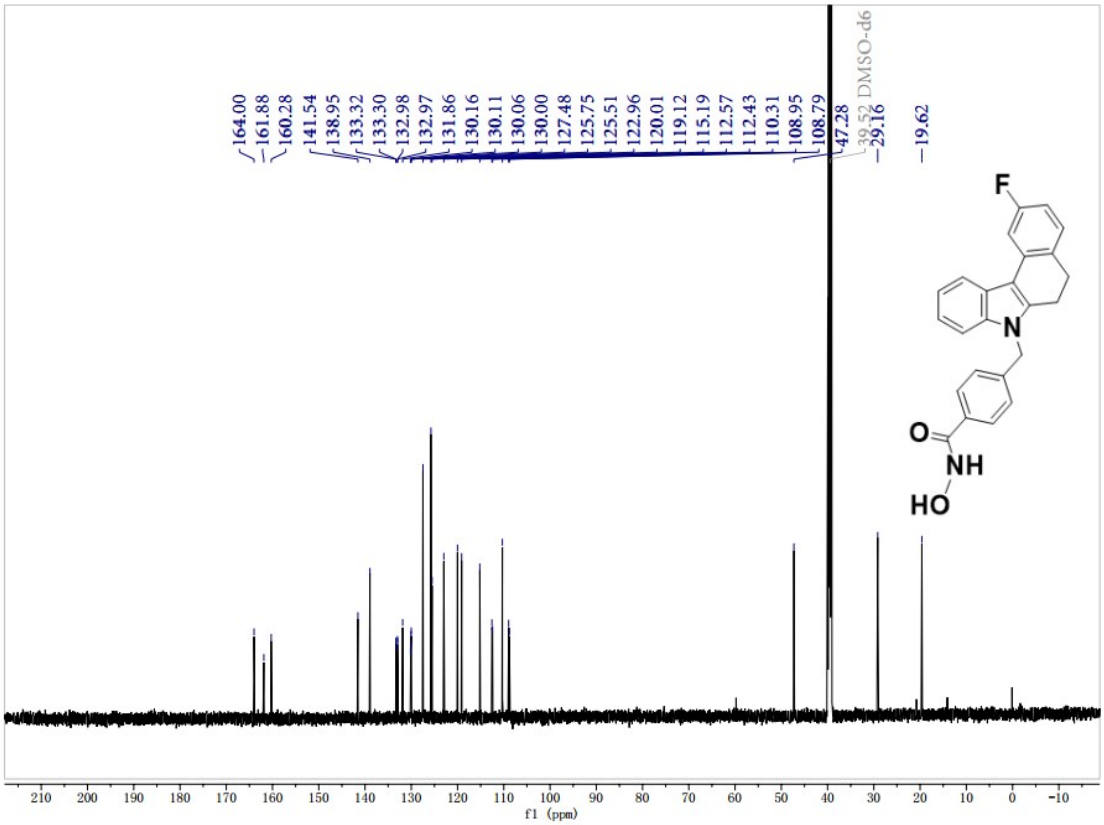


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C18H14F4N2O2	367.1064	11.0	-3.9	1			NA/NA

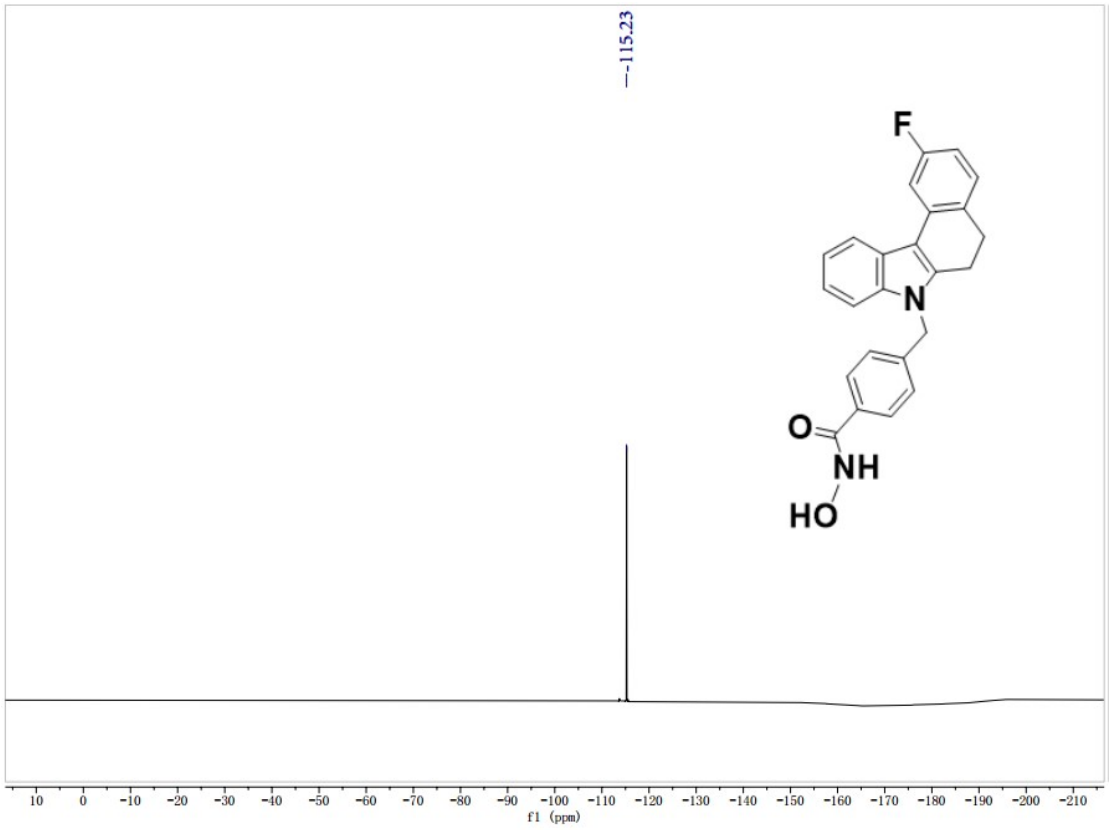
HRMS of compound **12b**



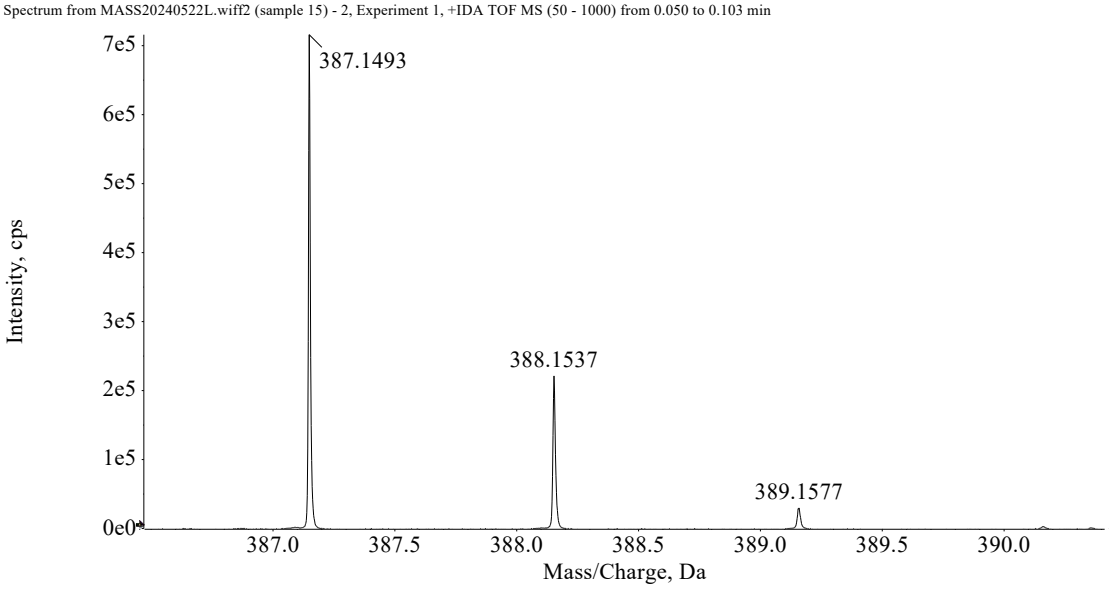
^{1}H NMR spectrum of compound **13a** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13a** (151 MHz, DMSO-d_6)

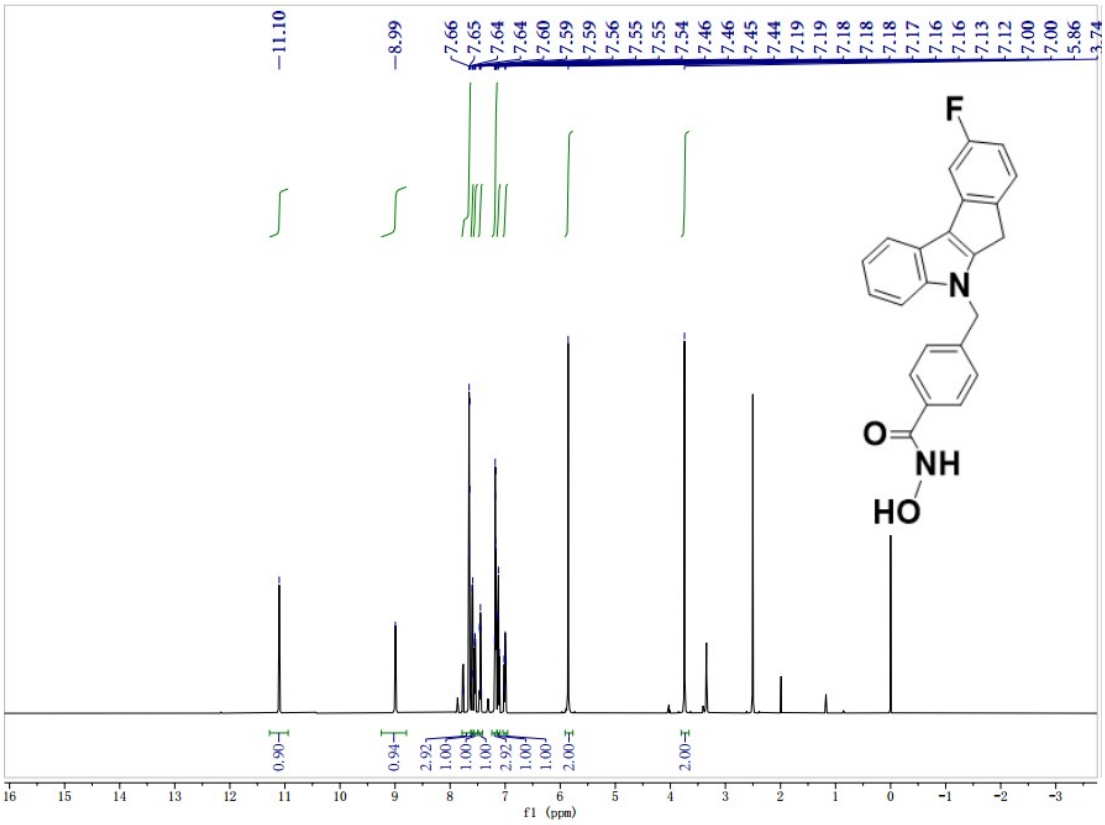


^{19}F NMR spectrum of compound **13a** (564 MHz, DMSO-d_6)

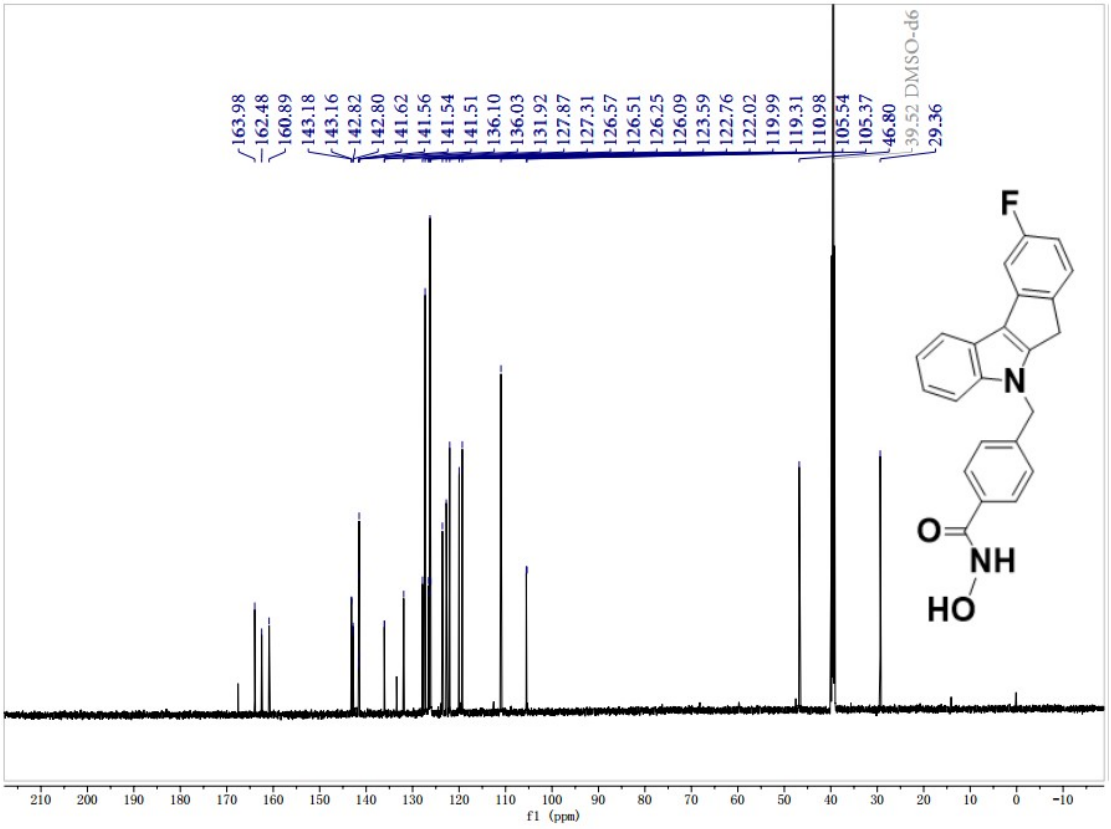


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C24H19FN2O2	387.1503	16.0	-2.7	1			NA/NA

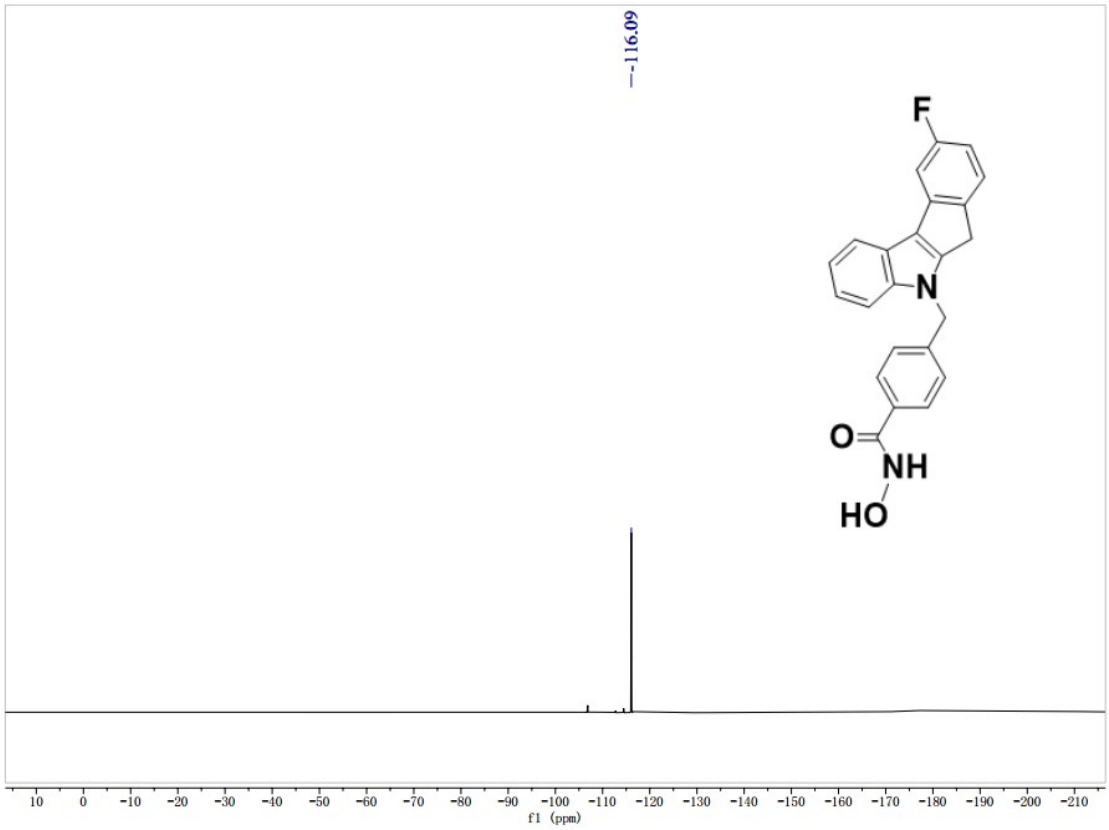
HRMS of compound **13a**



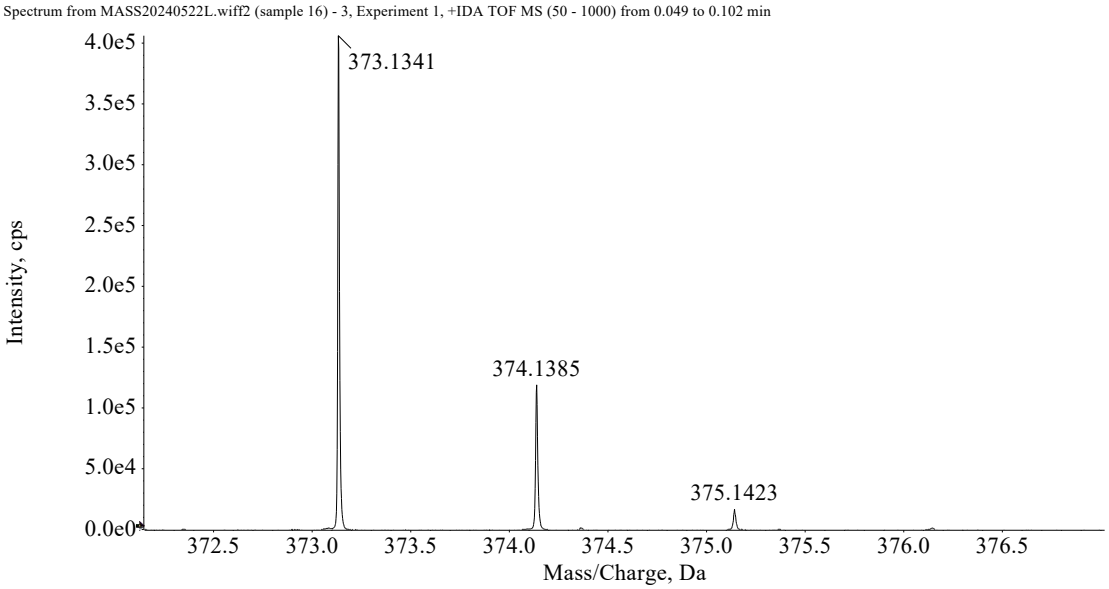
^{1}H NMR spectrum of compound **13b** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13b** (151 MHz, DMSO-d_6)

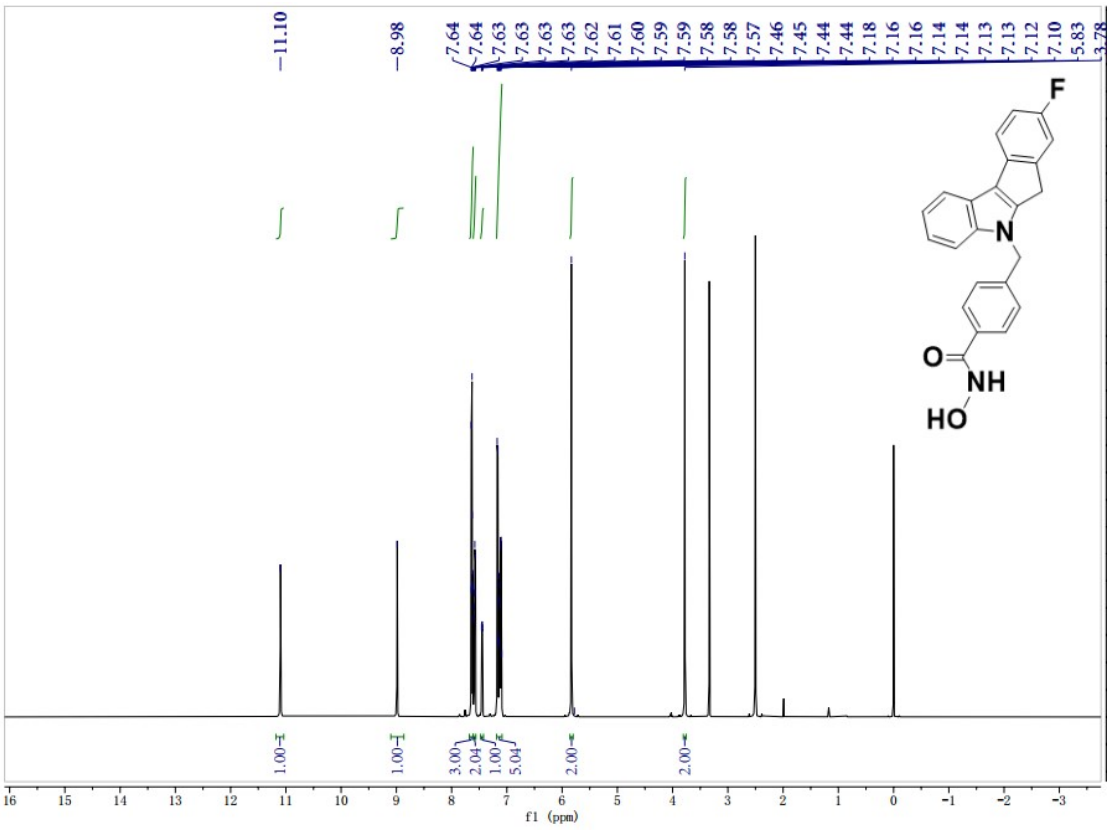


^{19}F NMR spectrum of compound **13b** (564 MHz, DMSO-d_6)

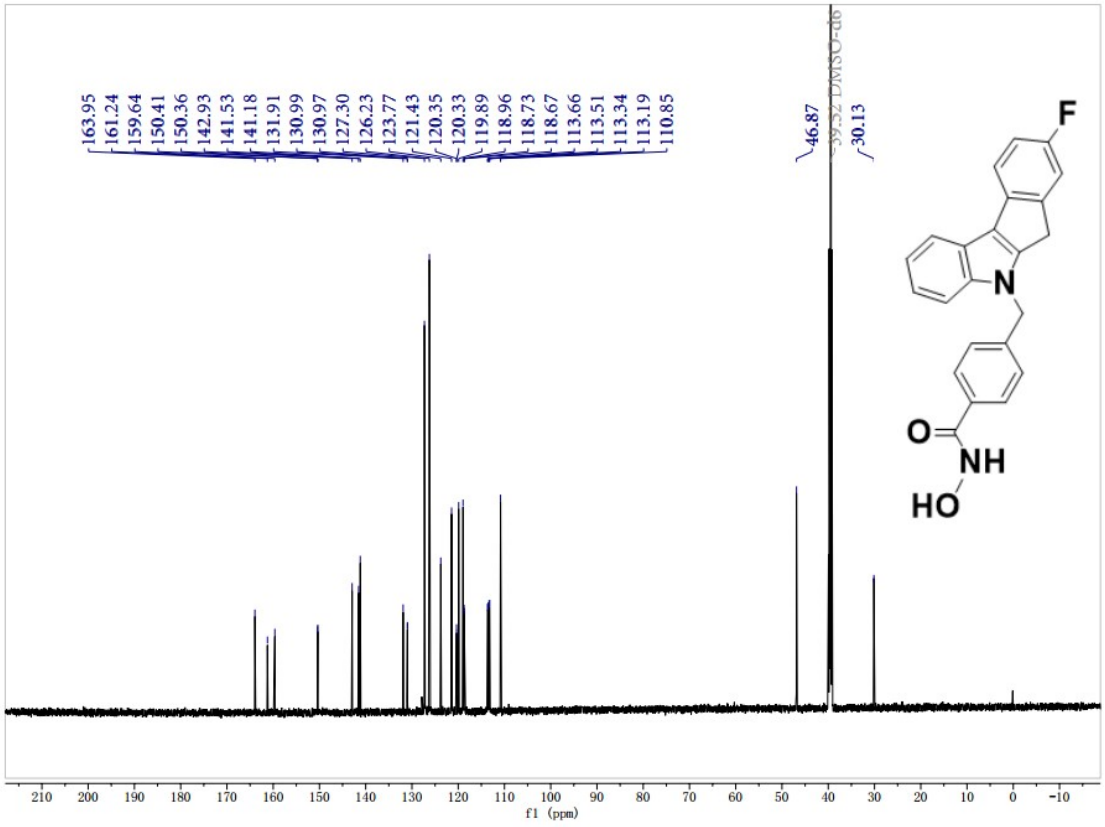


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H17FN2O2	373.1347	16.0	-1.6	1			NA/NA

