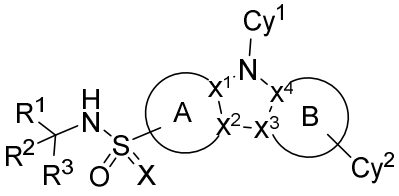
What Claimed is:

1. A compound of Formula (I), or a pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof, wherein:



(I)

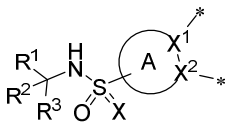
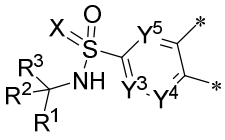
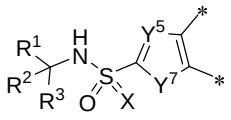
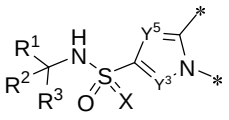
X is O or NR^5;

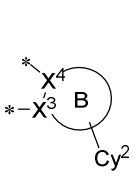
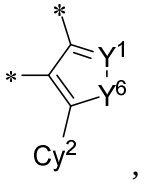
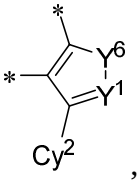
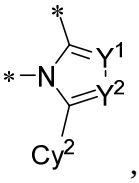
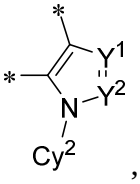
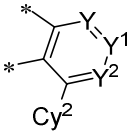
X^1 is C;

X^2 is N or C;

X^3 is N or C;

X^4 is C;

and  is ,  or ;

 is , , , , or ;

Y is N or CR^{15};

Y^1 is N or CR^6;

Y^2 is N or CR^7;

Y^3 is N or CR^8;

Y^4 is N or CR^4;

Y^5 is N or CR^4;

Y^6 is S, O or NR^{14};

Y^7 is S, O or NR^{16};

Cy^1 is 5-10 membered heteroaryl optionally substituted by 1, 2, 3, 4, or 5 substituents independently selected from R^9;

Cy^2 is selected from C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-14 membered heterocycloalkyl; wherein, the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-14 membered heterocycloalkyl is optionally substituted by 1, 2, 3, 4, or 5 substituents independently selected from R^{10};

R^1, R^2 and R^3 are each independently selected from H, D, CN, C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl, C_3-C_7 cycloalkyl, or 4-7 membered heterocycloalkyl; wherein, the C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl, C_3-C_7 cycloalkyl, or 4-7 membered heterocycloalkyl is optionally

substituted by 1-5 substituents independently selected from D, halo, CN, OH, C_1-C_6 alkyl, C_1-C_6 haloalkyl, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

or R^2 and R^3 together with the carbon atom to which they are attached form C_3-C_7 cycloalkyl, or 4-7 membered heterocycloalkyl; wherein, the C_3-C_7 cycloalkyl, 4-7 membered heterocycloalkyl is optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halo, CN, NO_2, oxo, OH, C_1-C_6 alkyl, C_1-C_6 haloalkyl, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

R^4 is selected from H, D, halo, OH, CN, NO_2, SF_5, C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl, -O-C_1-C_3 alkyl, or NR^CR^D; wherein, the C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl is optionally substituted with halogen or CN;

R^5 is selected from H, D, CN, OR^B, or C_1-C_4 alkyl optionally substituted with at least one of R^{5A}; wherein, each R^{5A} is independently selected from D, F, Cl, CN, NH_2, OH, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl, optionally substituted C_3-C_7 cycloalkyl, or optionally substituted 4-7 membered heterocycloalkyl; wherein, the optionally substituted substituent is selected from D, halo, CN, OH, C_1-C_4 alkyl, C_1-C_4 haloalkyl, -O-C_1-C_4 alkyl, -OC_1-C_4 haloalkyl;

or R^1 and R^5 together with the atoms to which they are attached form 5-7 membered partially saturated heterocycloalkyl optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halogen, CN, CF_3, NO_2, oxo, OH, C_1-C_6 alkyl, C_1-C_6 haloalkyl, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