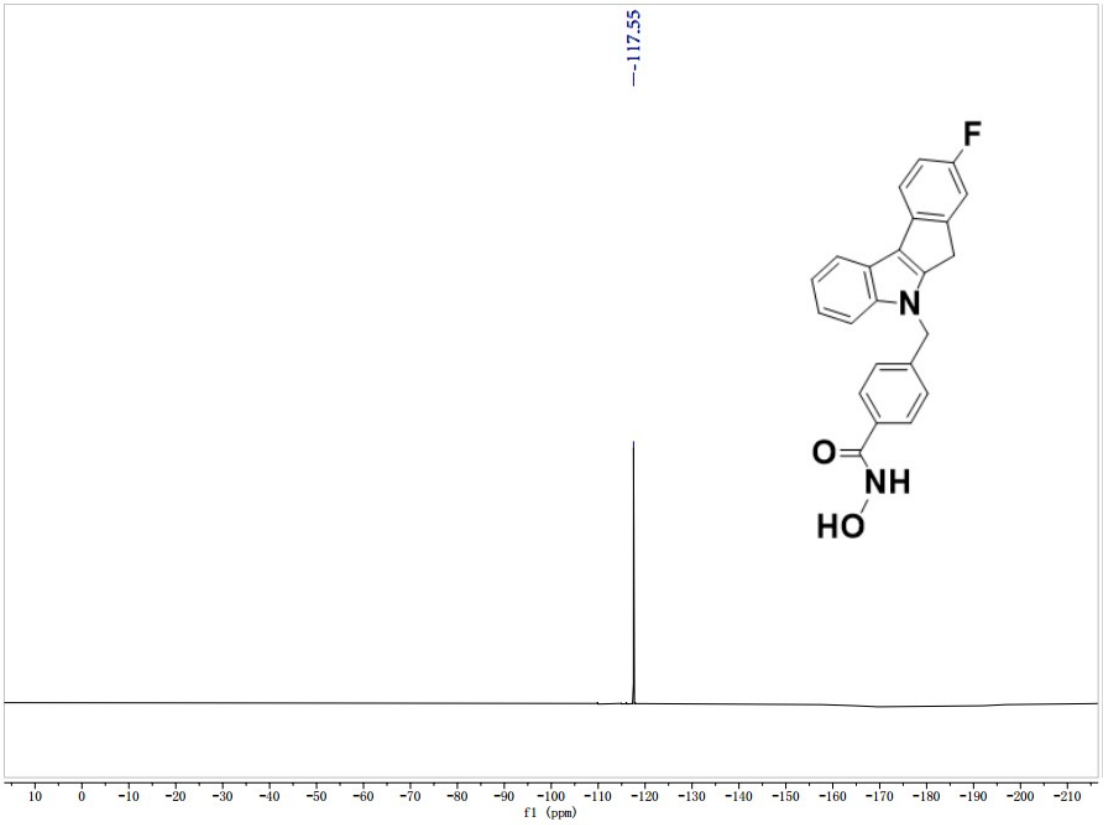
HRMS of compound **13b**



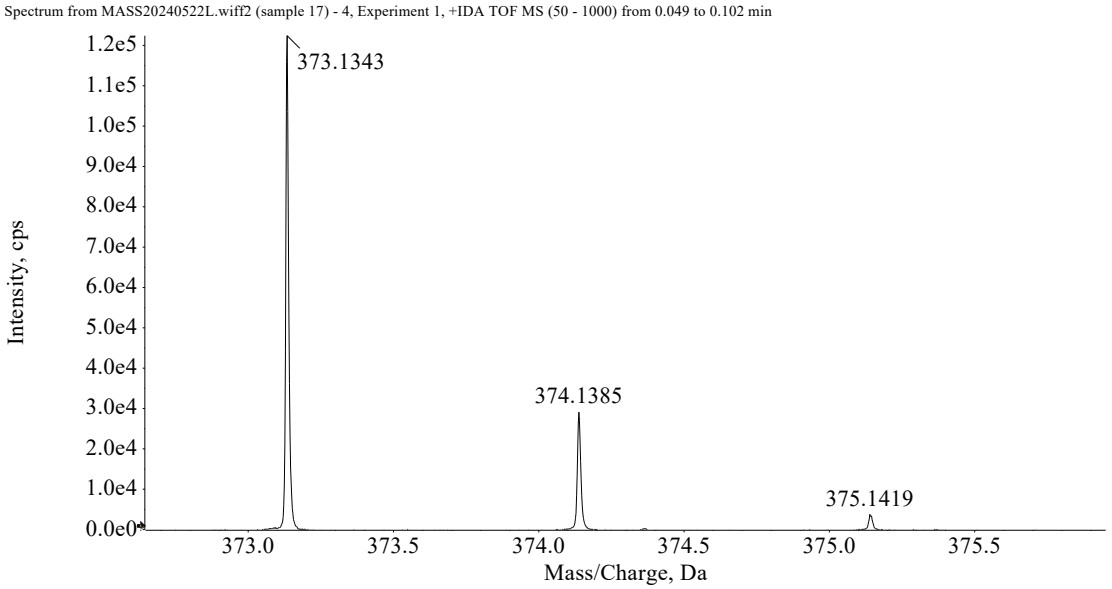
^{1}H NMR spectrum of compound **13c** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13c** (151 MHz, DMSO-d_6)

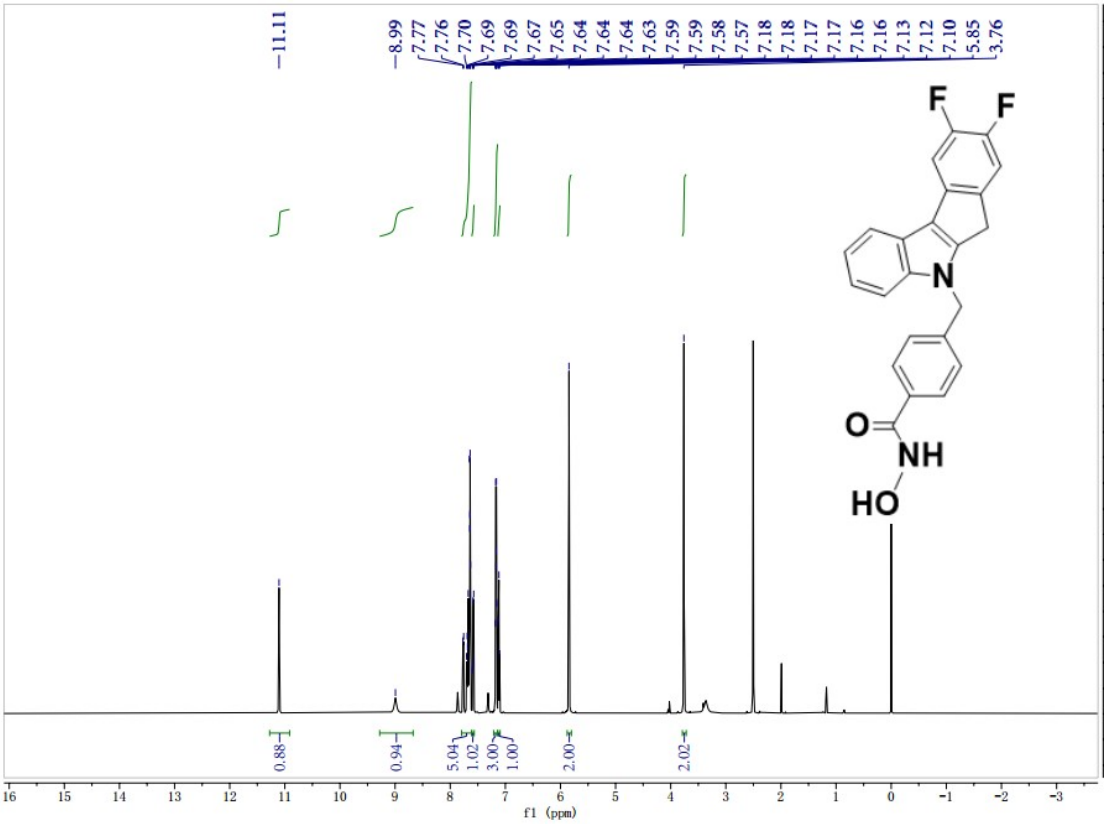


^{19}F NMR spectrum of compound **13c** (564 MHz, DMSO-d_6)

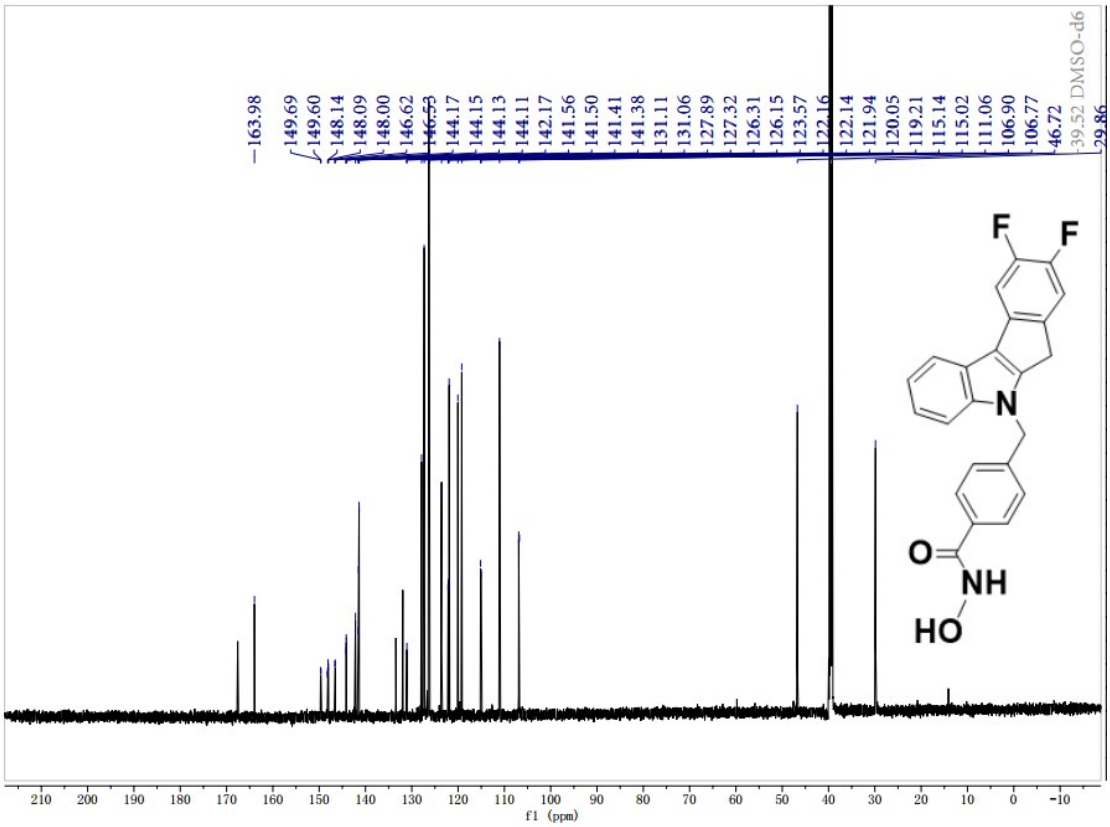


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H17FN2O2	373.1347	16.0	-1.0	1			NA/NA

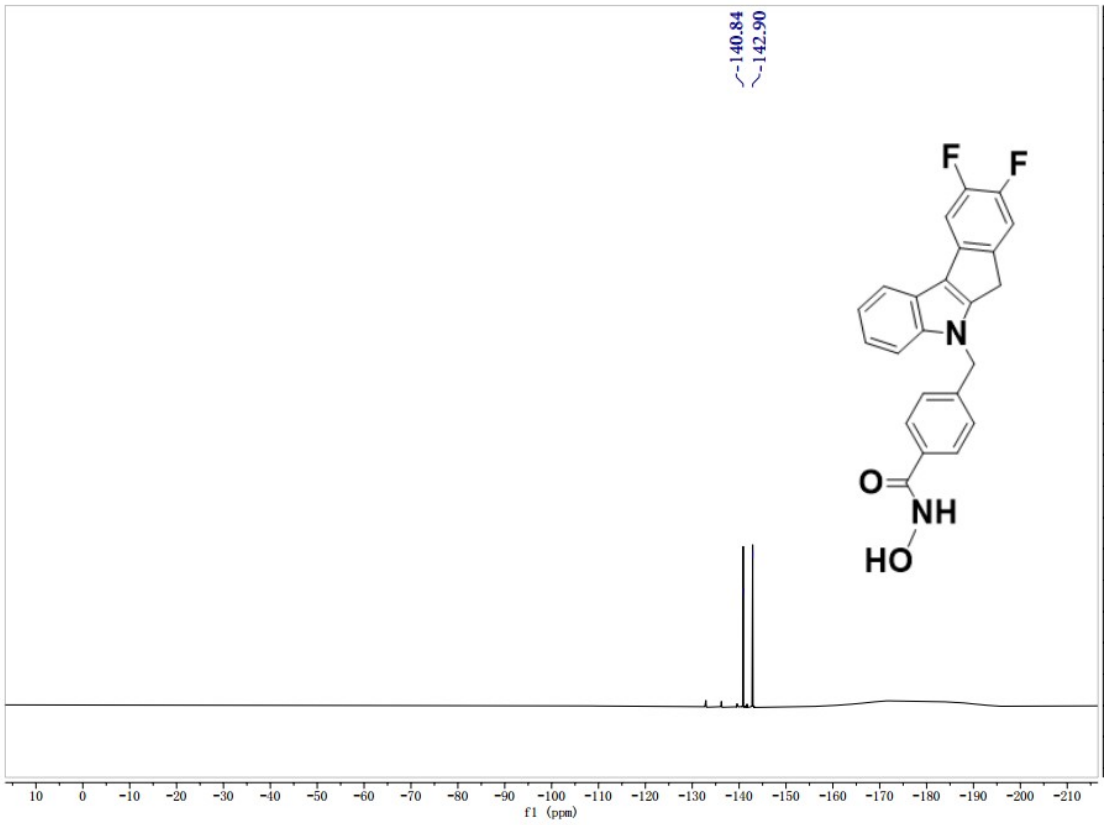
HRMS of compound **13c**



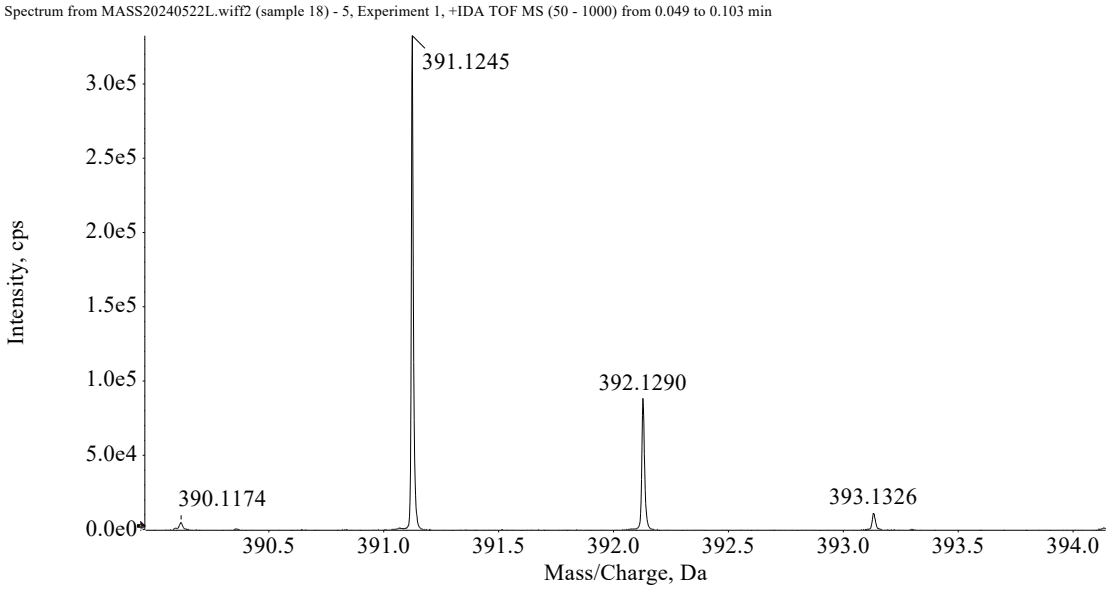
^{1}H NMR spectrum of compound **13d** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13d** (151 MHz, DMSO-d_6)

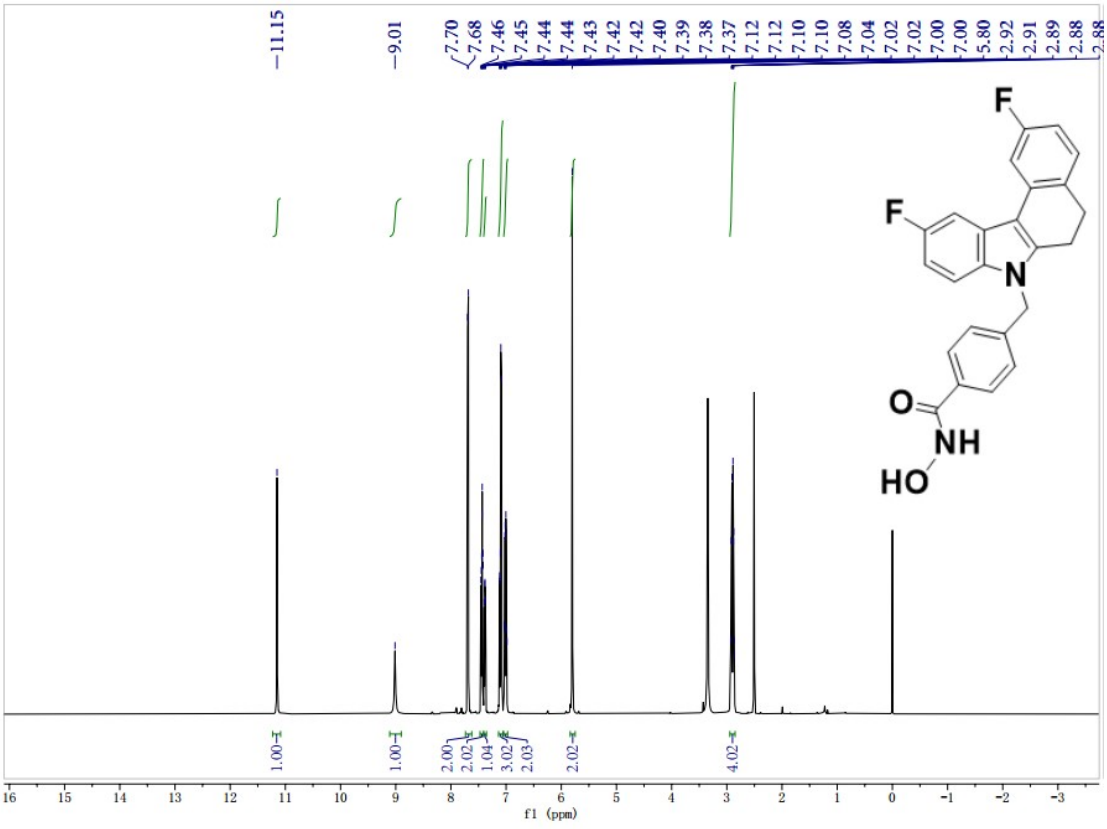


^{19}F NMR spectrum of compound **13d** (564 MHz, DMSO-d_6)

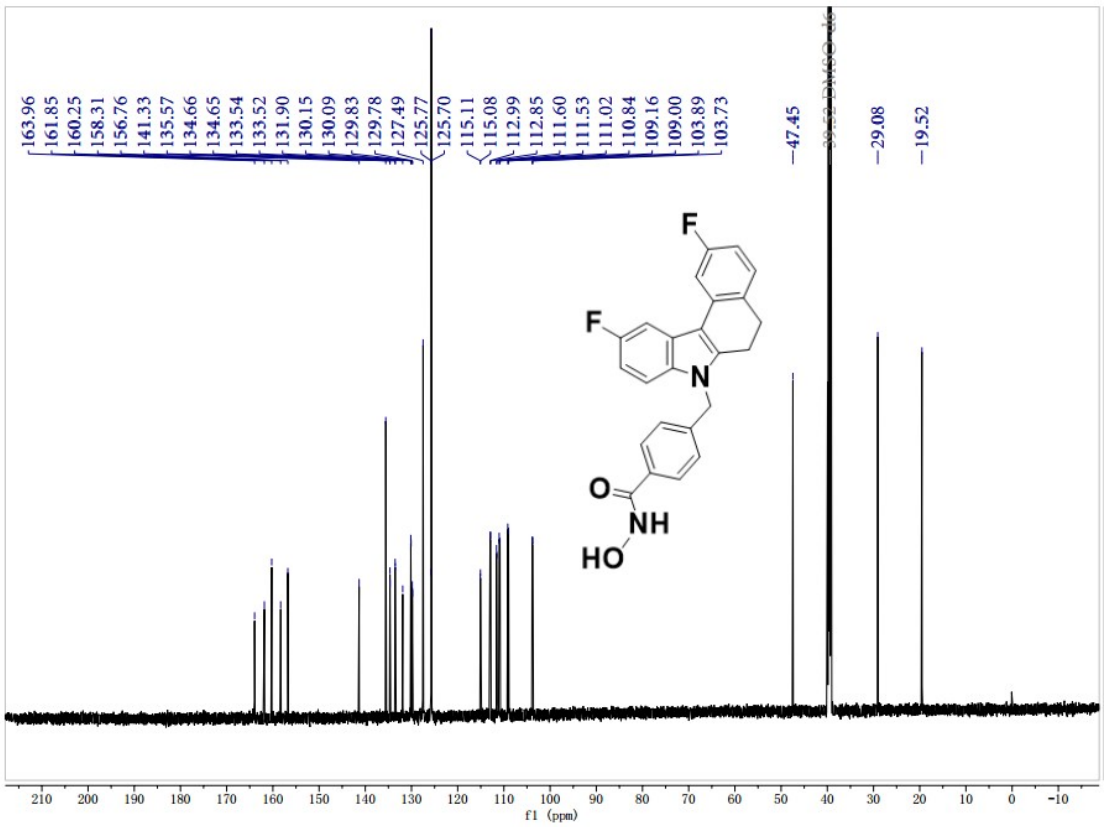


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H16F2N2O2	391.1253	16.0	-1.9	1			NA/NA

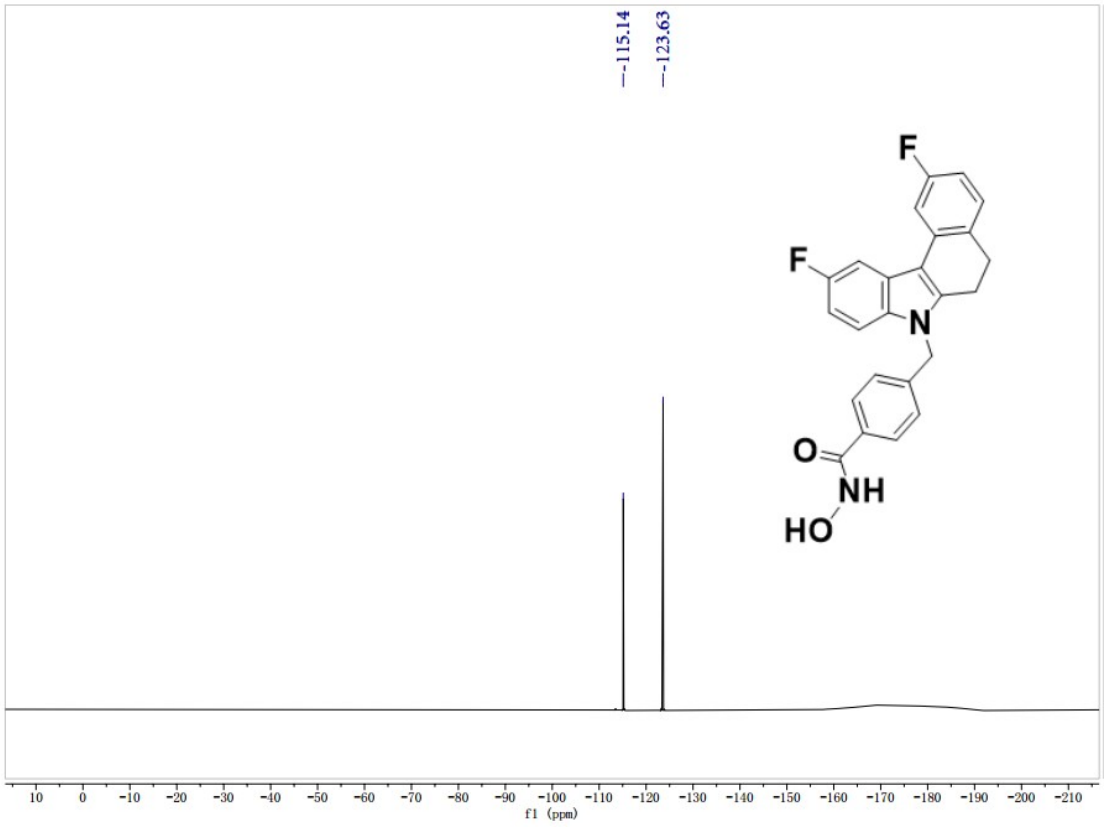
HRMS of compound **13d**



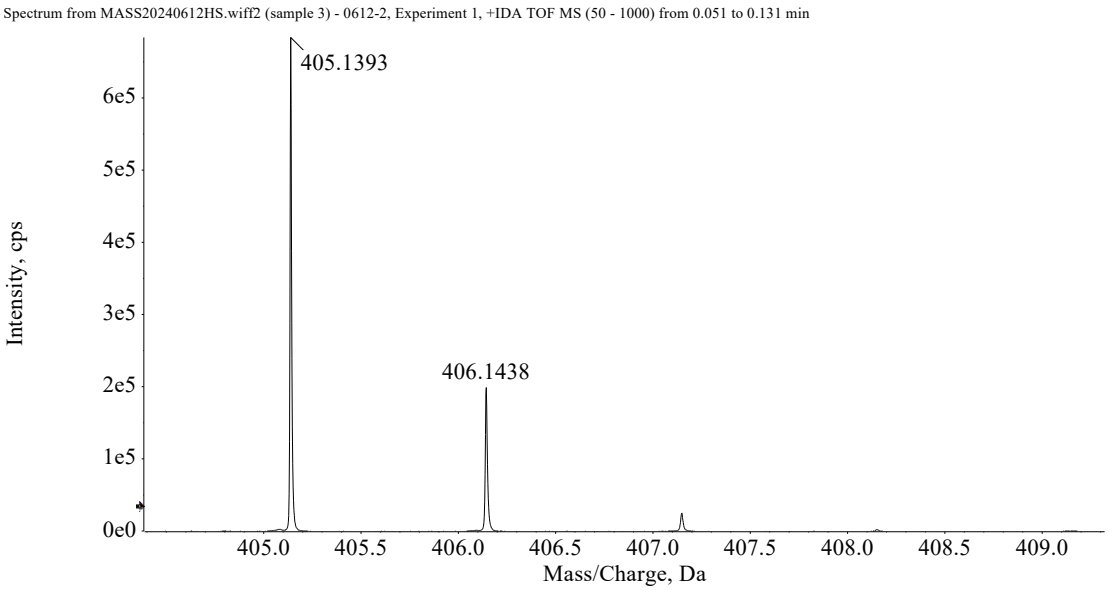
^{1}H NMR spectrum of compound **13e** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13e** (151 MHz, DMSO-d_6)

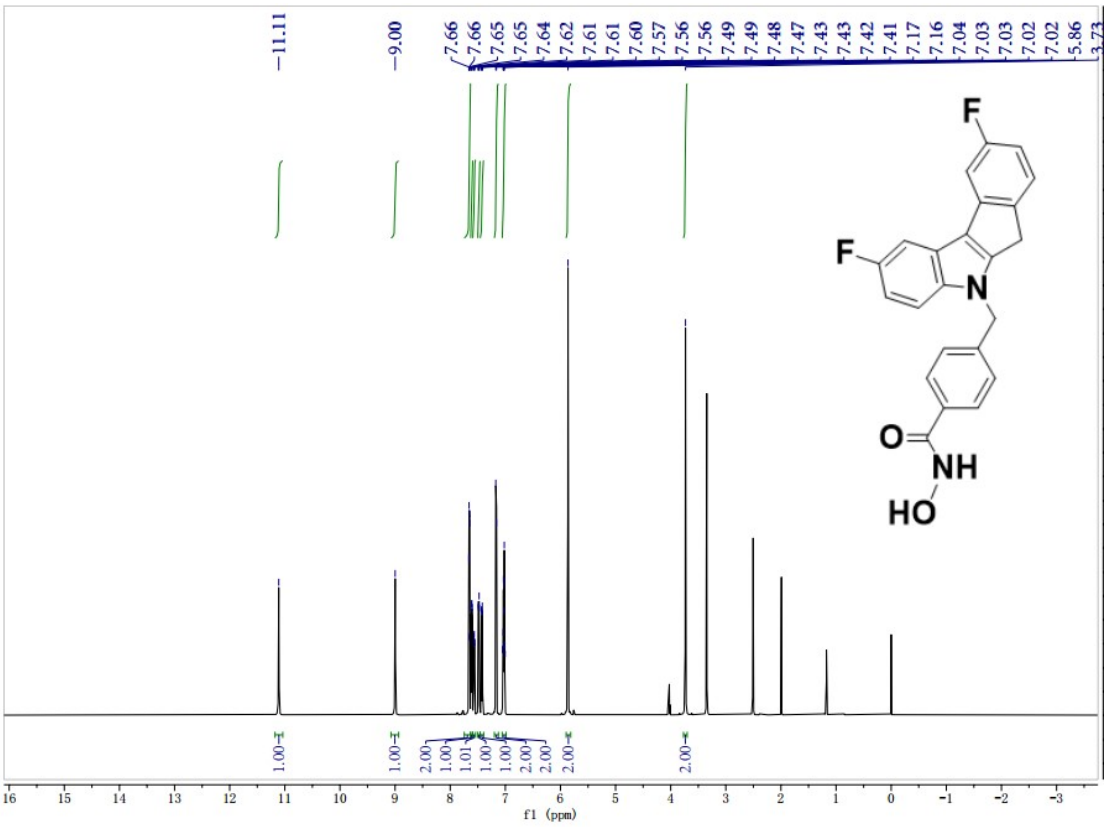


^{19}F NMR spectrum of compound **13e** (564 MHz, DMSO-d_6)

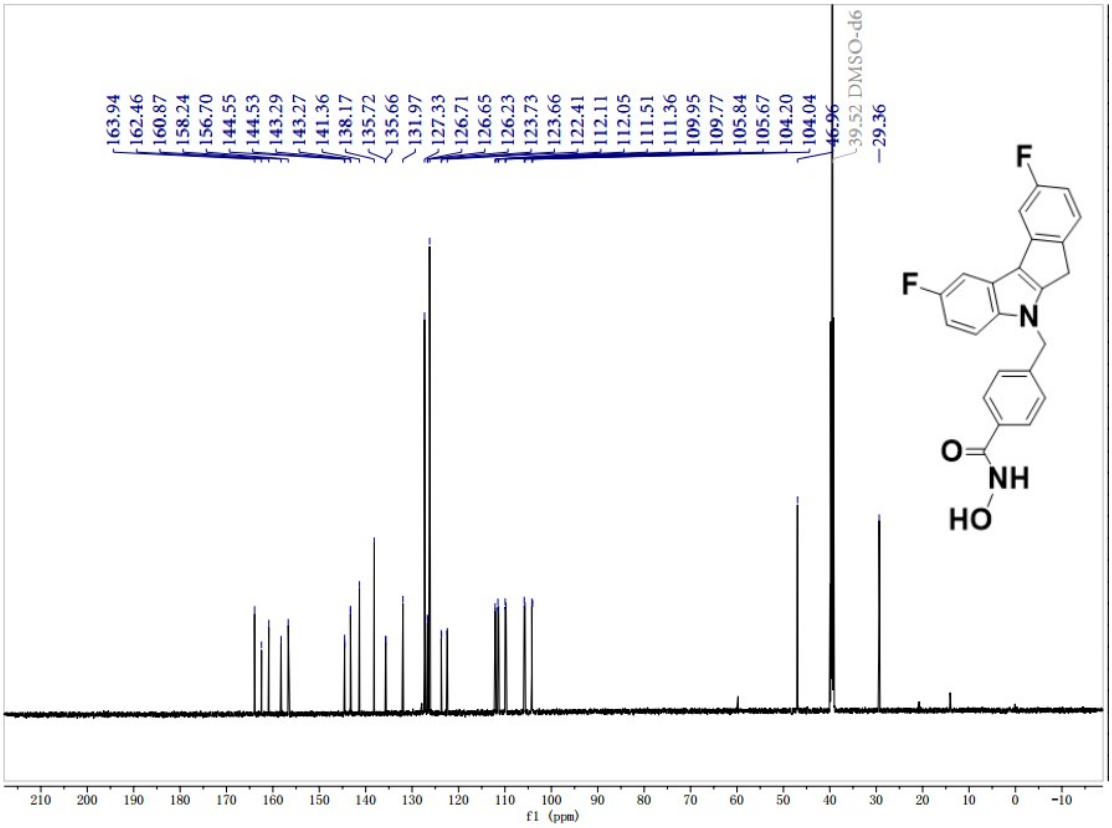


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C24H18F2N2O2	405.1409	16.0	-4.0	1			NA/NA

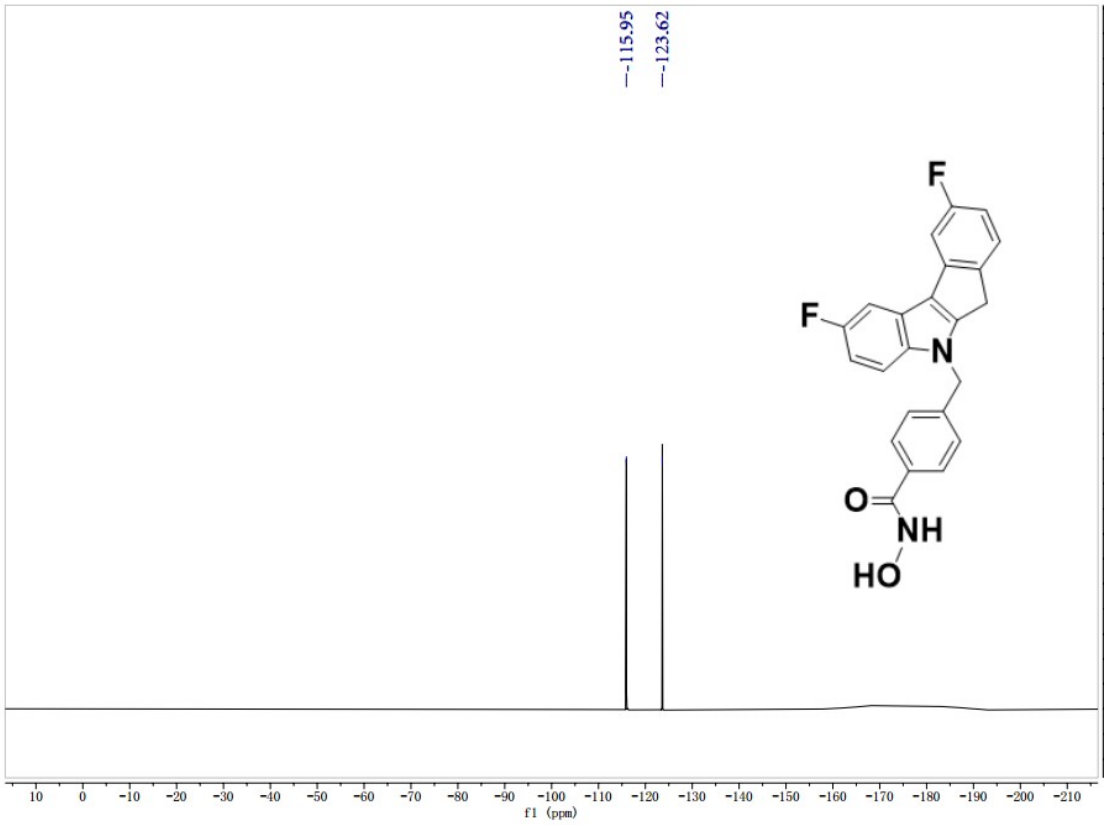
HRMS of compound **13e**



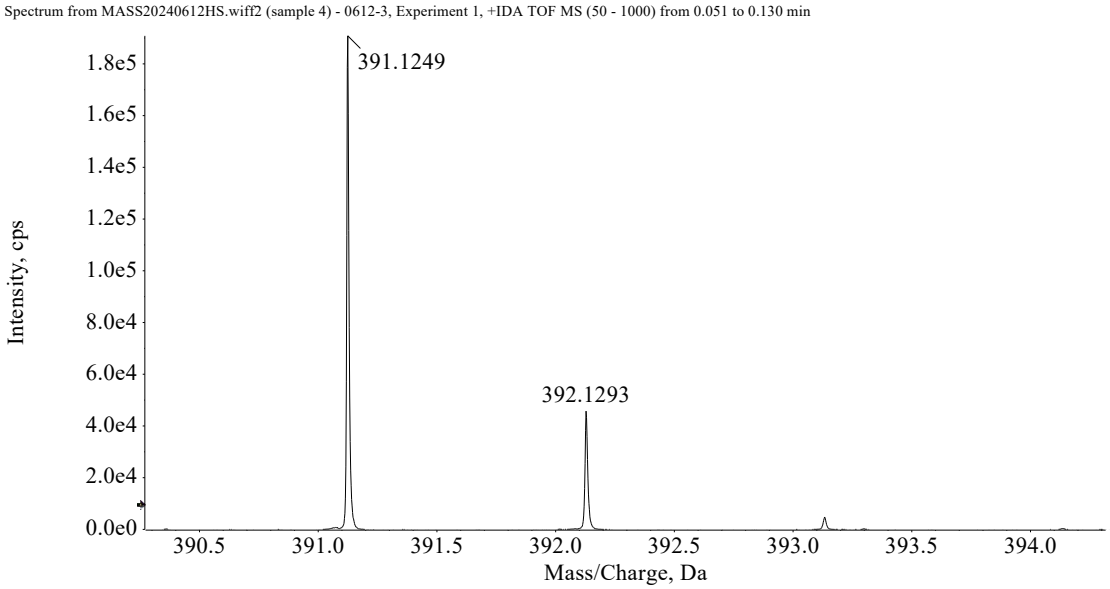
^{1}H NMR spectrum of compound **13f** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13f** (151 MHz, DMSO-d_6)

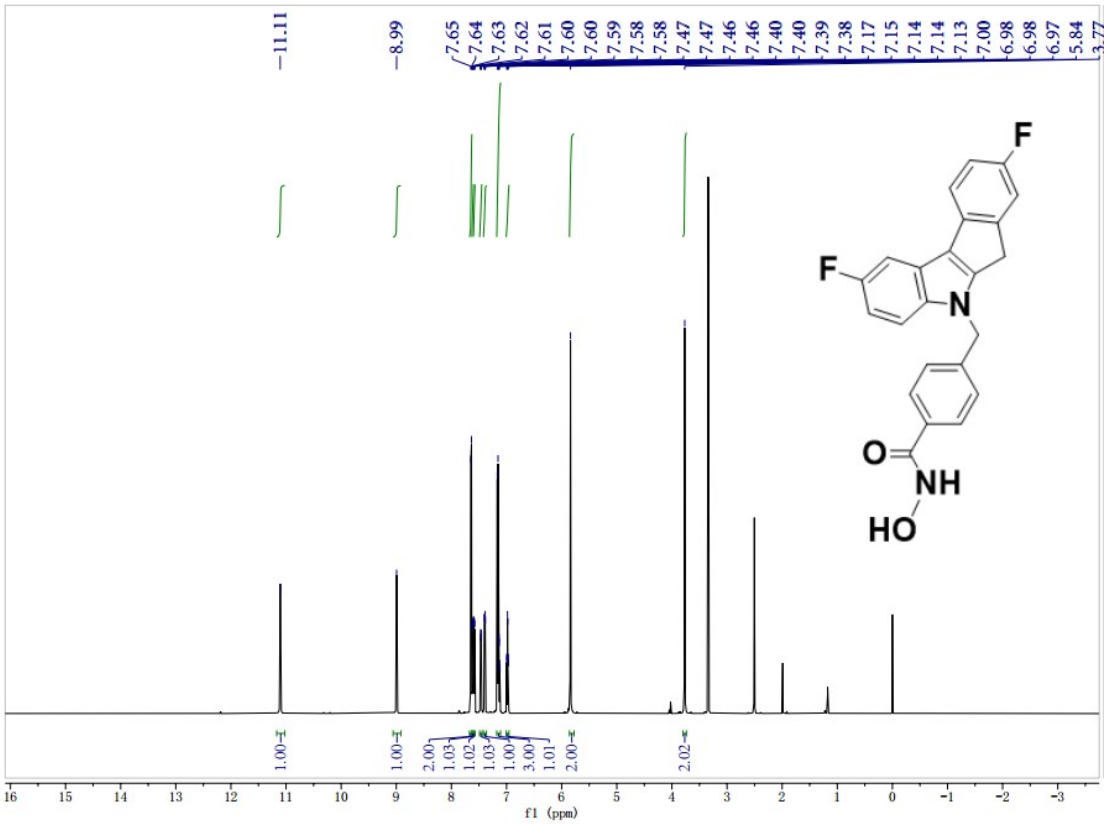


^{19}F NMR spectrum of compound **13f** (564 MHz, DMSO-d_6)

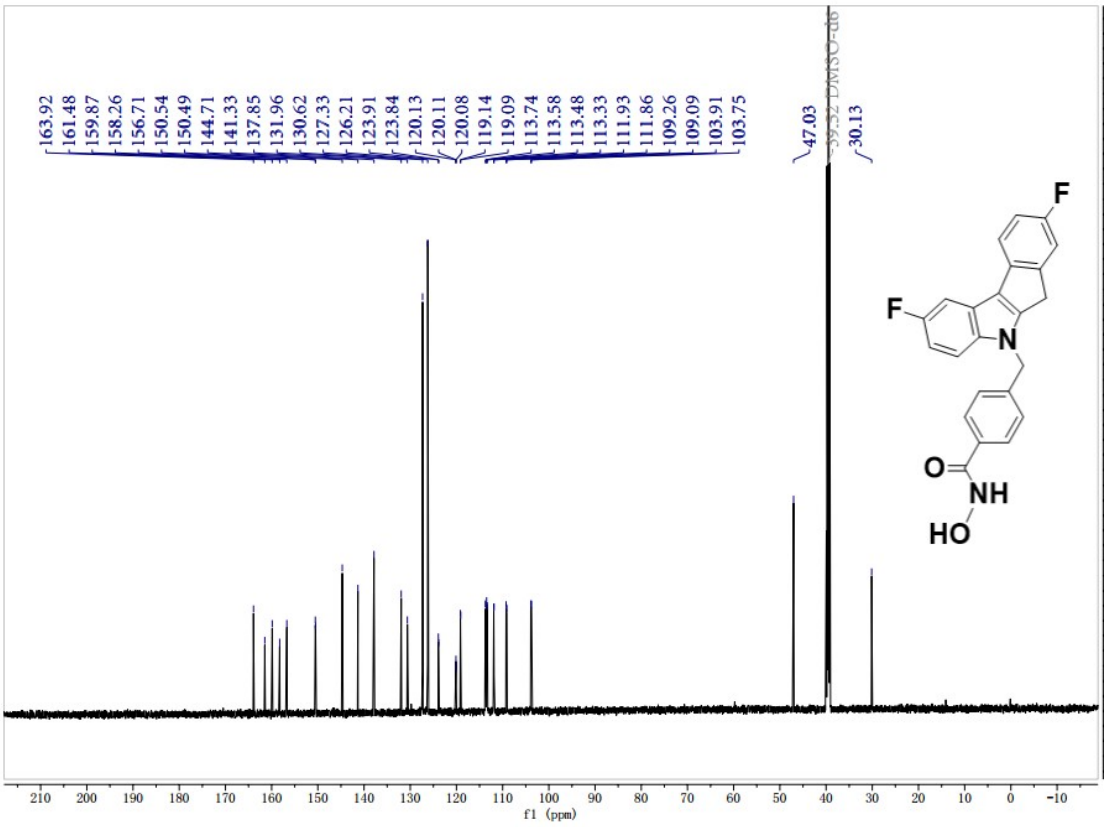


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H16F2N2O2	391.1253	16.0	-0.9	1			NA/NA

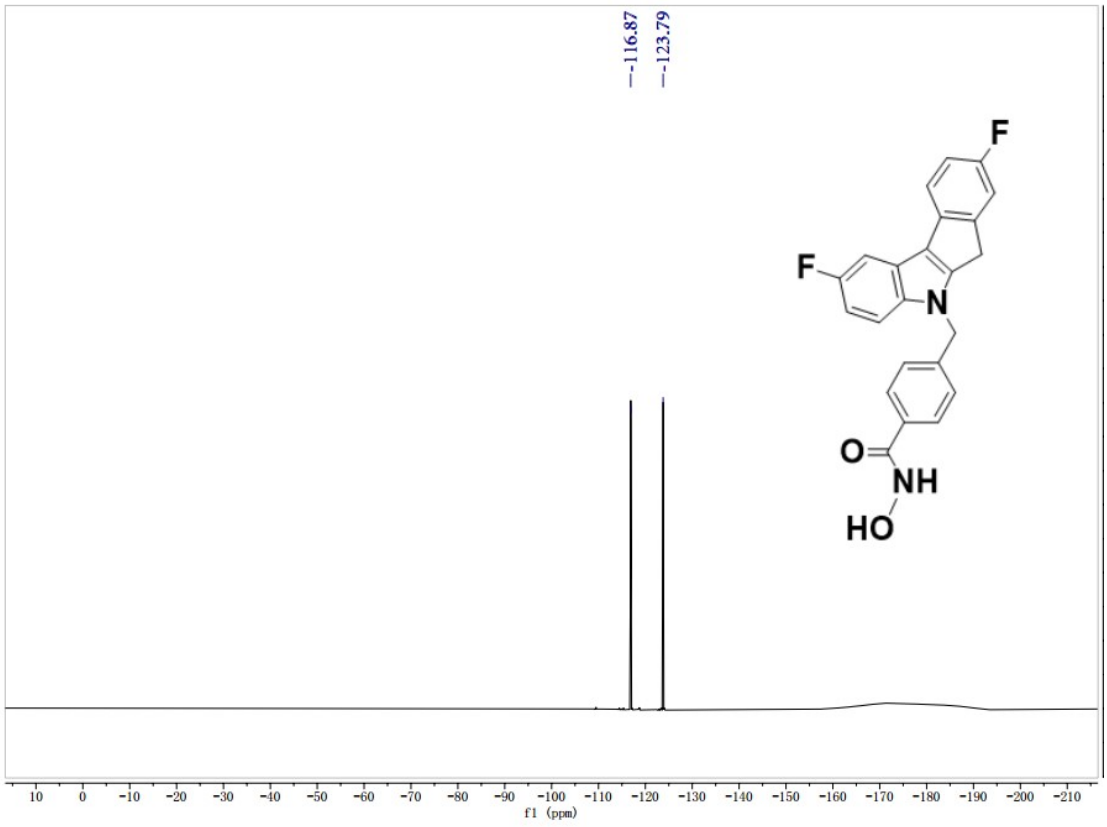
HRMS of compound **13f**



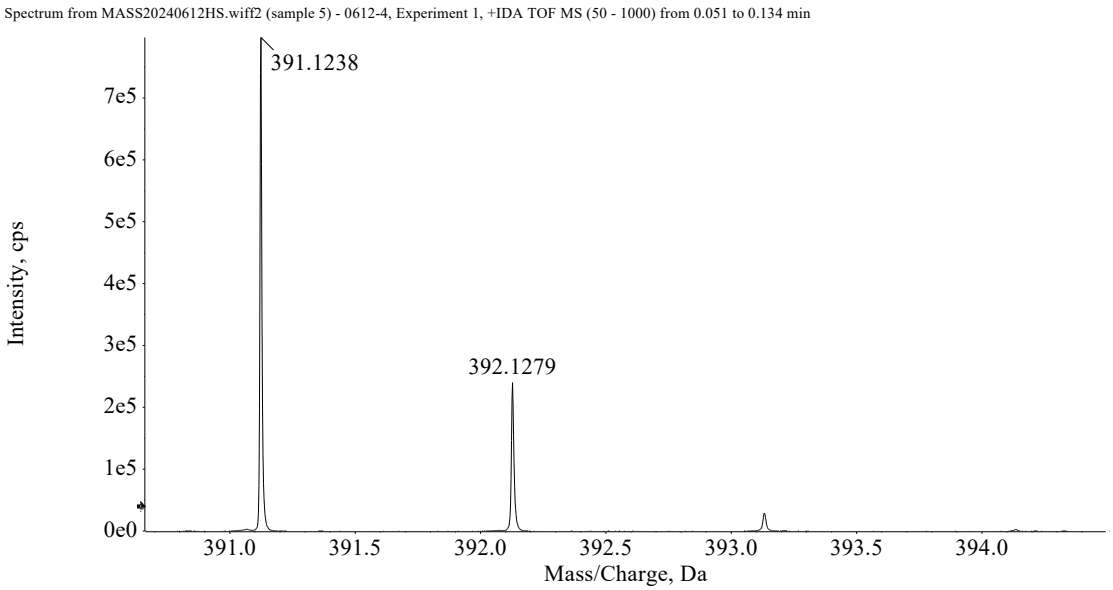
^{1}H NMR spectrum of compound **13g** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13g** (151 MHz, DMSO-d_6)

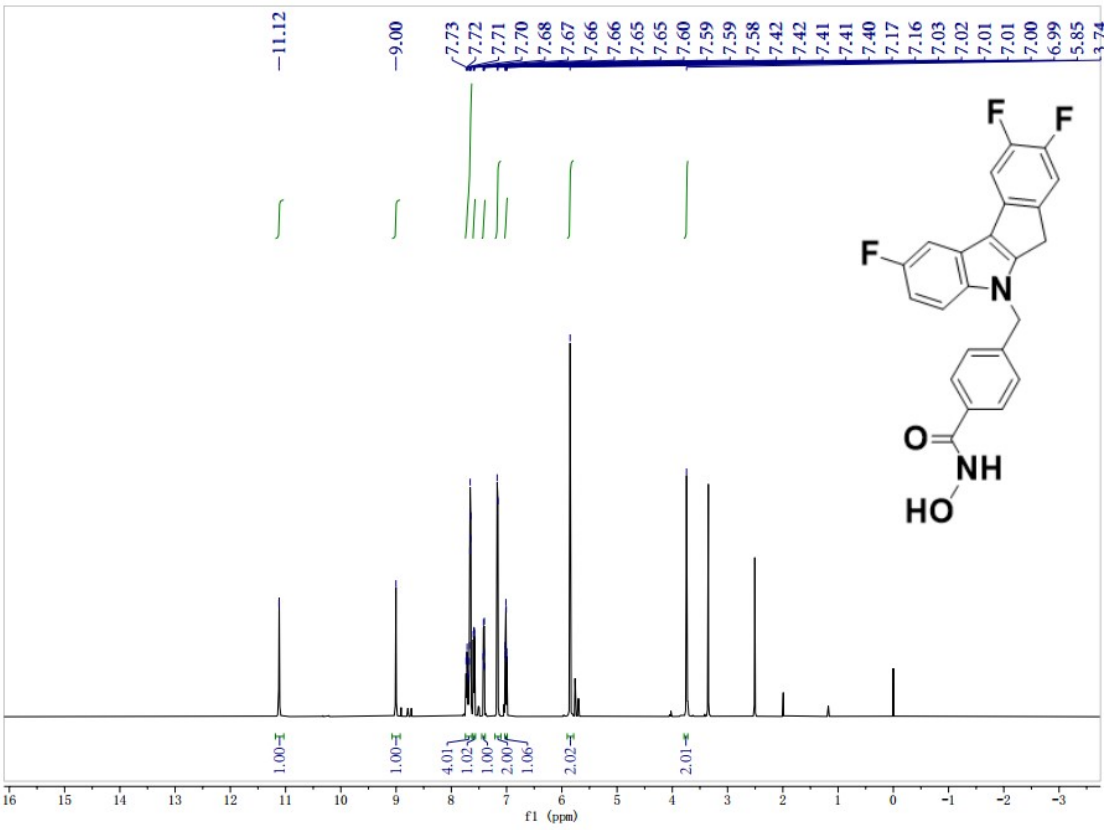


^{19}F NMR spectrum of compound **13g** (564 MHz, DMSO-d_6)

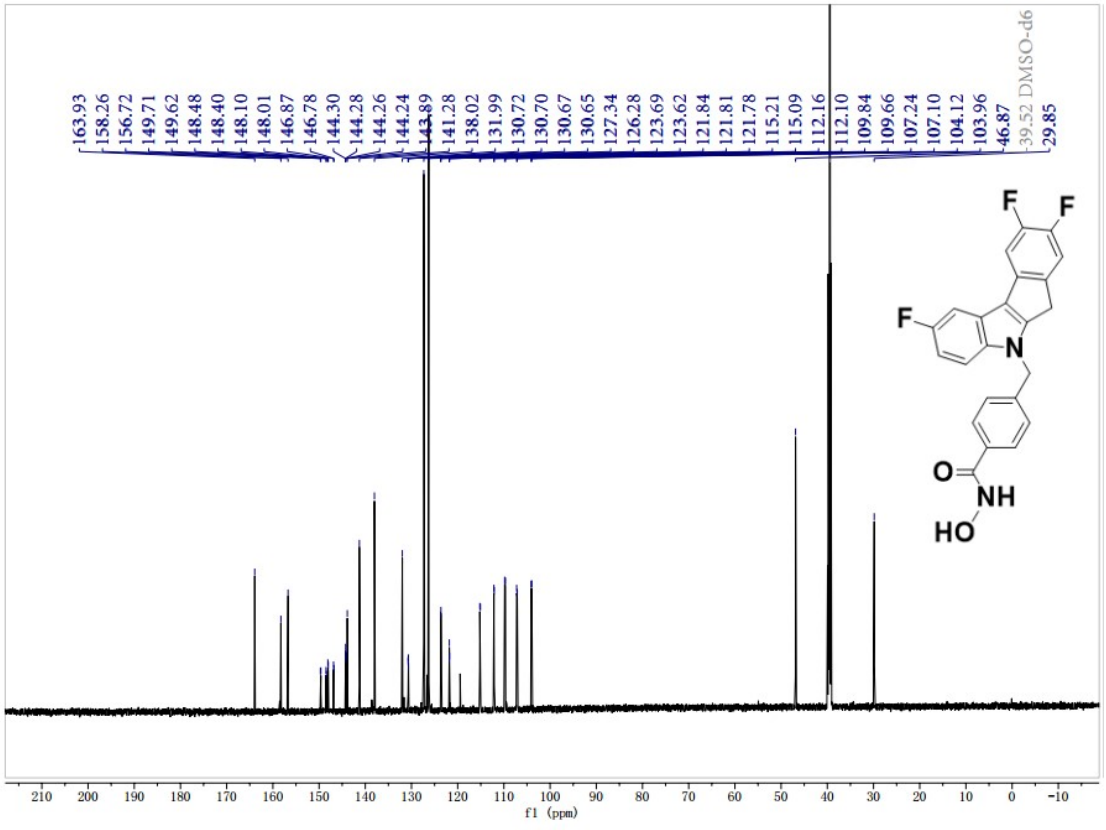


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H16F2N2O2	391.1253	16.0	-3.7	1			NA/NA

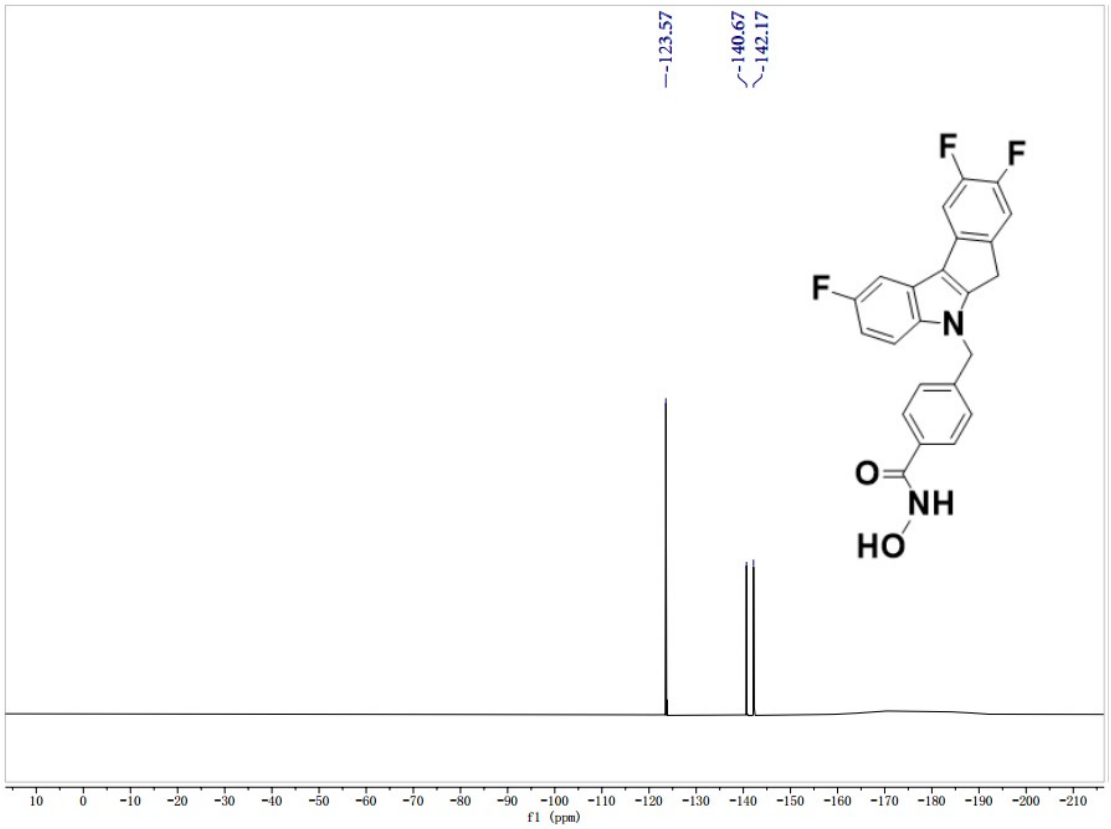
HRMS of compound **13g**



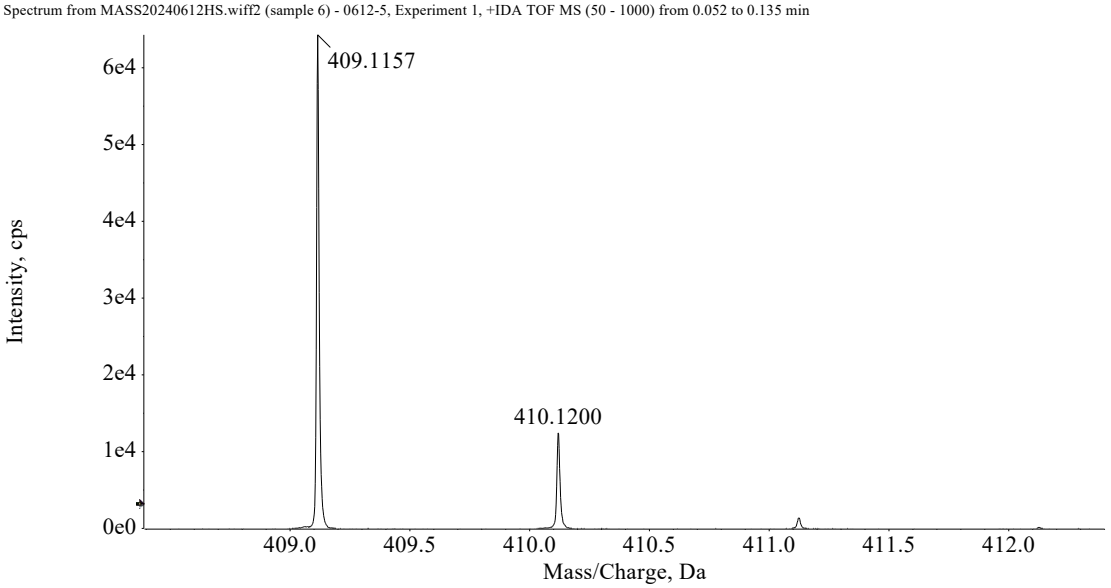
^{1}H NMR spectrum of compound **13h** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **13h** (151 MHz, DMSO-d_6)

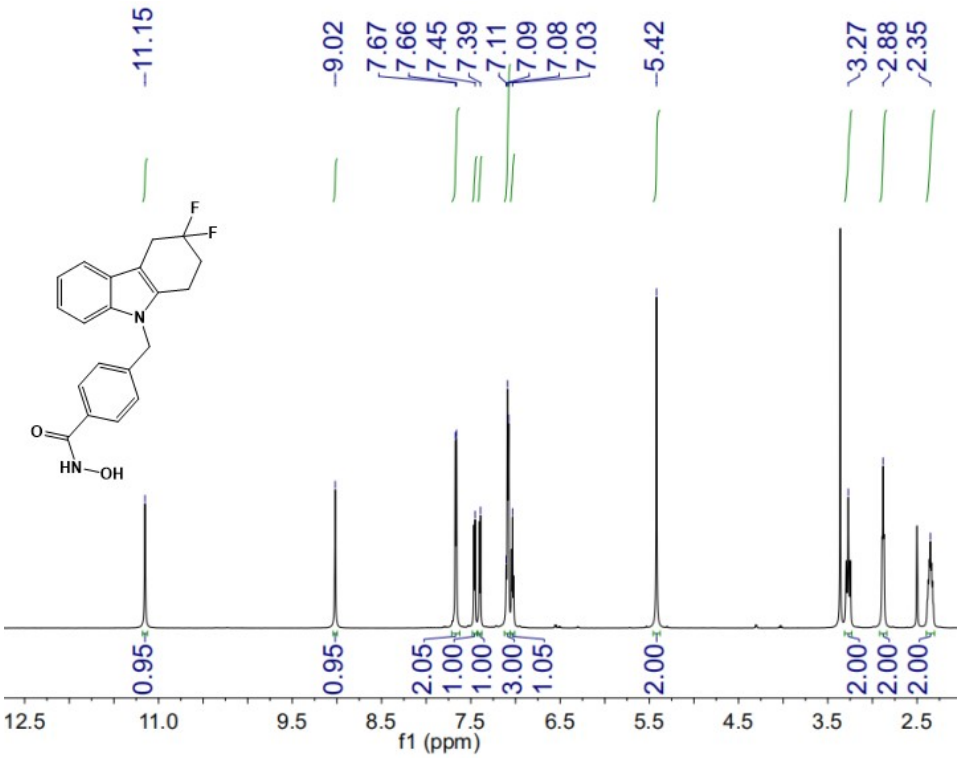


^{19}F NMR spectrum of compound **13h** (564 MHz, DMSO-d_6)

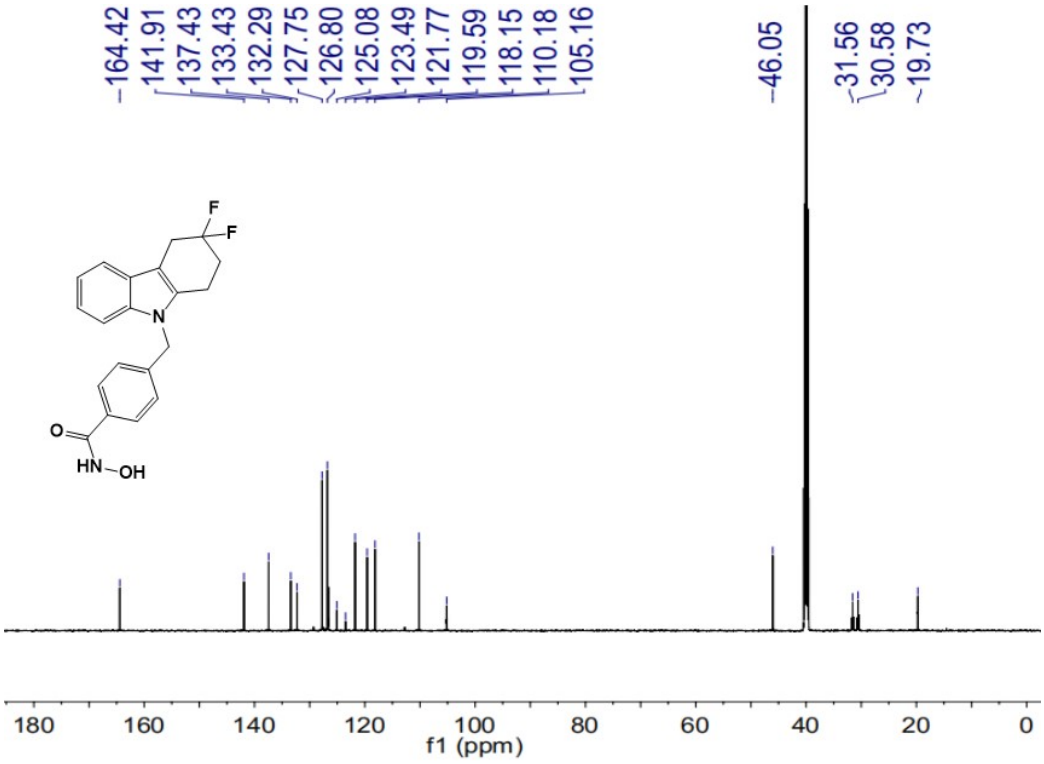


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	C23H15F3N2O2	409.1158	16.0	-0.3	1			NA/NA

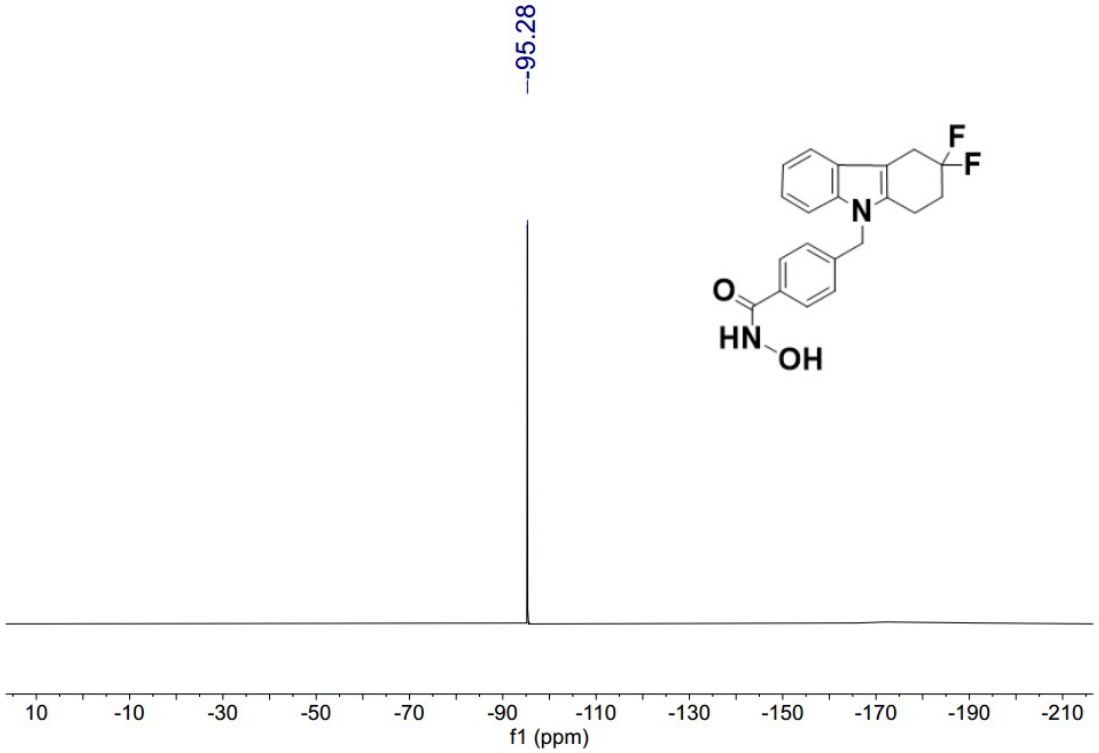
HRMS of compound **13h**



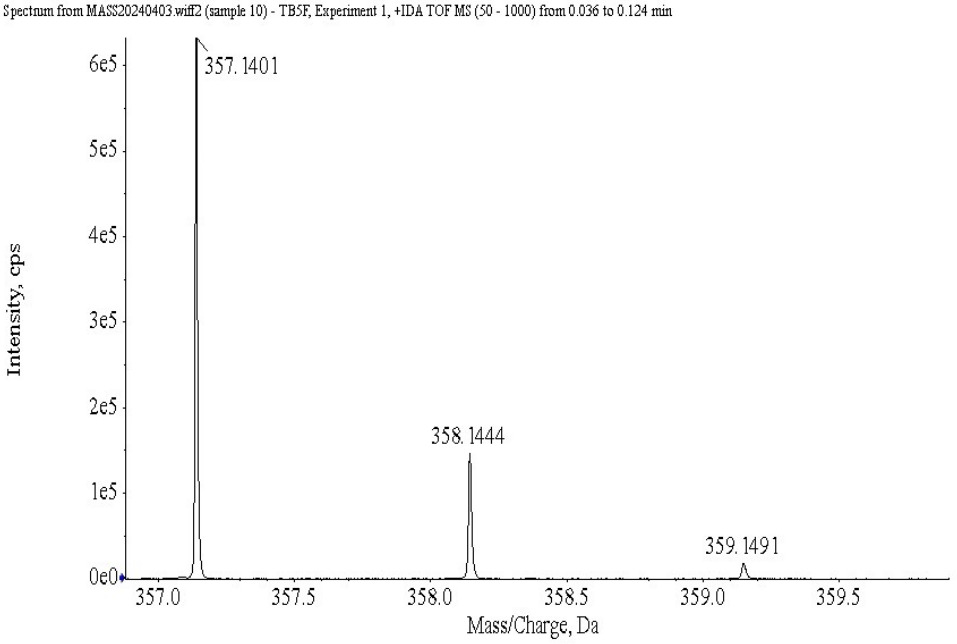
^{1}H NMR spectrum of compound **14a** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **14a** (151 MHz, DMSO-d_6)

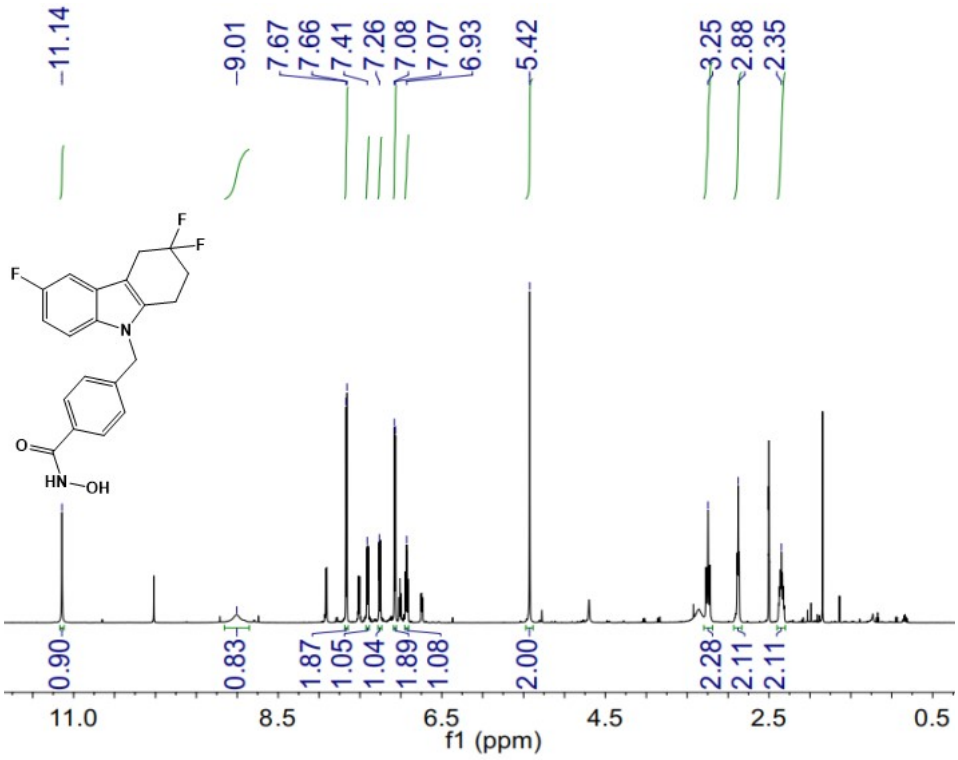


^{19}F NMR spectrum of compound **14a** (564 MHz, DMSO-d_6)

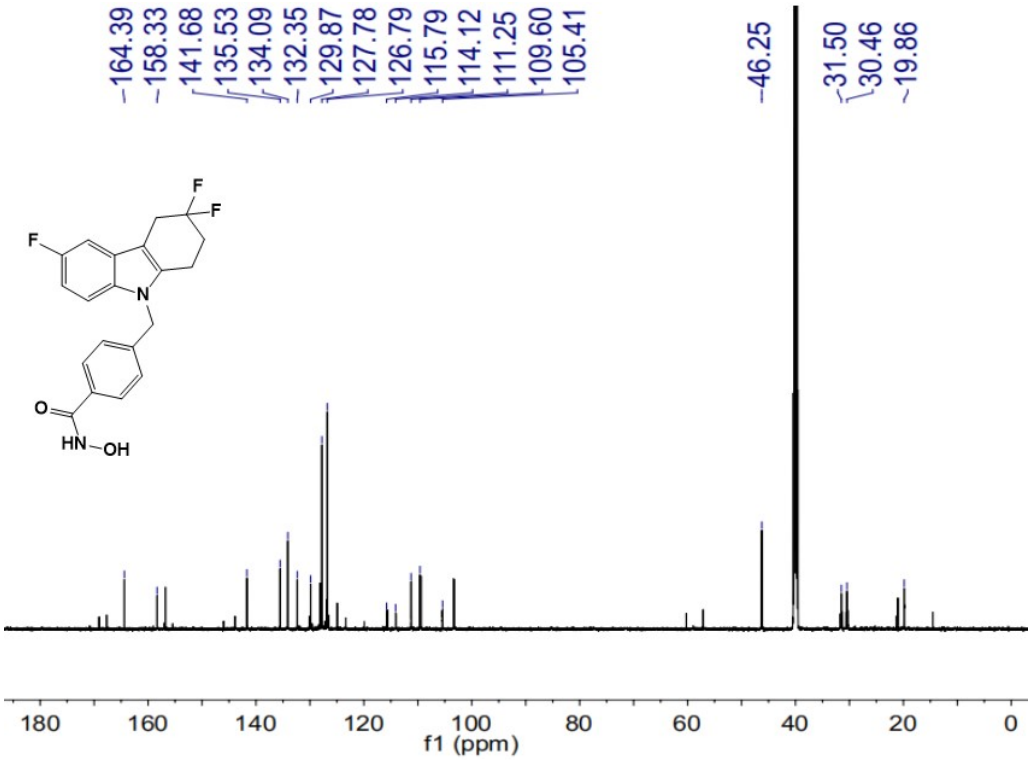


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{18}F_2N_2O_2$	357.1409	12.0	-2.3	1			NA/NA

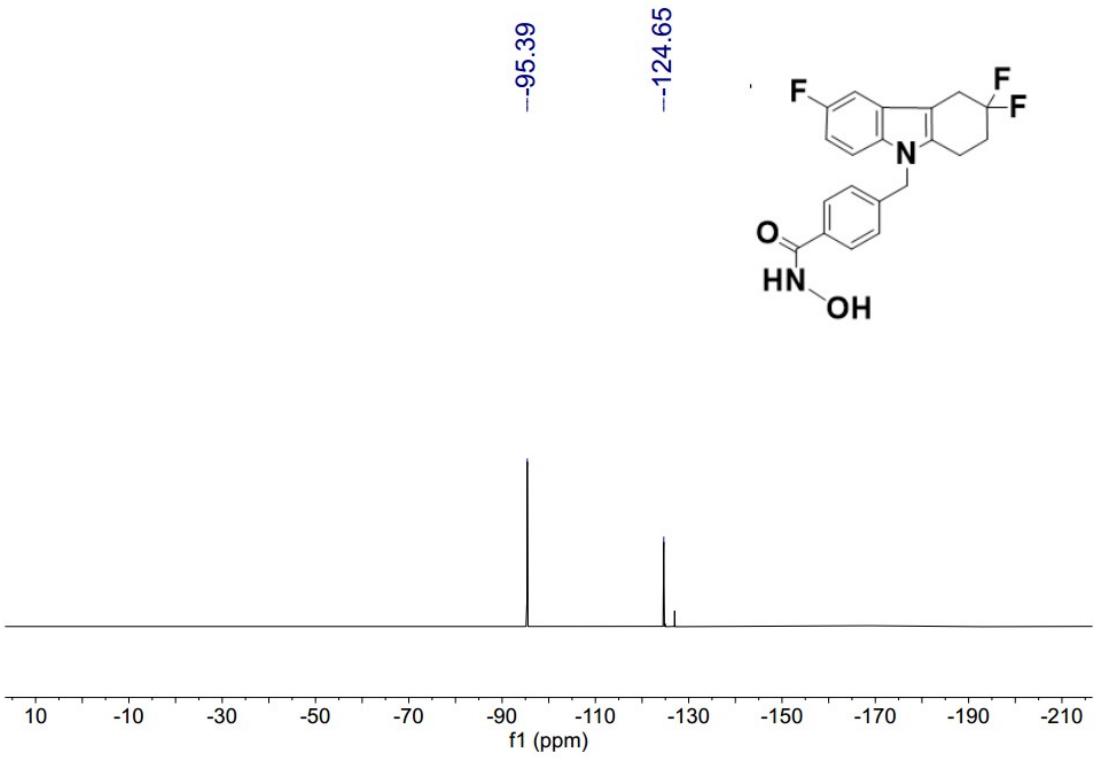
HRMS of compound **14a**



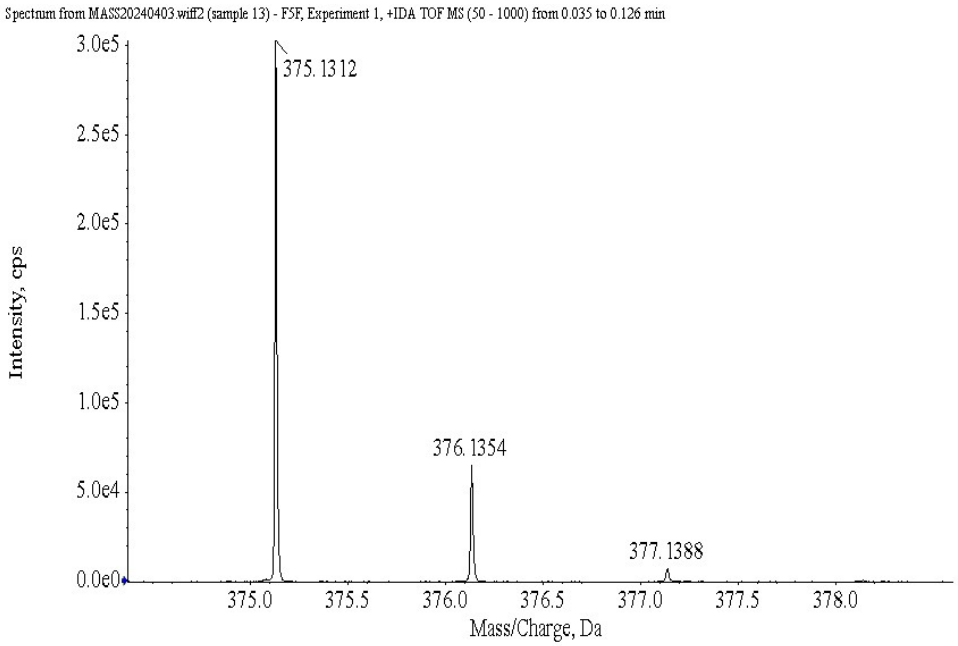
^{1}H NMR spectrum of compound **14b** (600 MHz, DMSO-d_6)



^{13}C NMR spectrum of compound **14b** (151 MHz, DMSO-d_6)

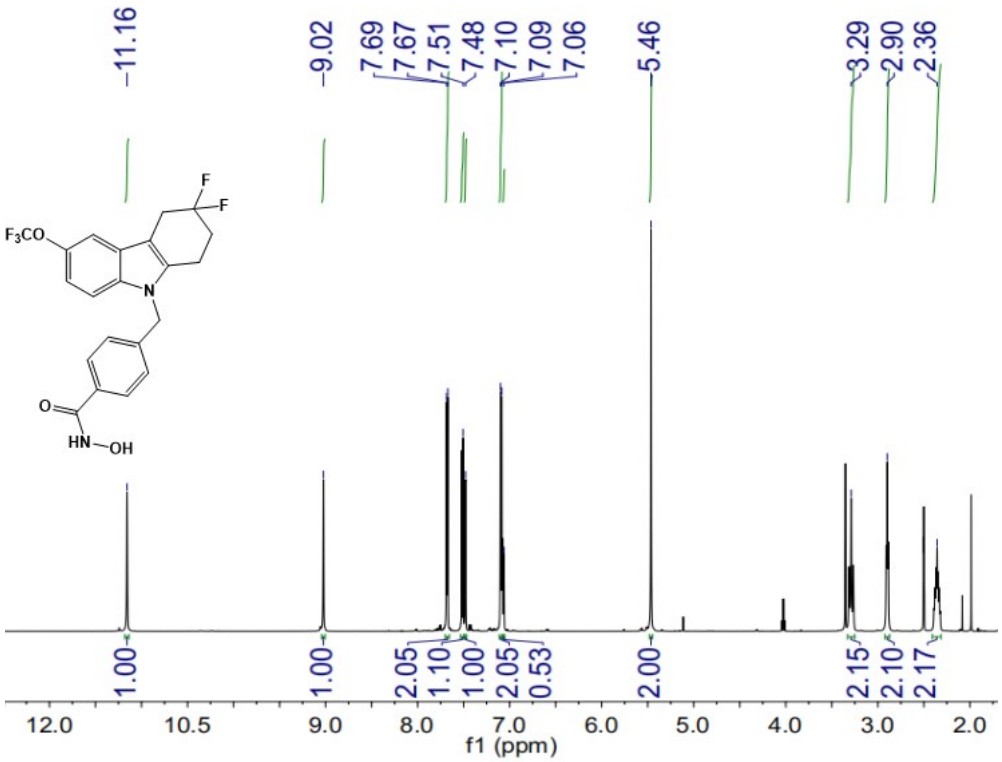


^{19}F NMR spectrum of compound **14b** (564 MHz, DMSO-d_6)

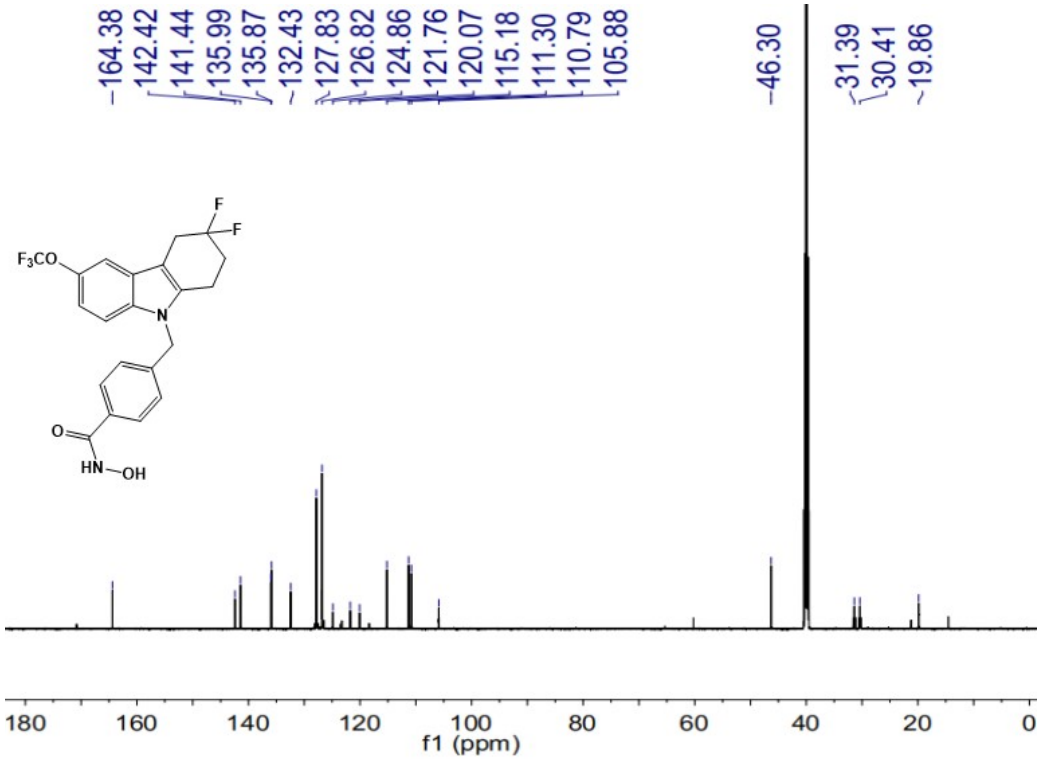


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{17}F_3N_2O_2$	375.1315	12.0	-0.8	1			NA/NA

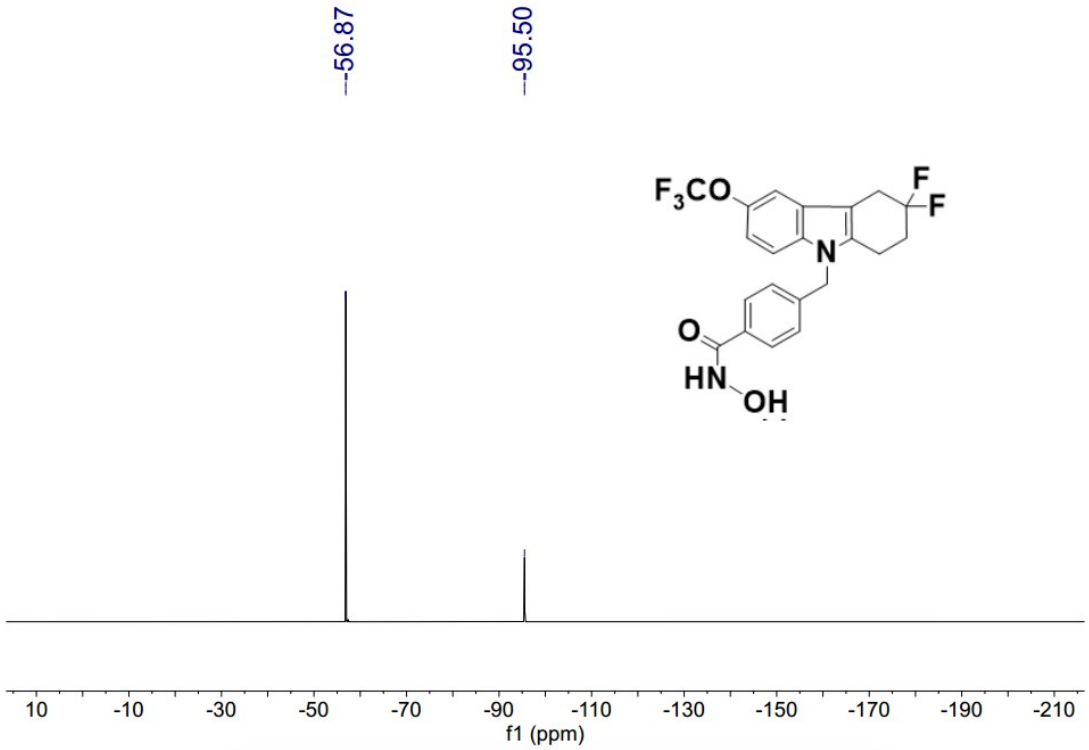
HRMS of compound **14b**



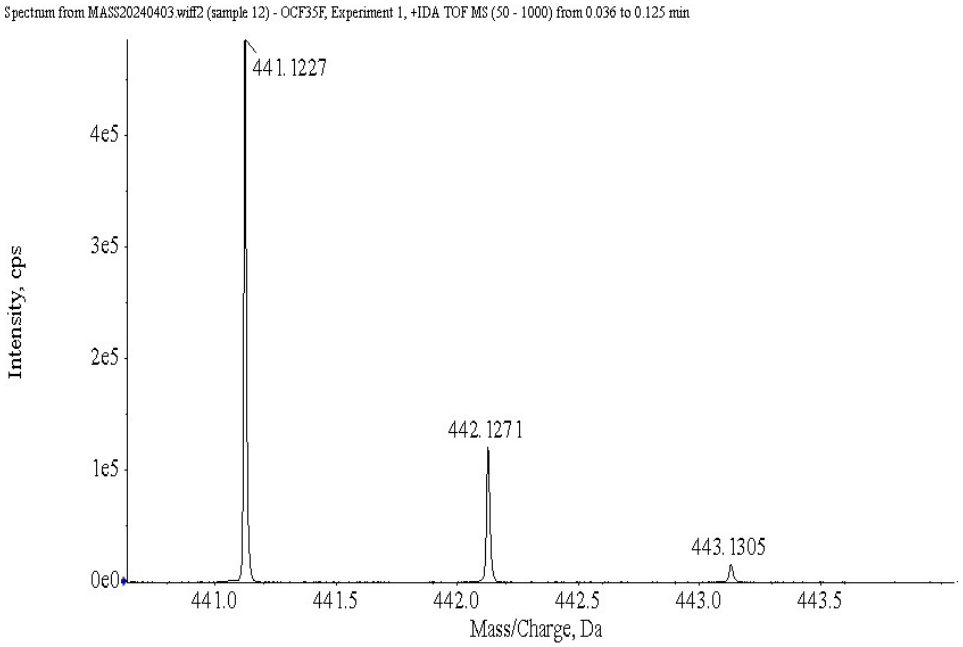
[1]H NMR spectrum of compound **14c** (600 MHz, DMSO-d_6)



[13]C NMR spectrum of compound **14c** (151 MHz, DMSO-d_6)

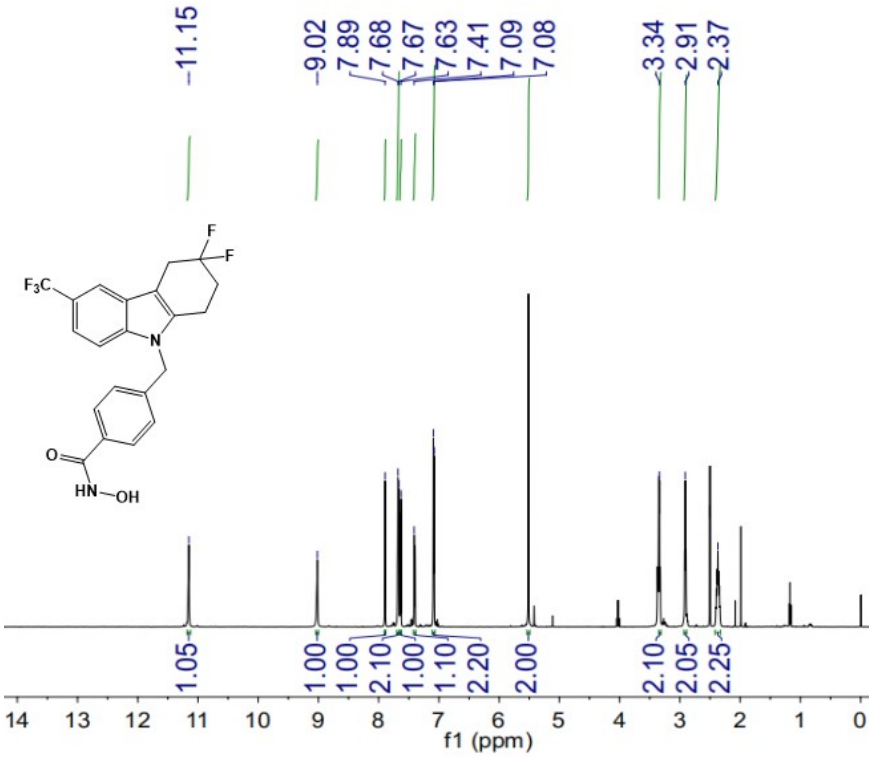


^{19}F NMR spectrum of compound **14c** (564 MHz, DMSO-d_6)

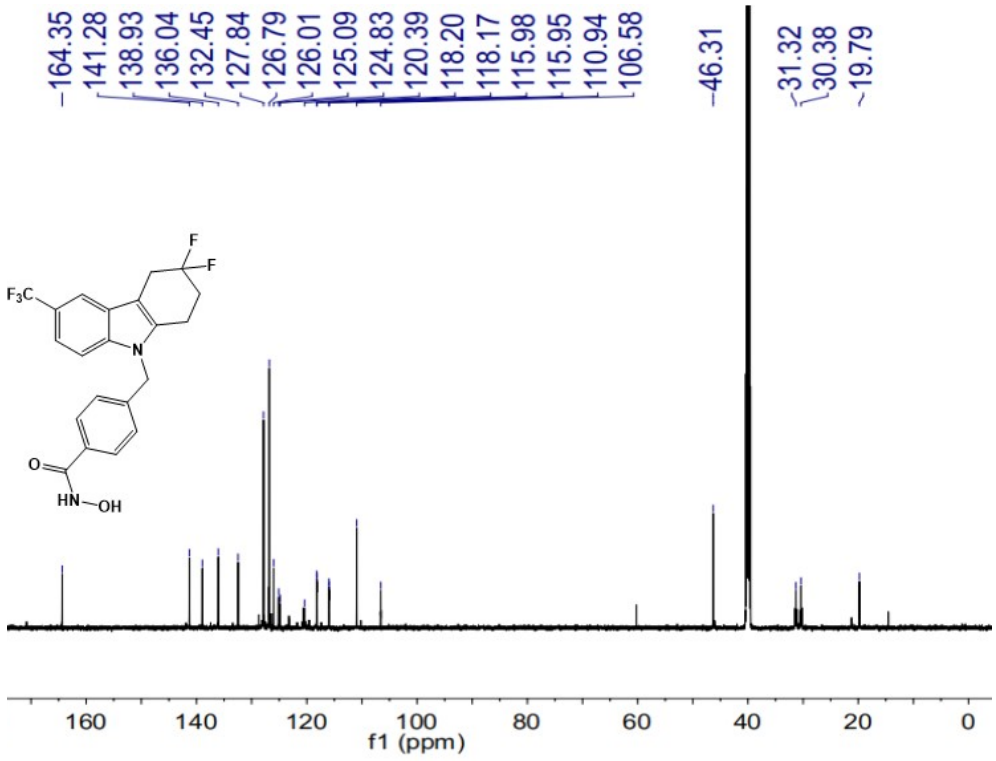


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{21}H_{17}F_5N_2O_3$	441.1232	12.0	-1.2	1			NA/NA

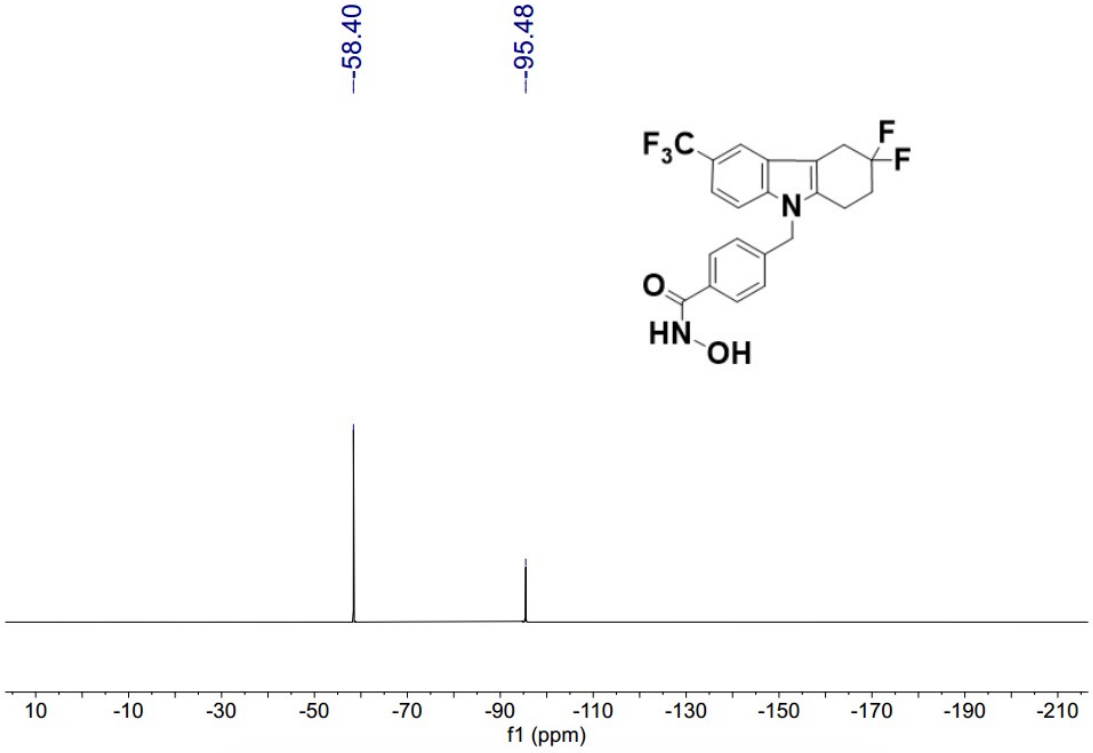
HRMS of compound **14c**



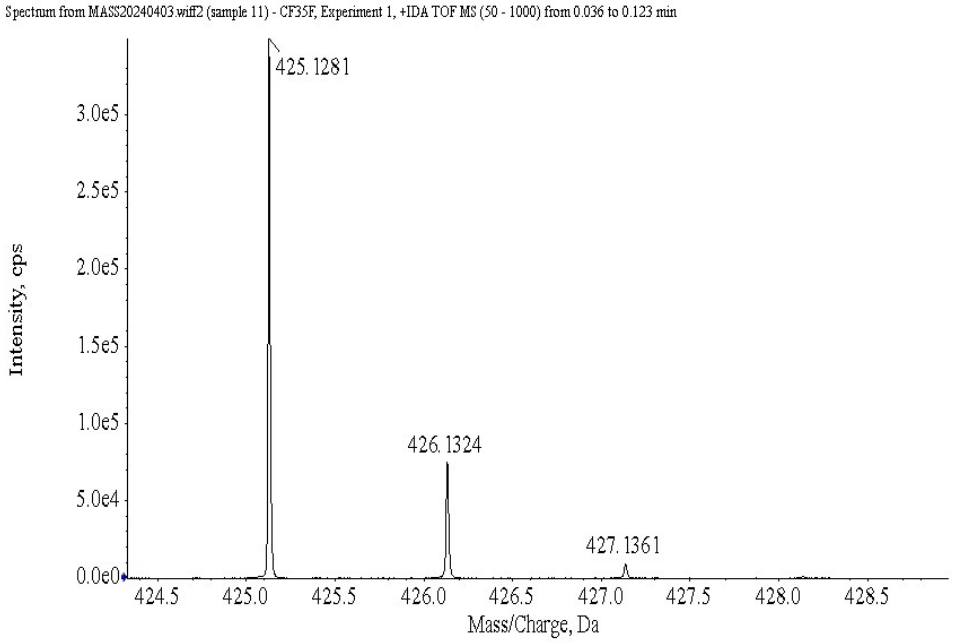
[1]H NMR spectrum of compound **14d** (600 MHz, DMSO-d_6)



[13]C NMR spectrum of compound **14d** (151 MHz, DMSO-d_6)

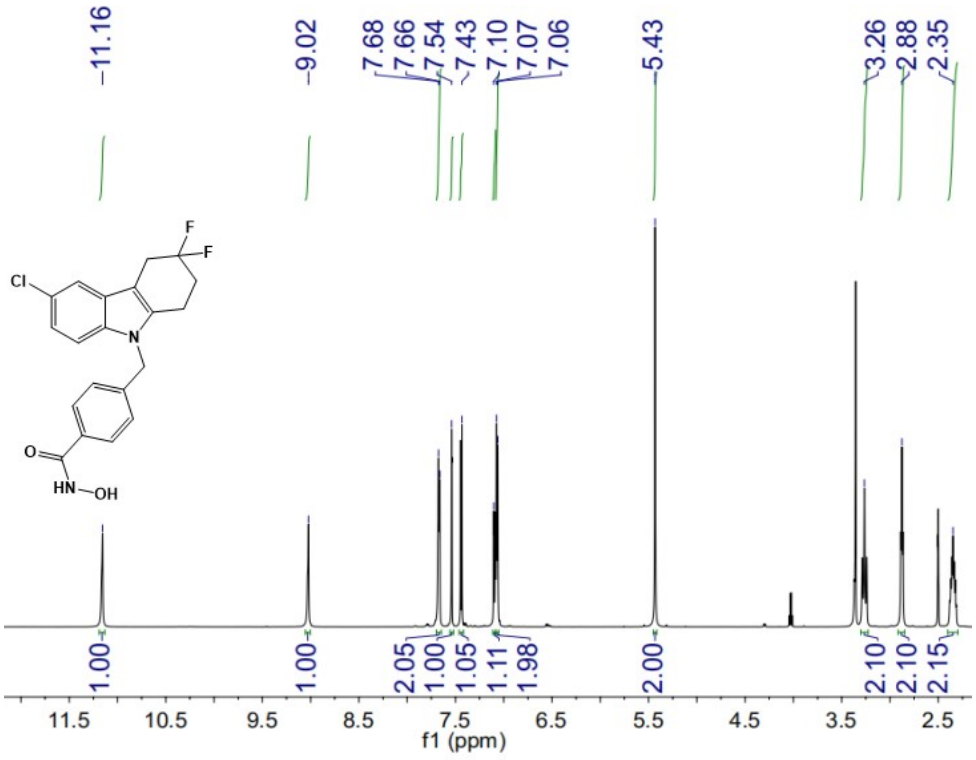


^{19}F NMR spectrum of compound **14d** (564 MHz, DMSO-d_6)

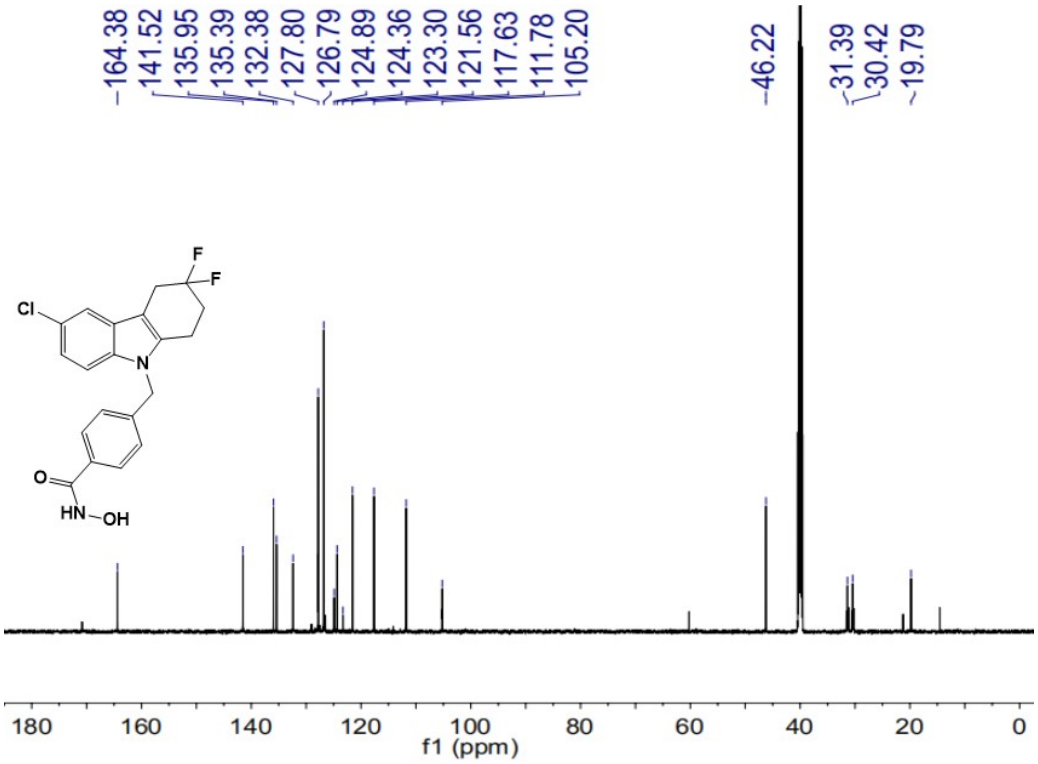


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{21}H_{17}F_5N_2O_2$	425.1283	12.0	-0.5	1			NA/NA

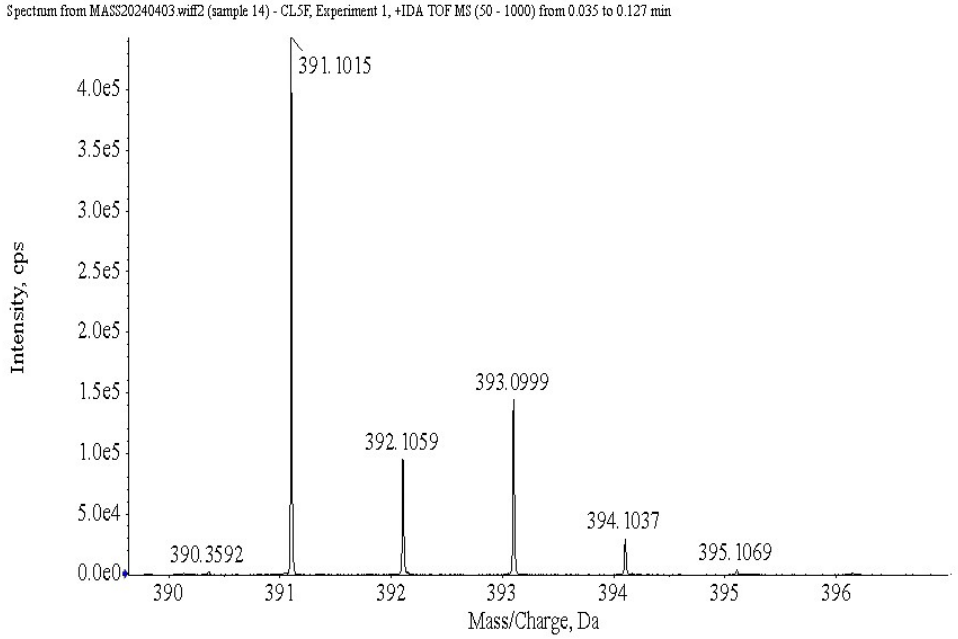
HRMS of compound **14d**



[1]H NMR spectrum of compound **14e** (600 MHz, DMSO-d_6)

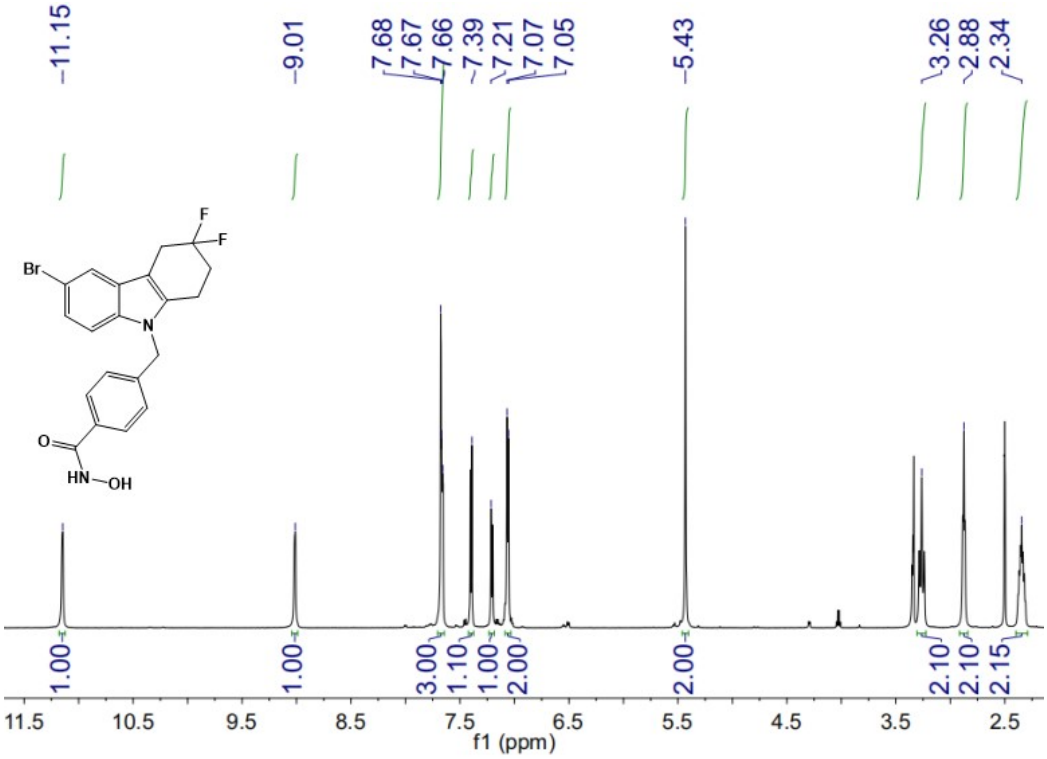


[13]C NMR spectrum of compound **14e** (151 MHz, DMSO-d_6)

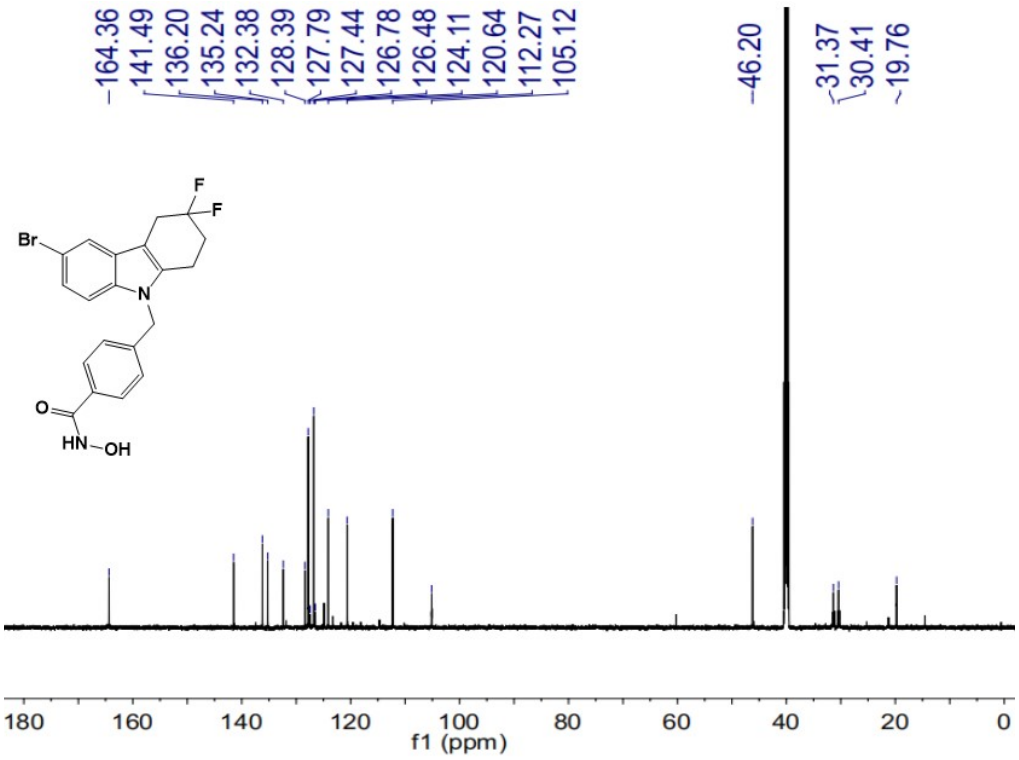


Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{17}ClF_2N_2O_2$	391.1019	12.0	-1.1	1			NA/NA

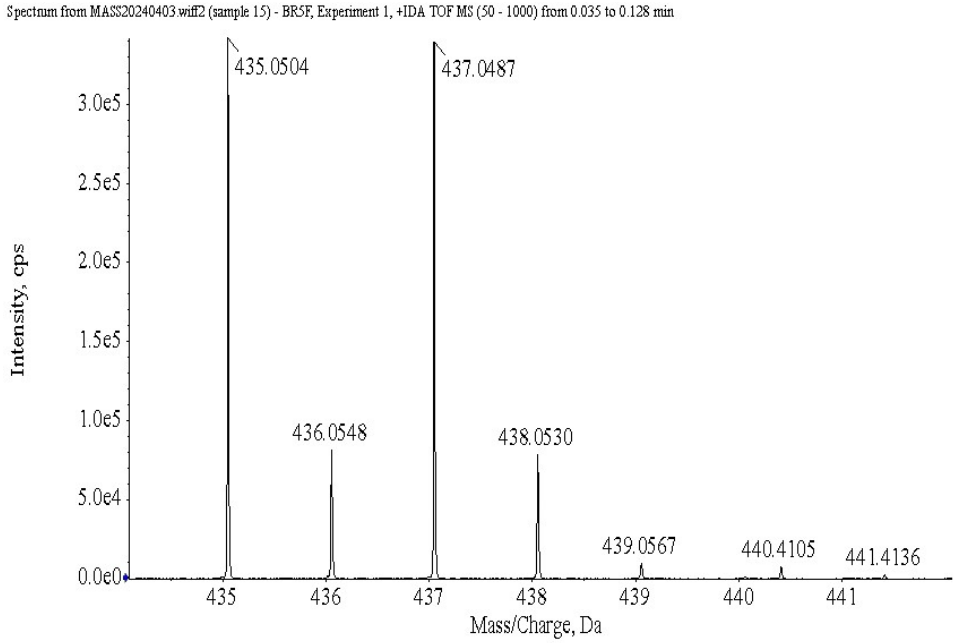
HRMS of compound **14e**



^{1}H NMR spectrum of compound **14f** (600 MHz, DMSO-d_6)



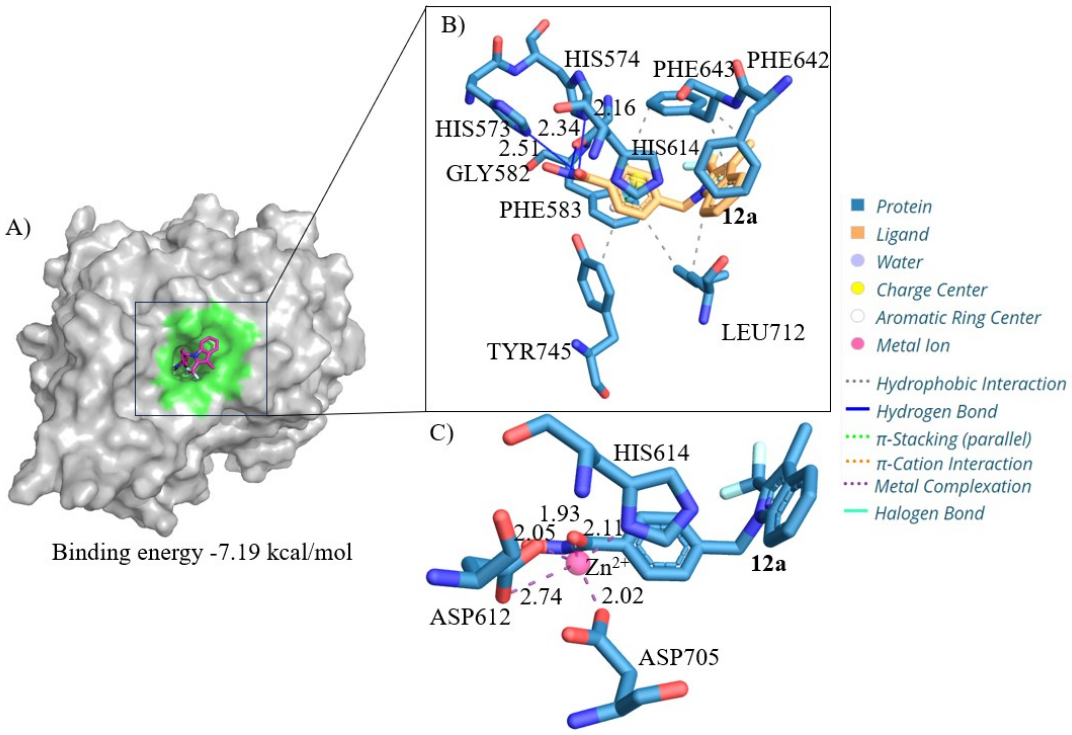
^{13}C NMR spectrum of compound **14f** (151 MHz, DMSO-d_6)



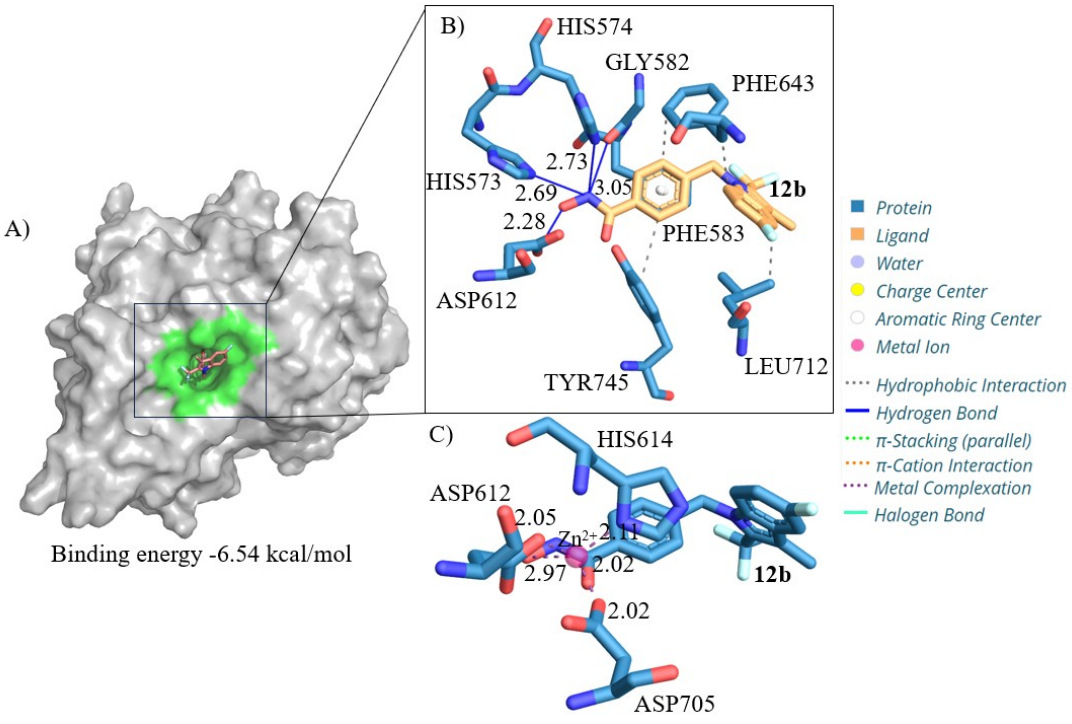
Hit	Formula	m/z	RDB	ppm	MS Rank	MSMS ppm	MSMS Rank	Found
1	$C_{20}H_{17}BrF_2N_2O_2$	435.0514	12.0	-2.4	1			NA/NA

HRMS of compound **14f**

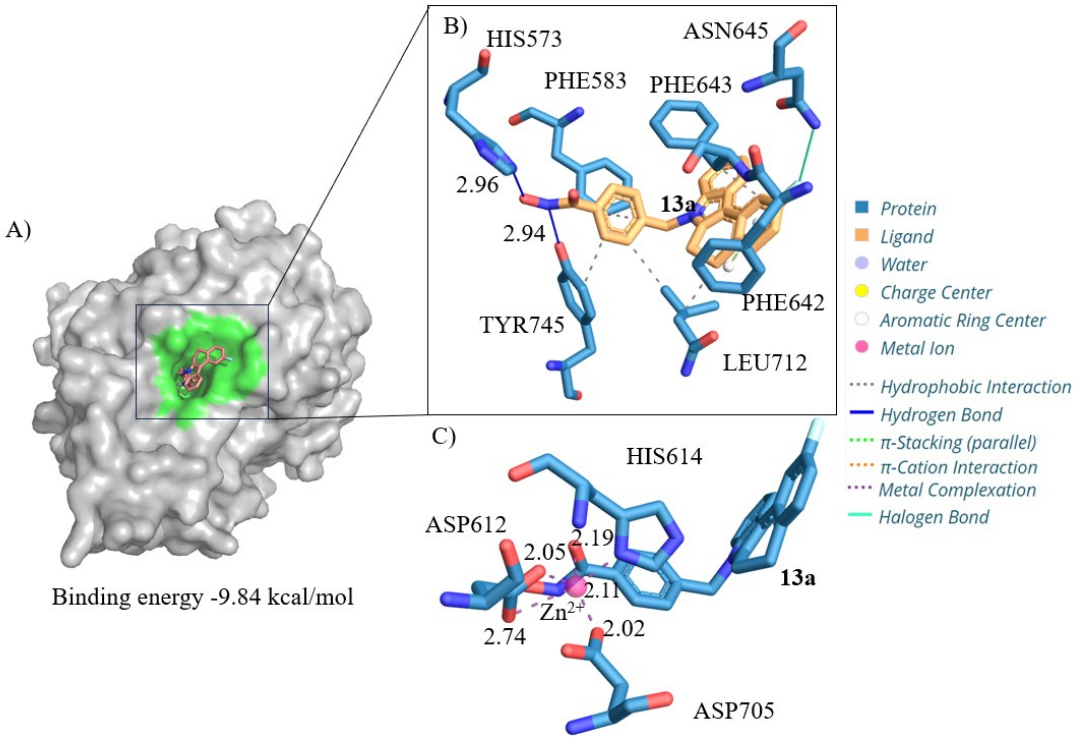
Molecular Docking Spectrum



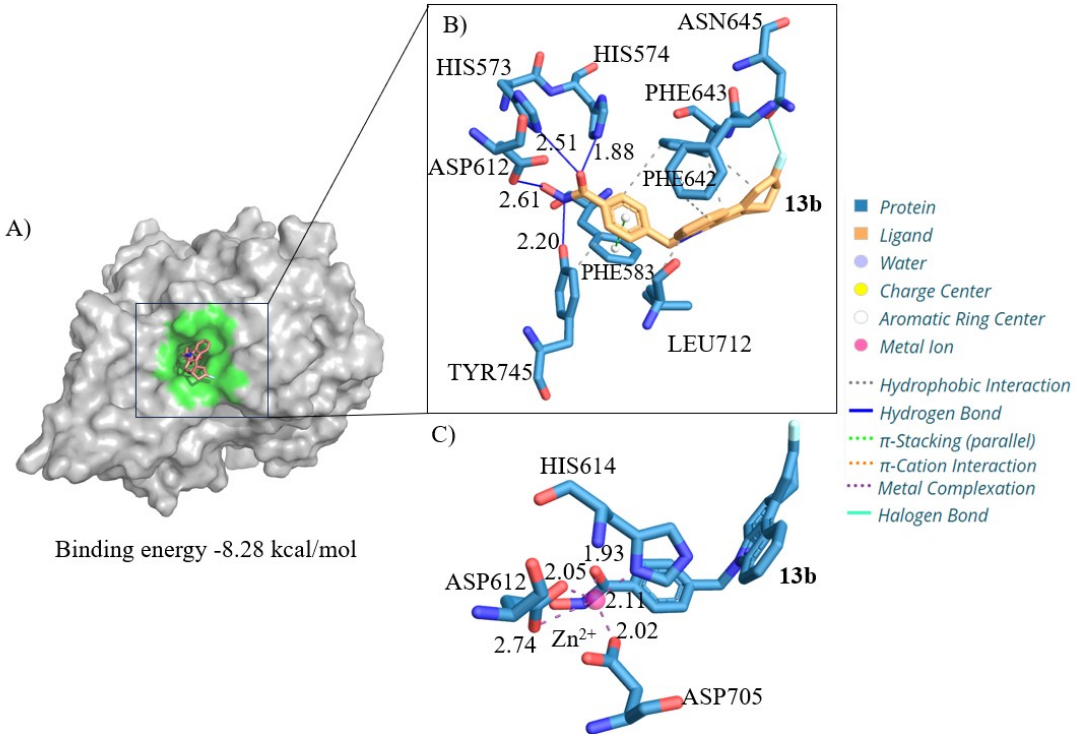
Molecular docking spectrum of compound **12a** with the HDAC6 protein



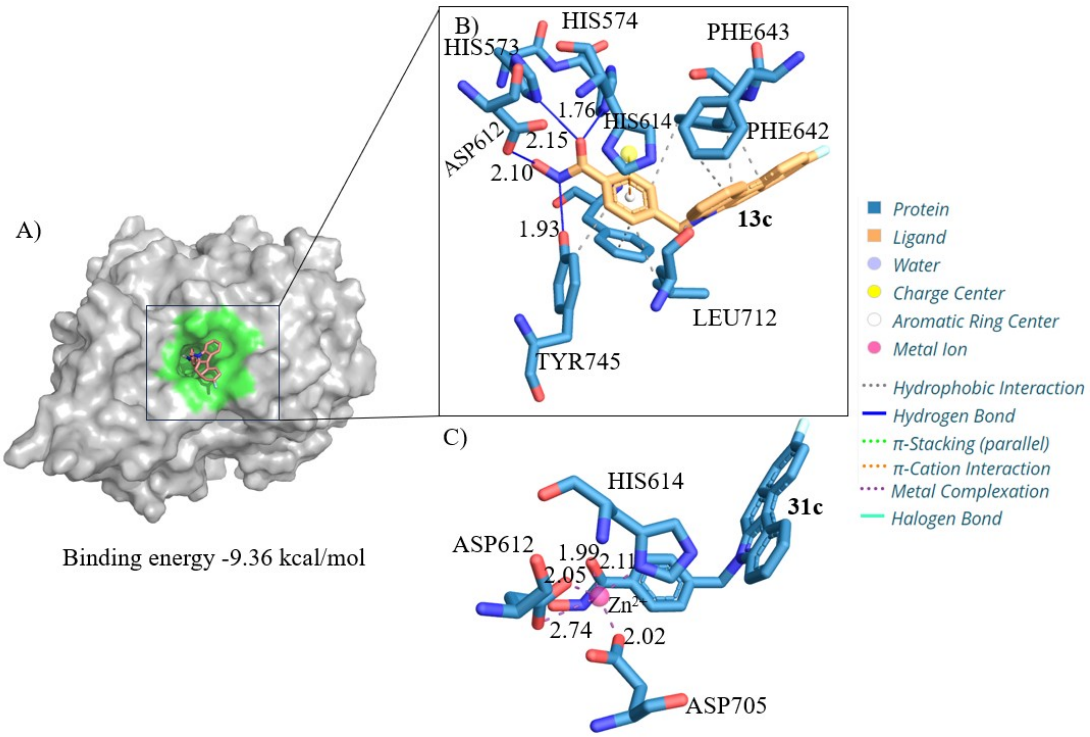
Molecular docking spectrum of compound **12b** with the HDAC6 protein



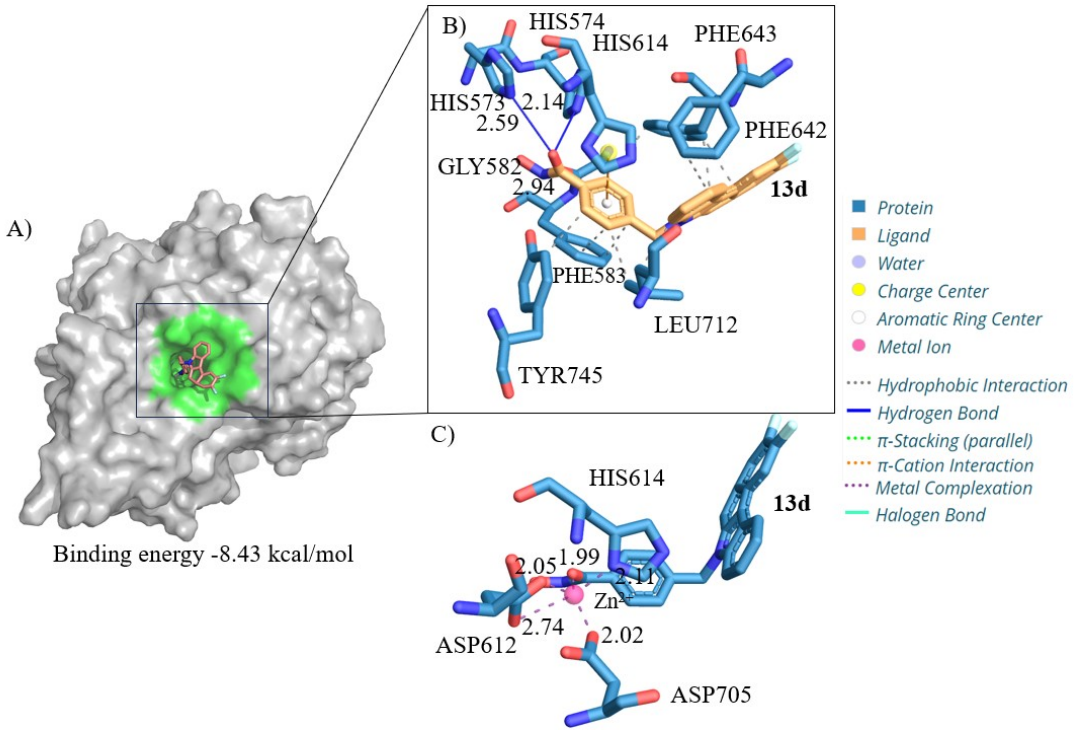
Molecular docking spectrum of compound **13a** with the HDAC6 protein



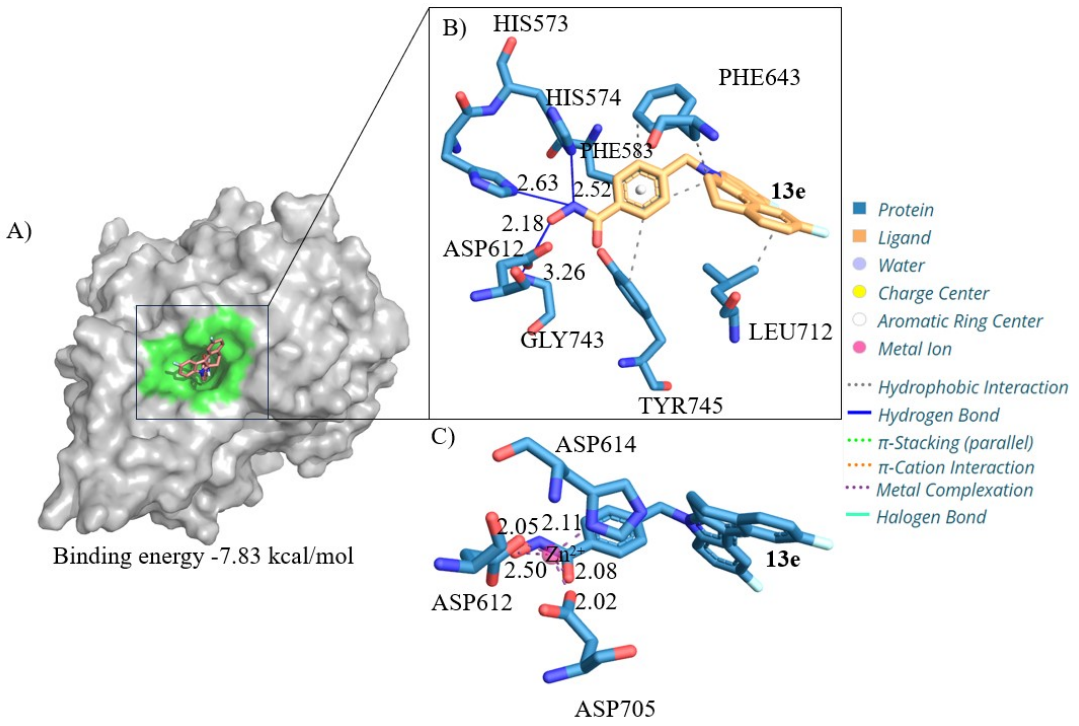
Molecular docking spectrum of compound **13b** with the HDAC6 protein



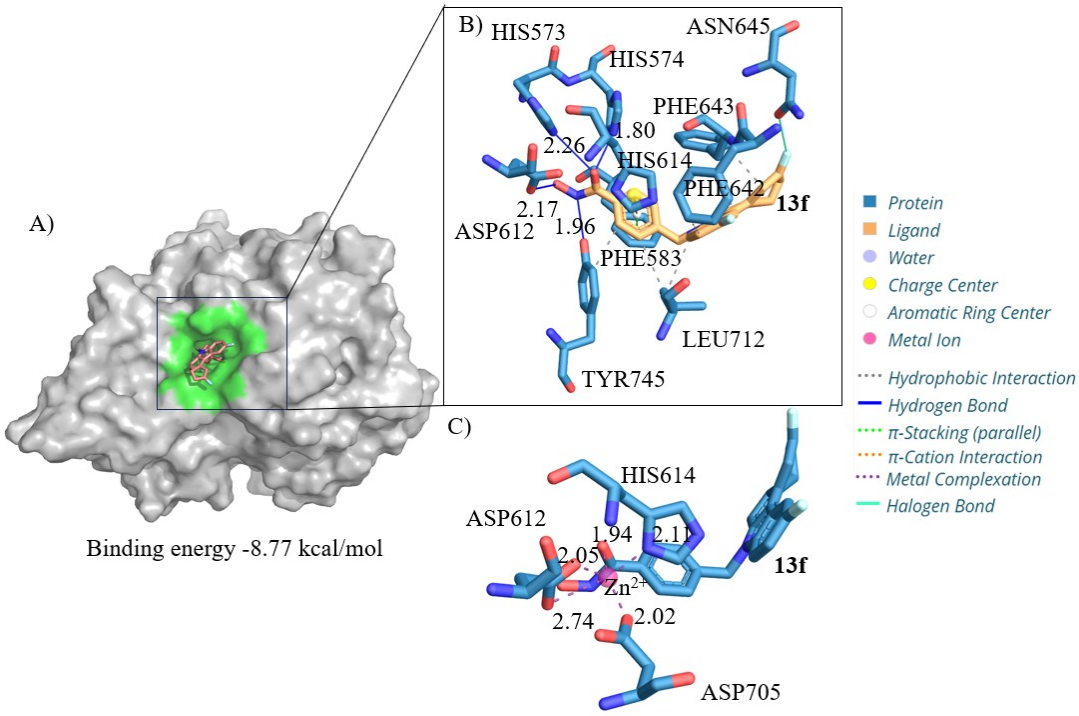
Molecular docking spectrum of compound **13c** with the HDAC6 protein



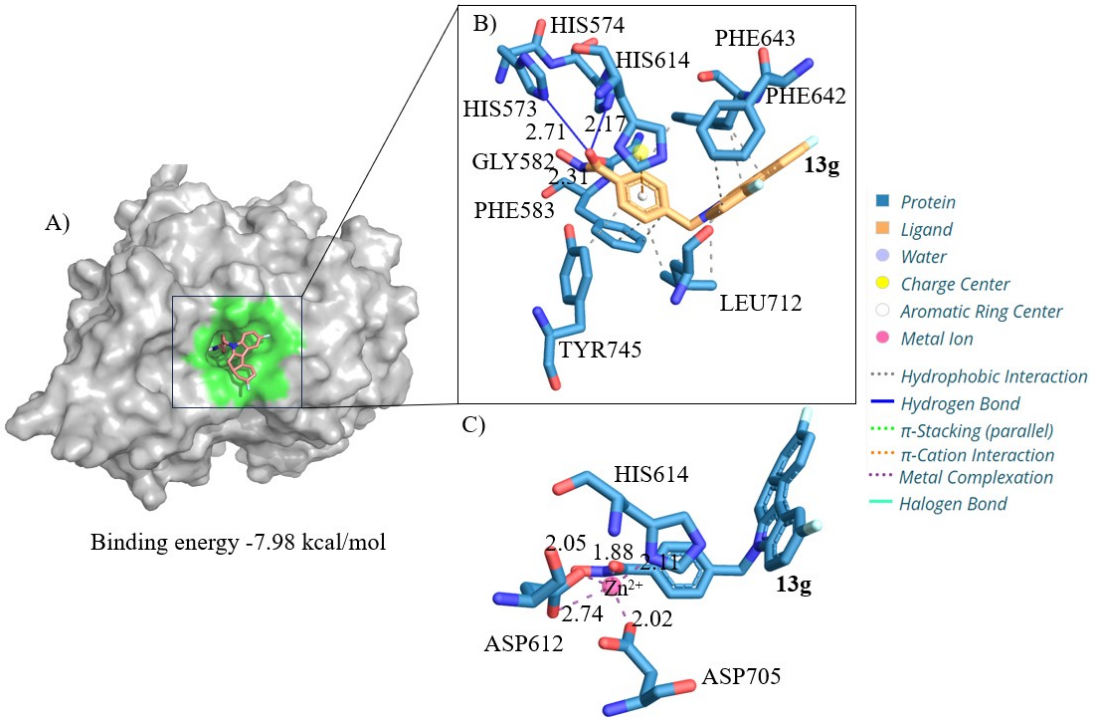
Molecular docking spectrum of compound **13d** with the HDAC6 protein



Molecular docking spectrum of compound **13e** with the HDAC6 protein

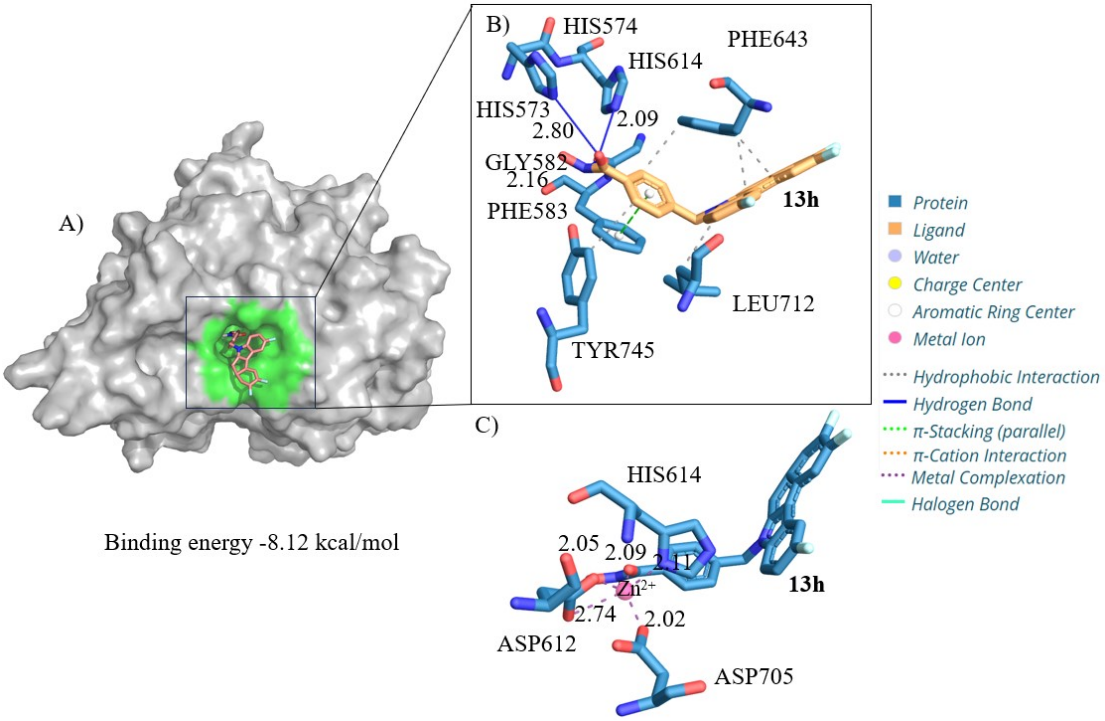


Molecular docking spectrum of compound **13f** with the HDAC6 protein



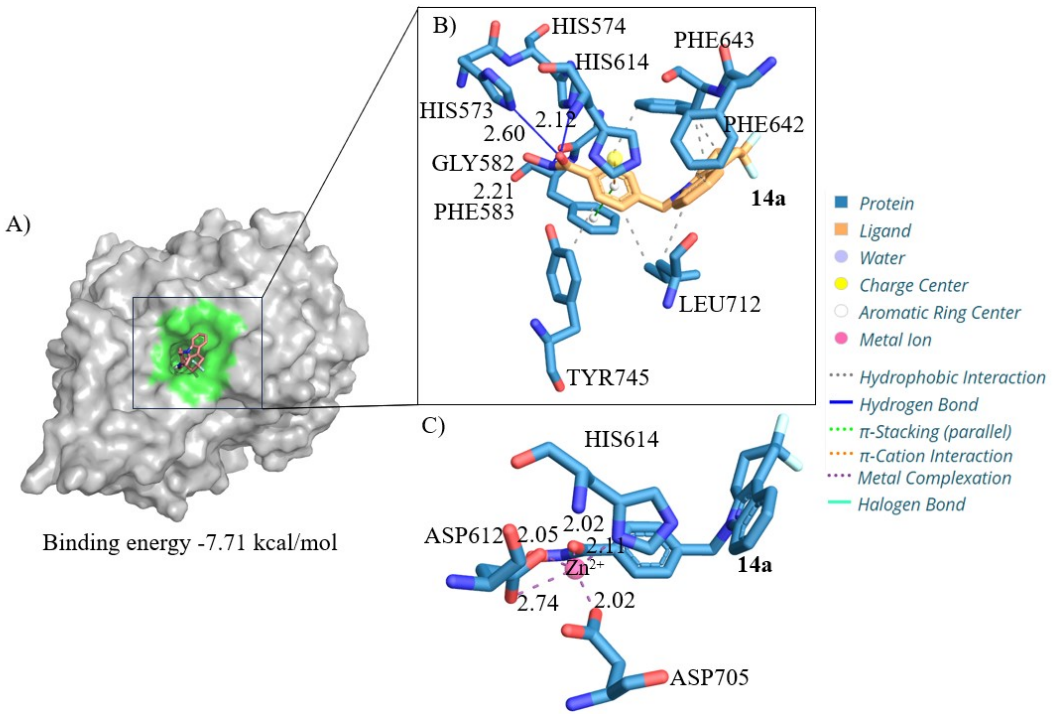
Binding energy -7.98 kcal/mol

Molecular docking spectrum of compound **13g** with the HDAC6 protein

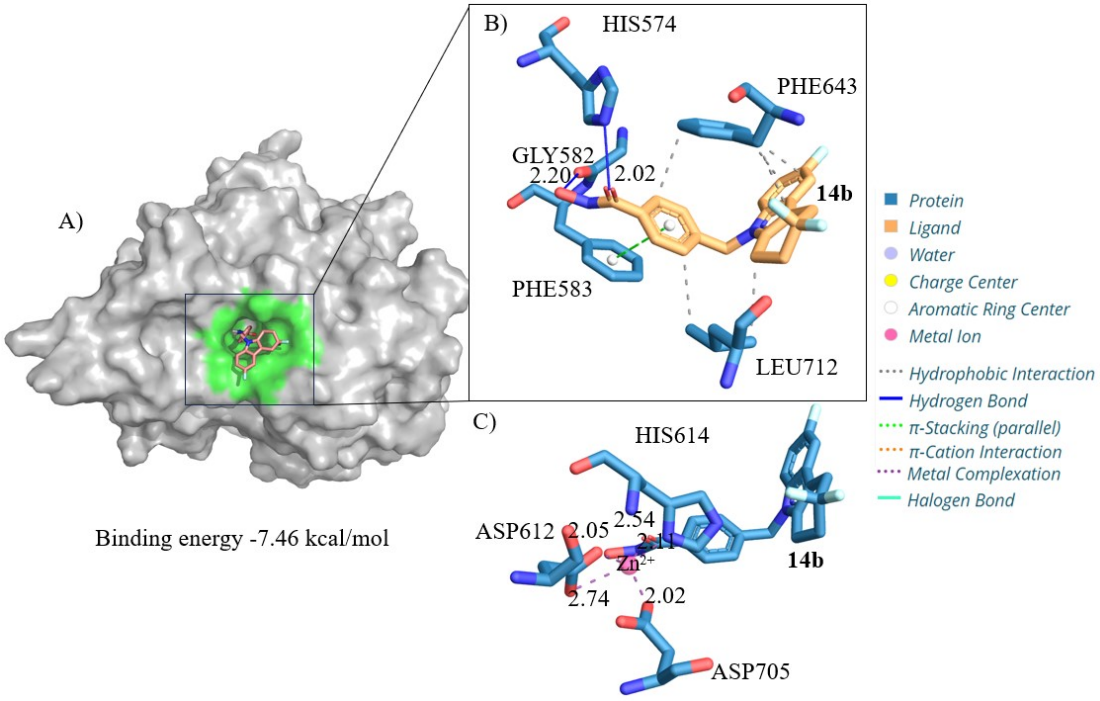


Binding energy -8.12 kcal/mol

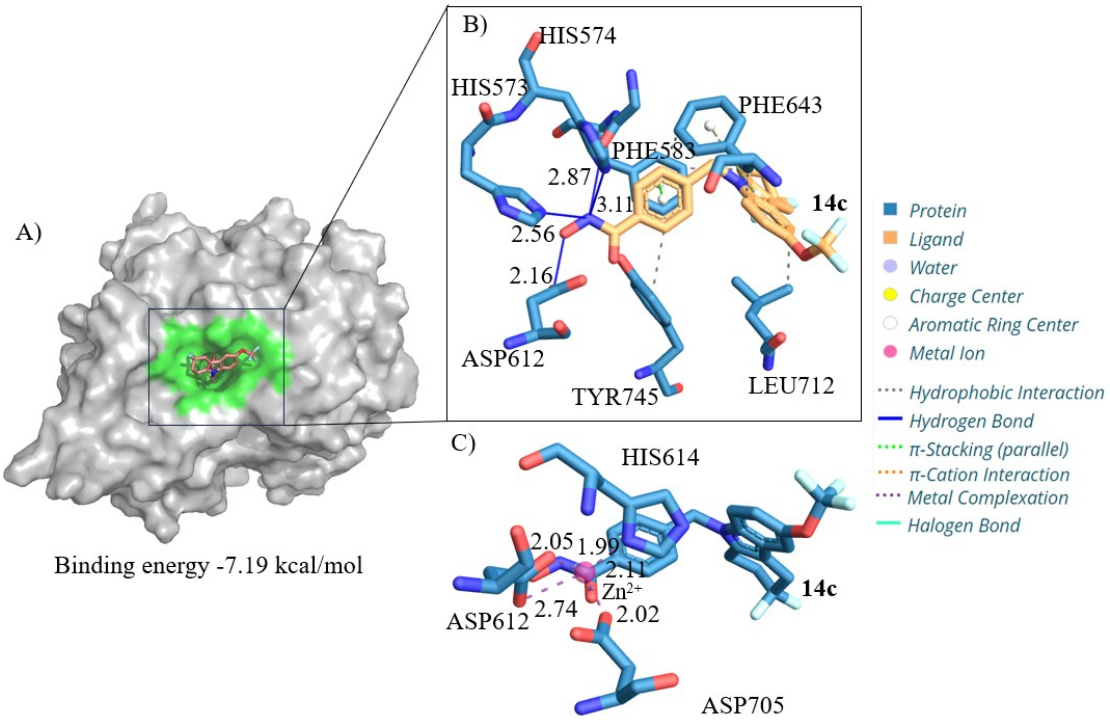
Molecular docking spectrum of compound **13h** with the HDAC6 protein



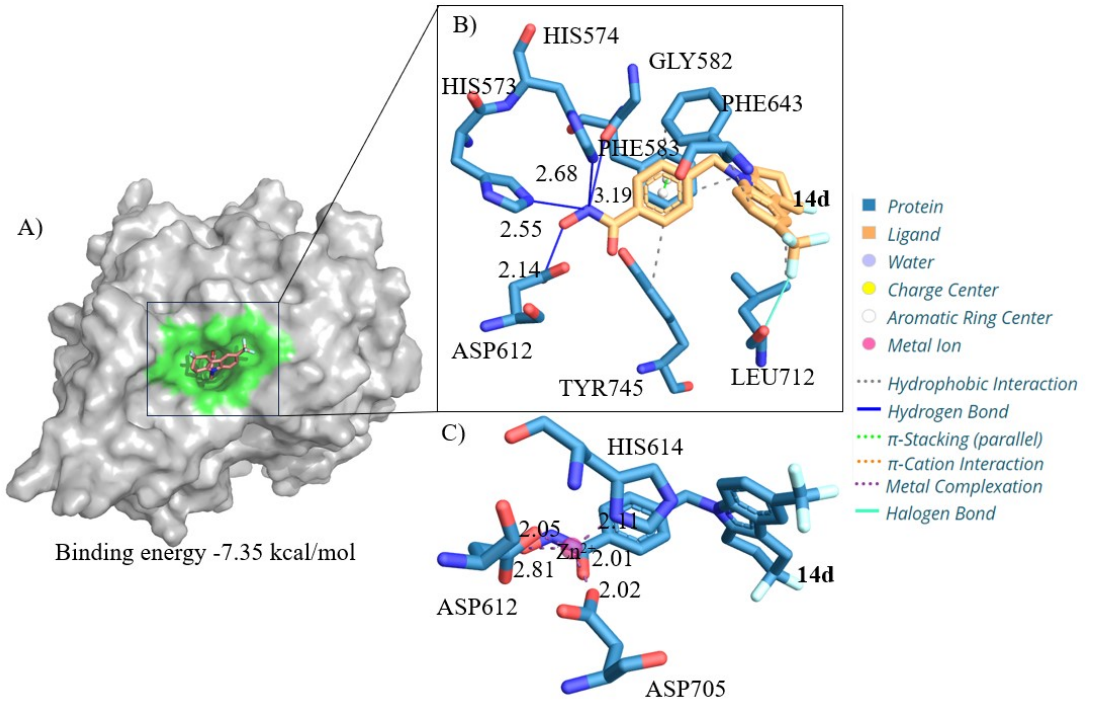
Molecular docking spectrum of compound **14a** with the HDAC6 protein



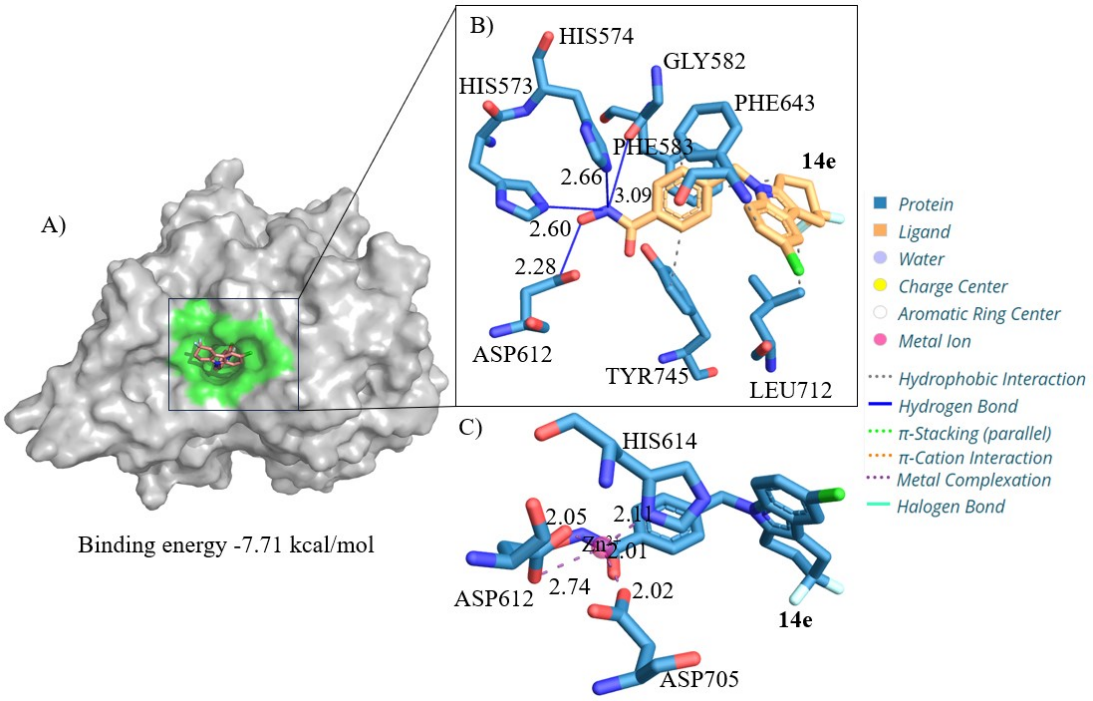
Molecular docking spectrum of compound **14b** with the HDAC6 protein



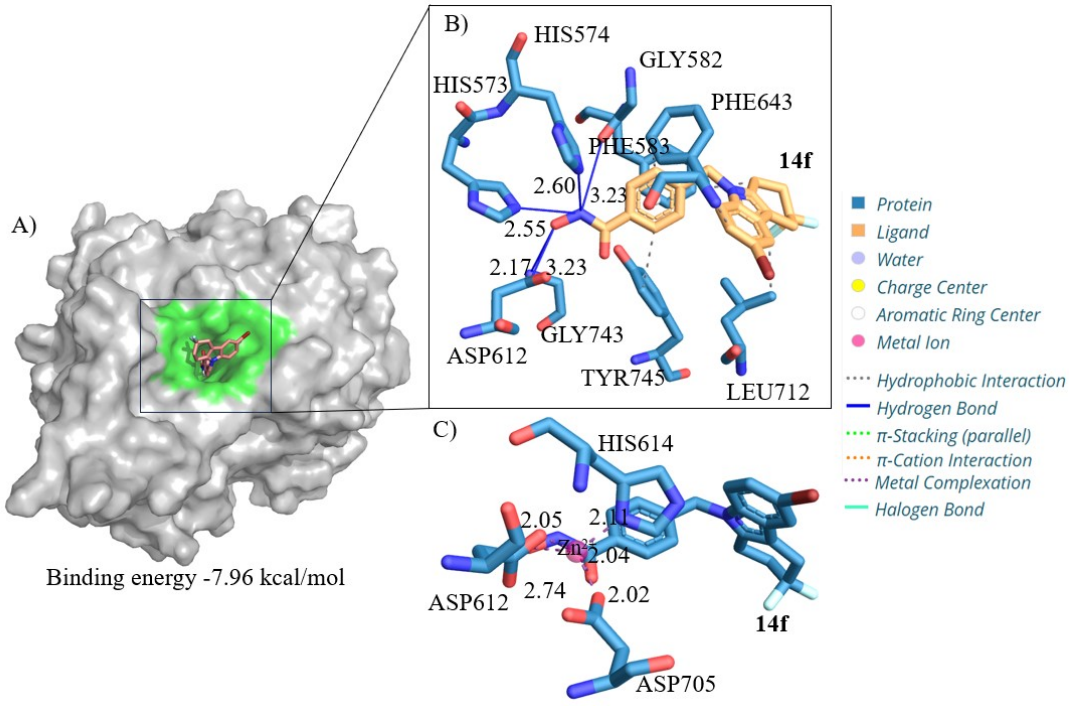
Molecular docking spectrum of compound **14c** with the HDAC6 protein



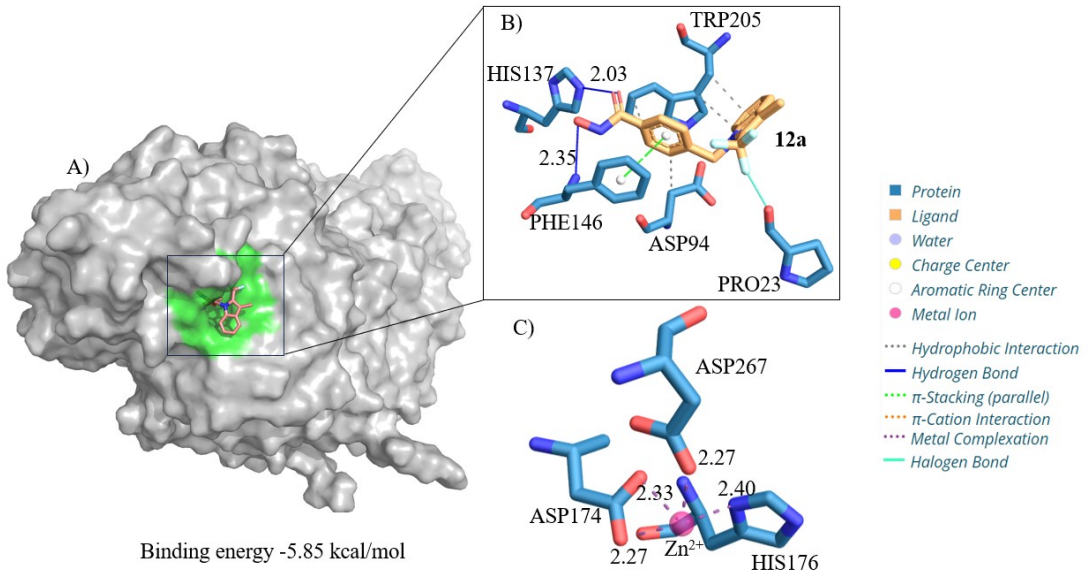
Molecular docking spectrum of compound **14d** with the HDAC6 protein



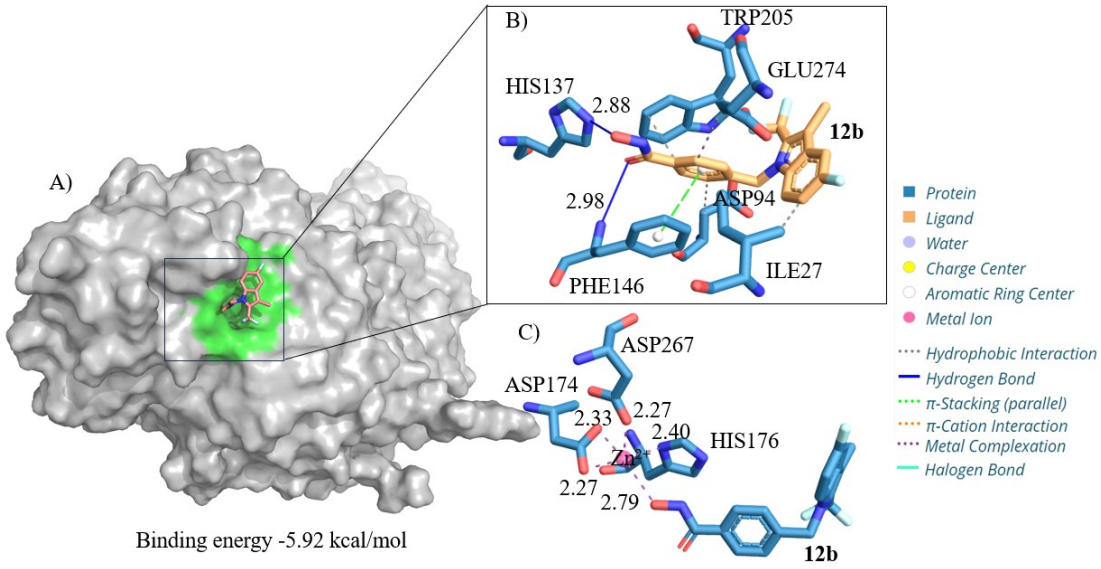
Molecular docking spectrum of compound **14e** with the HDAC6 protein



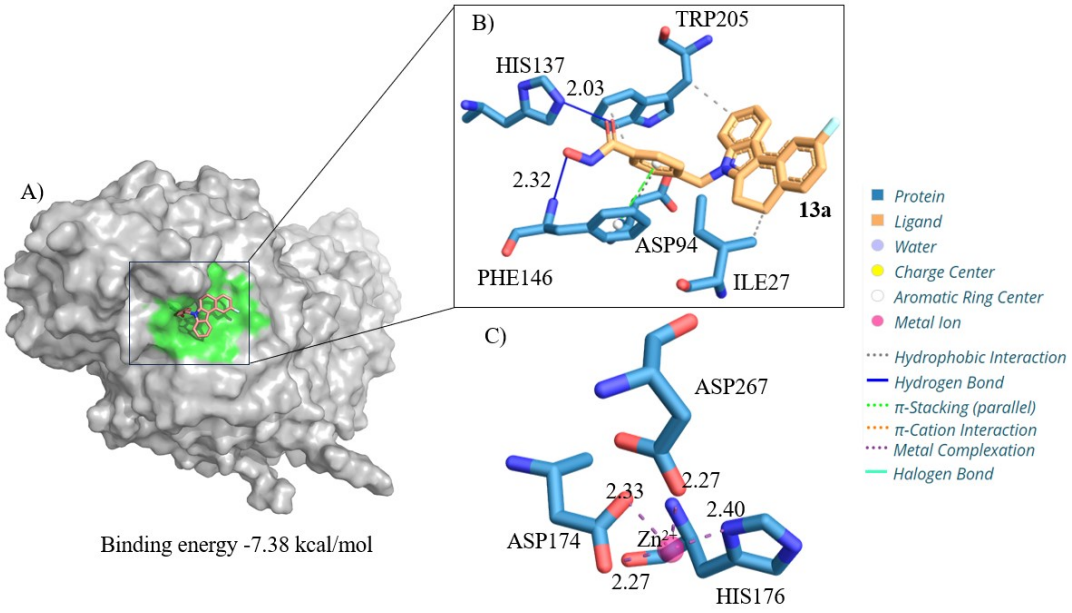
Molecular docking spectrum of compound **14f** with the HDAC6 protein



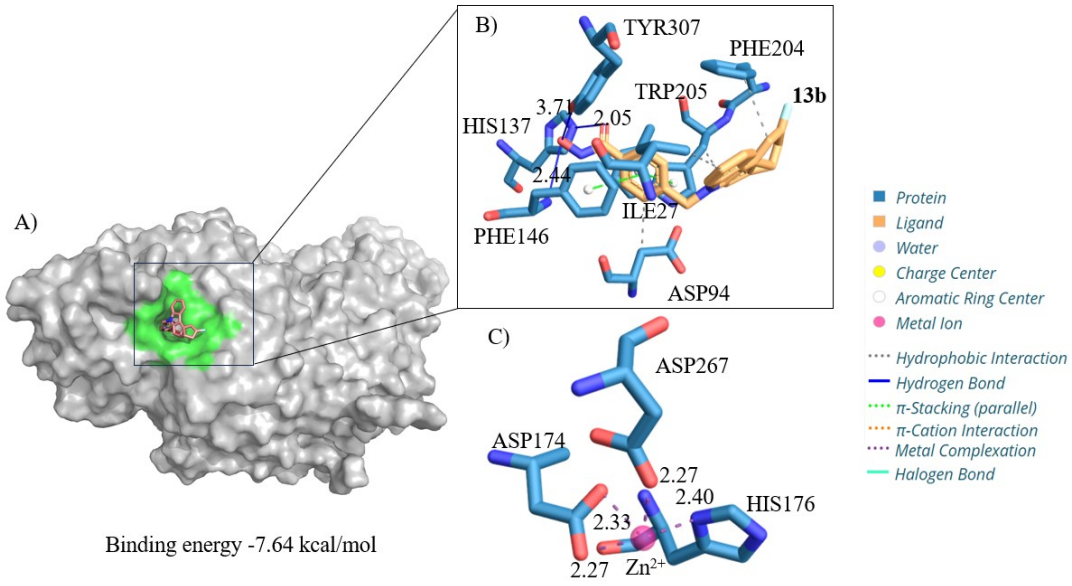
Molecular docking spectrum of compound **12a** with the HDAC10 protein



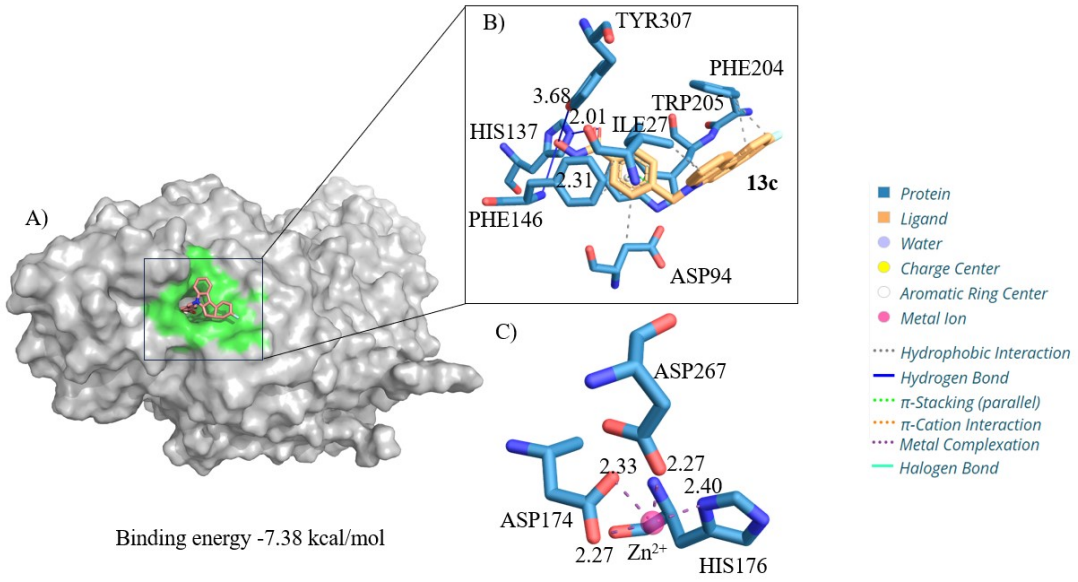
Molecular docking spectrum of compound **12b** with the HDAC10 protein



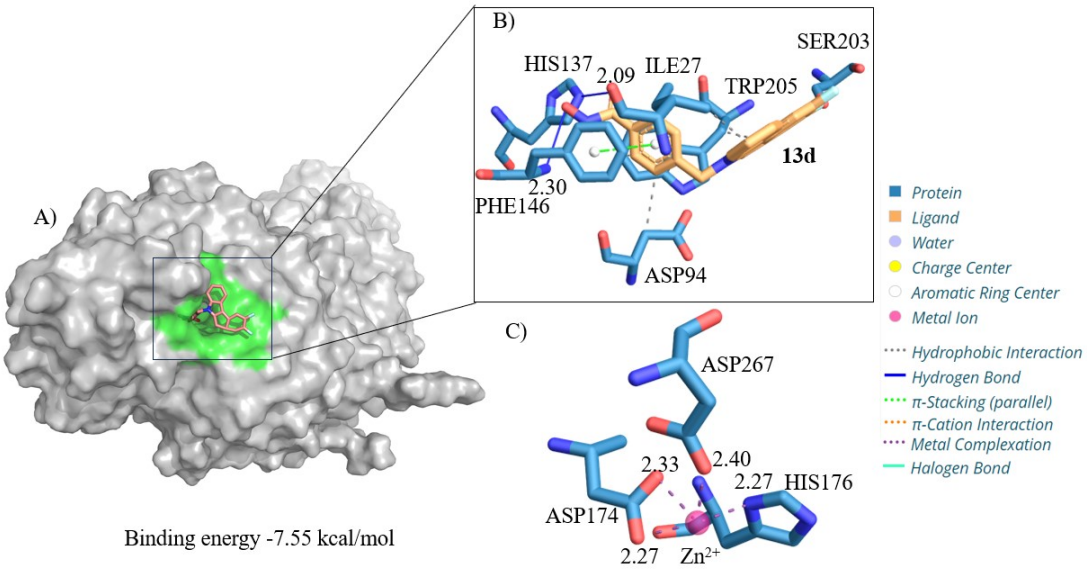
Molecular docking spectrum of compound **13a** with the HDAC10 protein



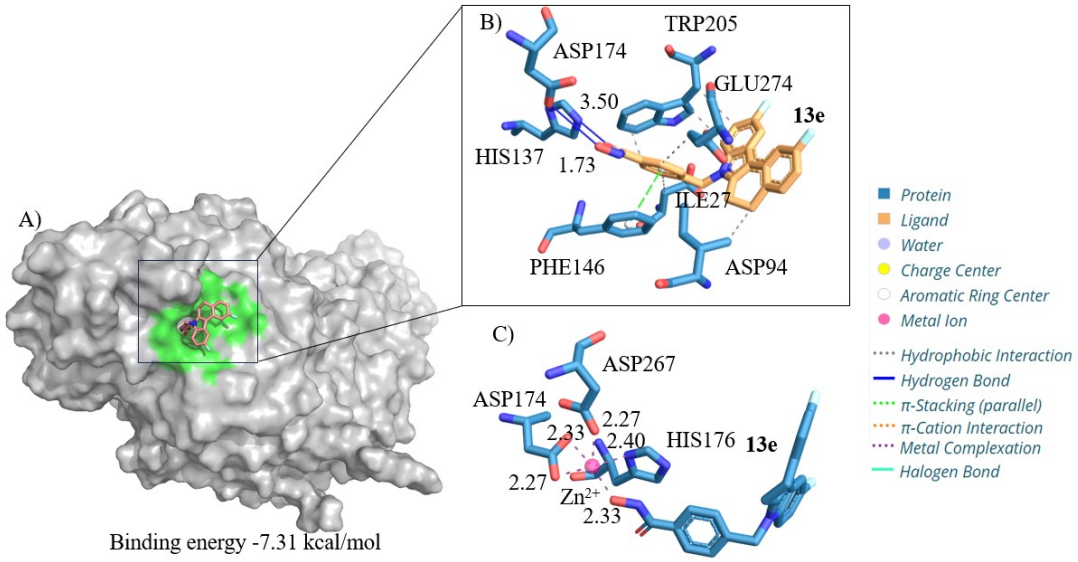
Molecular docking spectrum of compound **13b** with the HDAC10 protein



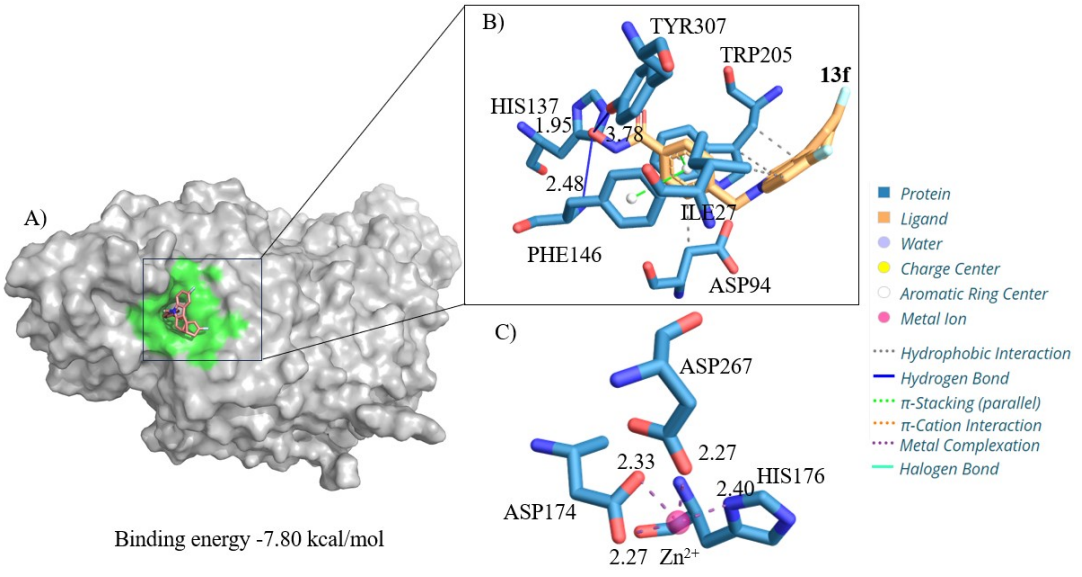
Molecular docking spectrum of compound **13c** with the HDAC10 protein



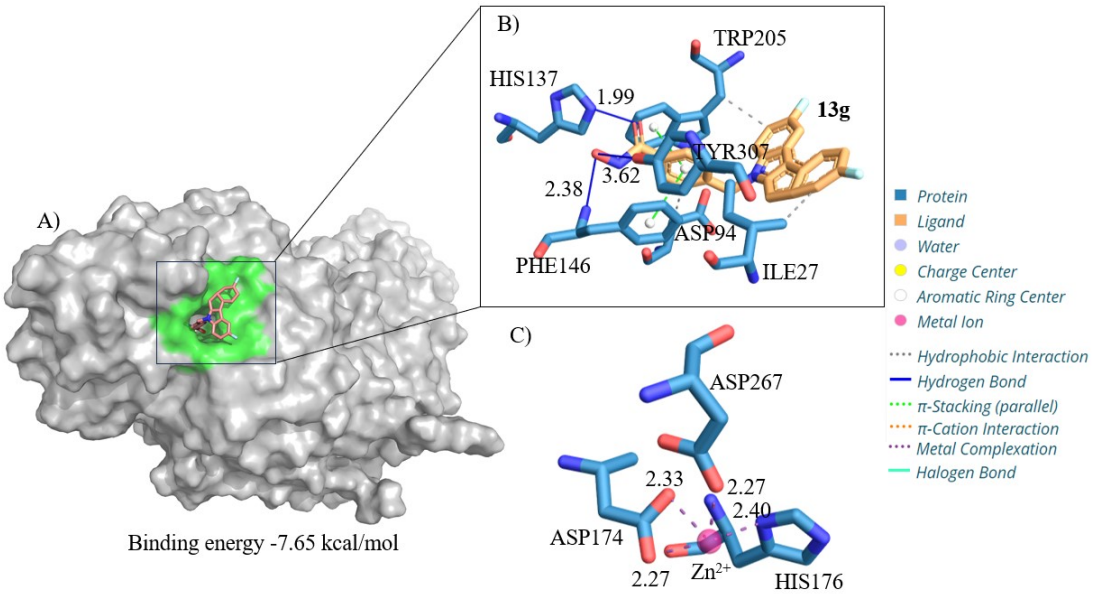
Molecular docking spectrum of compound **13d** with the HDAC10 protein



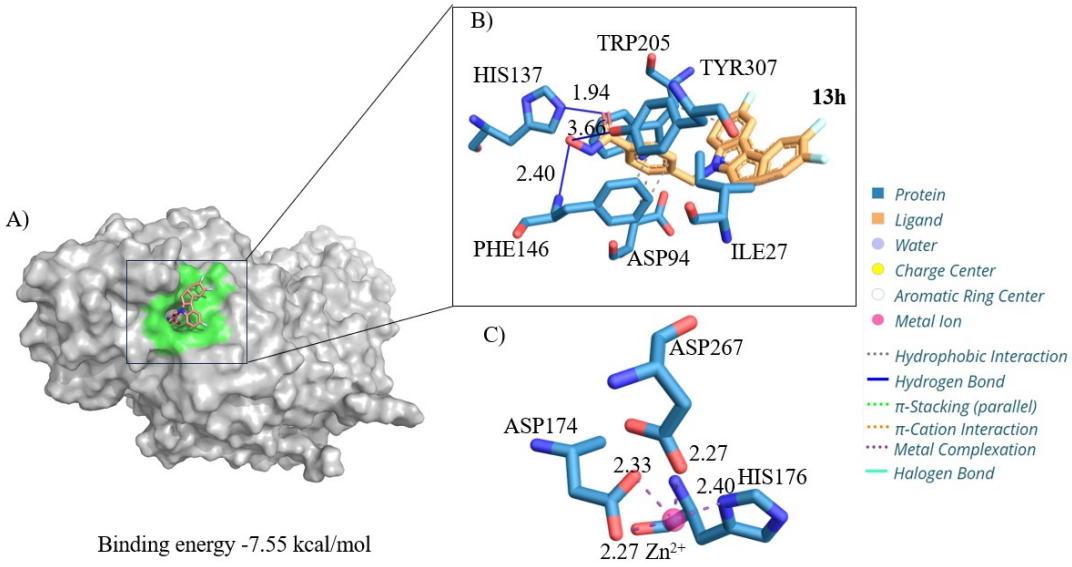
Molecular docking spectrum of compound **13e** with the HDAC10 protein



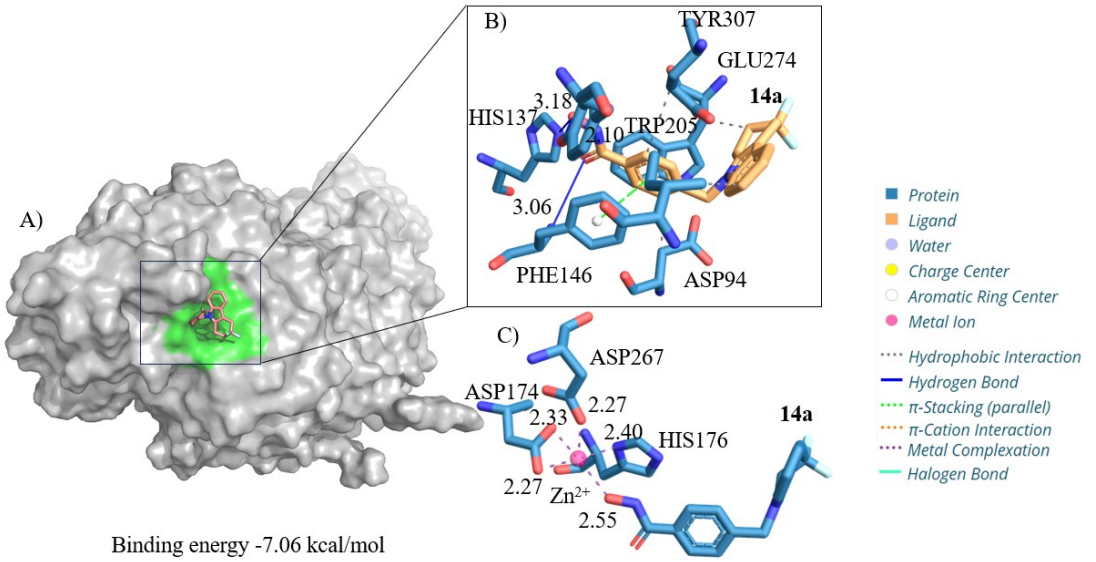
Molecular docking spectrum of compound **13f** with the HDAC10 protein



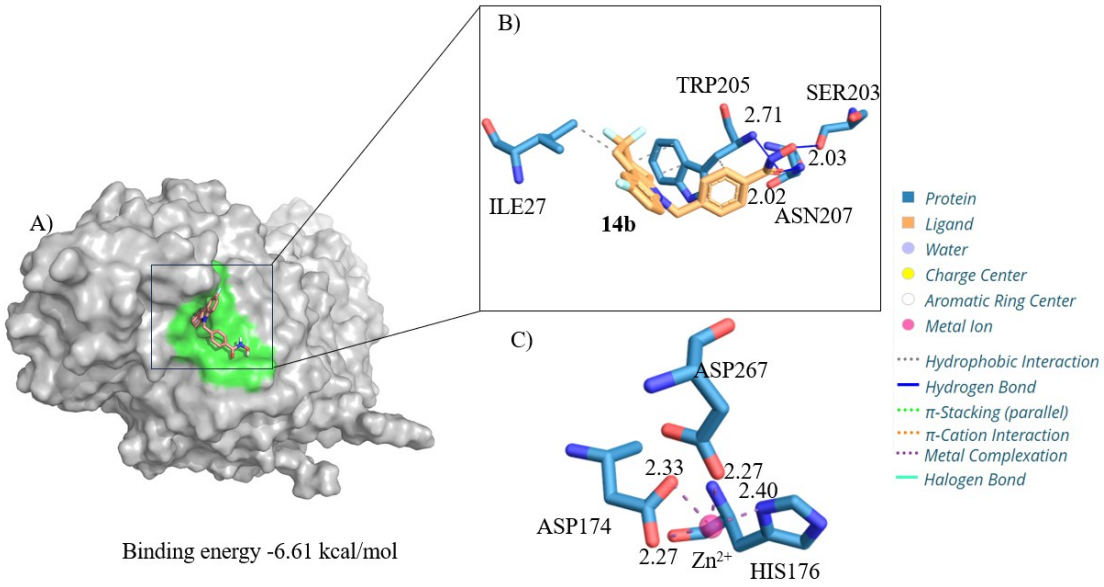
Molecular docking spectrum of compound **13g** with the HDAC10 protein



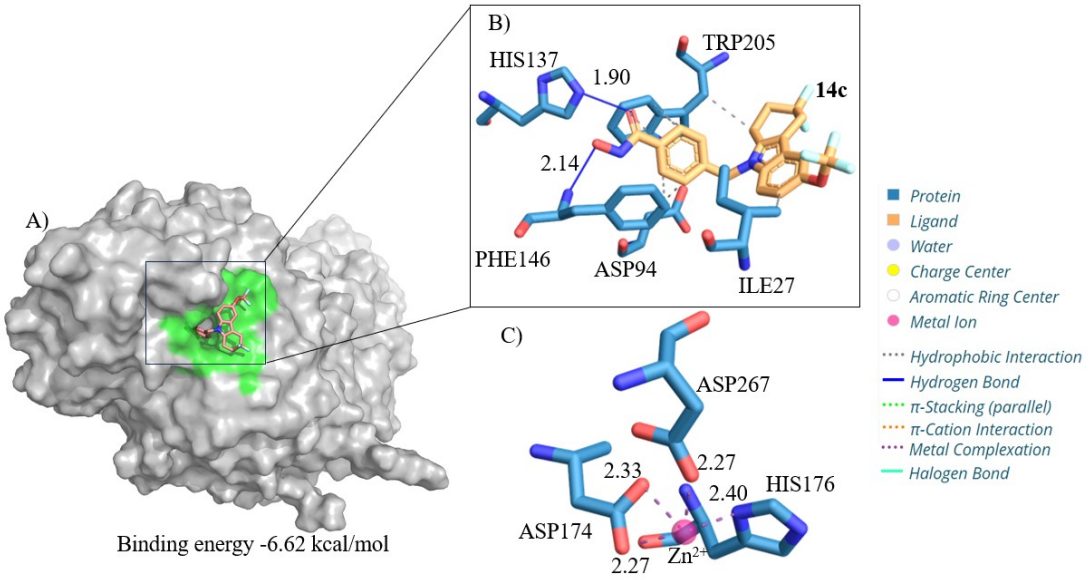
Molecular docking spectrum of compound **13h** with the HDAC10 protein



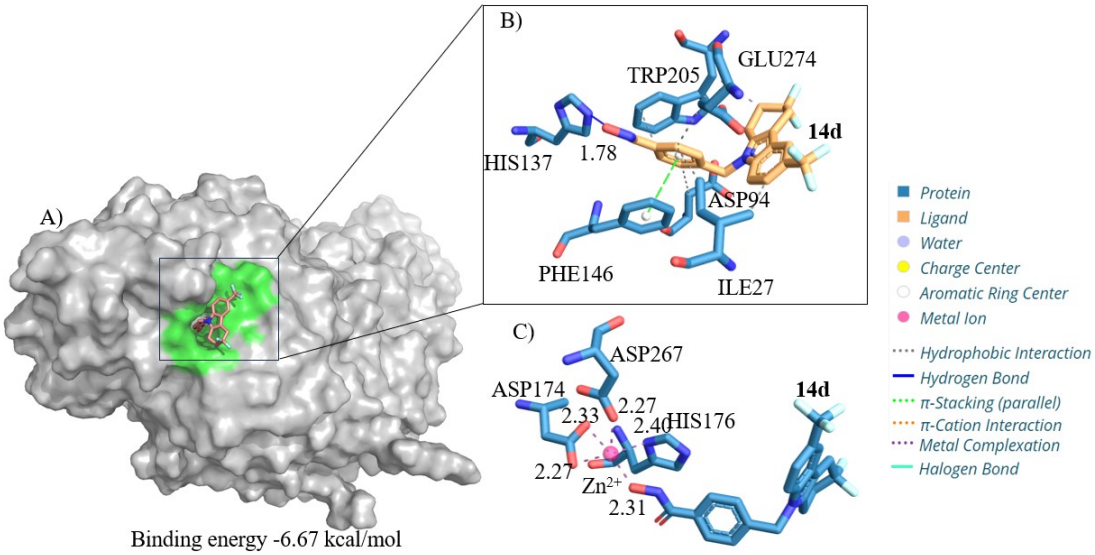
Molecular docking spectrum of compound **14a** with the HDAC10 protein



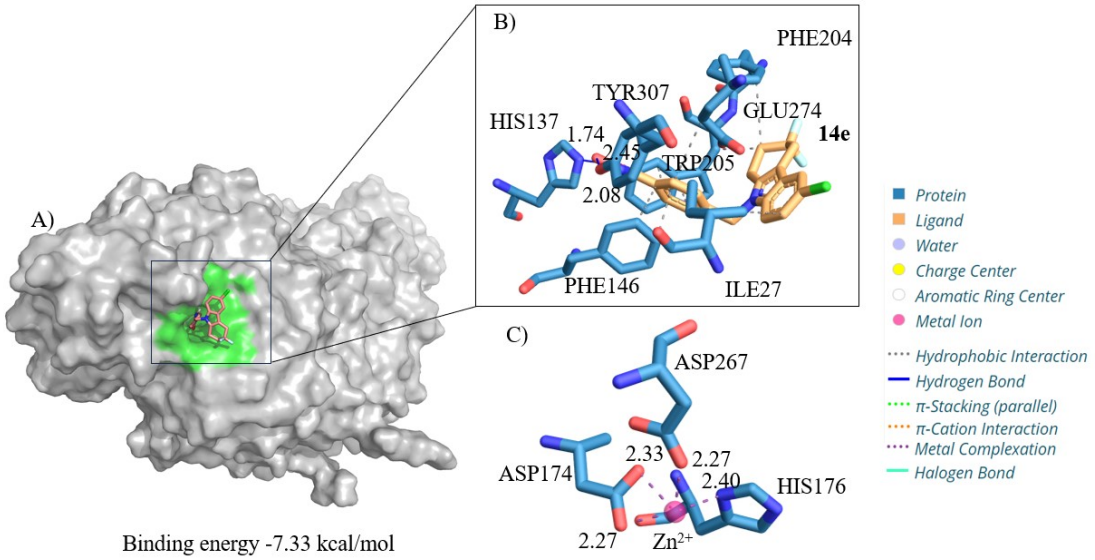
Molecular docking spectrum of compound **14b** with the HDAC10 protein



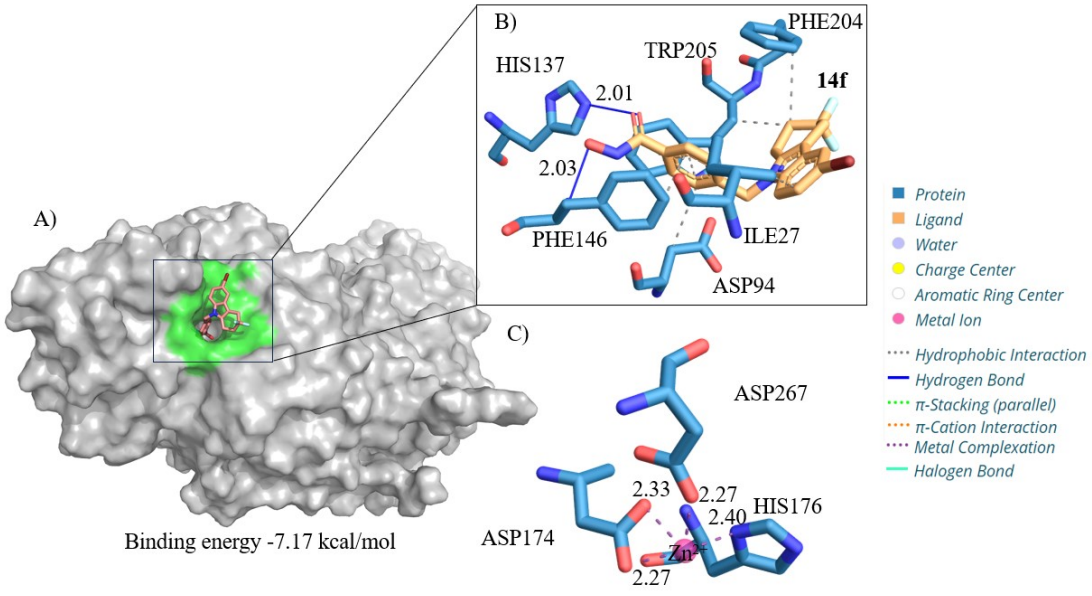
Molecular docking spectrum of compound **14c** with the HDAC10 protein



Molecular docking spectrum of compound **14d** with the HDAC10 protein



Molecular docking spectrum of compound **14e** with the HDAC10 protein



Molecular docking spectrum of compound **14f** with the HDAC10 protein

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