R^6, R^7 and R^{15} are each independently selected from H, D, halogen, CN, NO_2, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, OR^A, SR^A, SF_5, $NHOR^A$, $C(O)OR^A$, $C(O)R^B$, $C(O)NR^CR^D$, $OC(O)NR^CR^D$, NR^CR^D, $NR^CC(O)R^B$, $NR^CC(O)NR^CR^D$, $NR^CC(O)OR^A$, $NR^CS(O)_2R^B$, $B(OR^C)(OR^D)$, $C(=NR^C)NR^CR^D$, $NR^DC(=NR^C)NR^CR^D$, $NR^DC(=NR^C)R^B$, $P(O)R^ER^F$, $P(O)OR^EOR^F$, $OP(O)OR^EOR^F$, $S(O)(=NR^B)R^B$, $S(O)R^B$, $S(O)NR^CR^D$, $S(O)_2R^B$, $S(O)_2NR^CR^D$, $NR^CS(O)_2NR^CR^D$, or $NR^CS(O)(=NR^B)R^B$; wherein, the C_1-C_6 alkyl, C_2-C_6 alkenyl, or C_2-C_6 alkynyl is optionally substituted with 1, 2, or 3 substituents independently selected from R^{11};

R^8 is selected from H, D, CN, halo, OH, NH_2, C_1-C_3 alkyl, C_1-C_3 haloalkyl, -O-C_1-C_3 alkyl, -OC_1-C_3 haloalkyl, C_1-C_3 cyanoalkyl, or SF_5;

each R^9 is independently selected from H, D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, OC_1-C_6 alkyl, OC_1-C_6 haloalkyl, OC_3-C_7 cycloalkyl, C_3-C_7 cycloalkyl, CN, NO_2, N_3, or SF_5; wherein, the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_7 cycloalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from R^{11};

each R^{10} is independently selected from H, D, halo, CN, NO_2, N_3, oxo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, OR^A, SR^A, SF_5, NR^COR^A, $C(O)R^B$, $C(=S)R^B$, $C(O)NR^CR^D$, $C(O)N(R^C)OR^A$, $C(O)OR^A$, $OC(O)R^B$, $OC(O)NR^CR^D$, NR^CR^D, $NR^CC(O)R^D$, $NR^CC(O)NR^CR^D$, $NR^CC(O)OR^A$, $B(OR^C)(OR^D)$, $C(=NR^C)NR^CR^D$, $NR^DC(=NR^C)NR^CR^D$, $NR^DC(=NR^C)R^B$, $SiR^GR^HR^I$, $P(O)R^ER^F$, $P(O)OR^EOR^F$, $OP(O)OR^EOR^F$, $S(O)(=NR^B)R^B$, $S(O)R^B$, $S(O)NR^CR^D$, $S(O)_2R^B$, $NR^CS(O)_2R^B$, $S(O)_2NR^CR^D$, $NR^CS(O)_2NR^CR^D$, $NR^CS(O)(=NR^B)R^B$, Cy^3, C_1-C_6 alkyl-

Cy^3, OCy^3, or O-C_1-C_6 alkyl-Cy^3; wherein, the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from R^{11}; or

two R^{10}, together with the atom(s) to which they are attached form oxo, C_3-C_{10} cycloalkyl or 4-10 membered heterocycloalkyl; wherein, the C_3-C_{10} cycloalkyl or 4-10 membered heterocycloalkyl optionally substituted by 1, 2, or 3 substituents independently selected from D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_1-C_6-cyanoalkyl, CN, NO_2, oxo, OR^a, SR^a, SF_5, $NHOR^a$, $C(O)R^b$, $C(O)NR^cR^d$, $C(O)OR^a$, $OC(O)R^b$, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $NR^cC(O)NR^cR^d$, $NR^cC(O)OR^a$, $B(OR^c)(OR^d)$, $C(=NR^c)NR^cR^d$, $NR^dC(=NR^c)NR^cR^d$, $NR^dC(=NR^c)R^b$, $OP(O)OR^eOR^f$, $P(O)OR^eOR^f$, $S(O)(=NR^b)R^b$, $S(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, $NR^cS(O)(=NR^b)R^b$, Cy^4; wherein, Cy^4 is C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, and 4-10 membered heterocycloalkyl; wherein the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl is optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halo, CN, NO_2, OH, oxo, NH_2, NHC_1-C_4 alkyl, $N(C_1$-C_4 alkyl$)_2$, C_1-C_3 alkyl, C_1-C_3 haloalkyl, OC_1-C_3 alkyl, OC_1-C_3 haloalkyl, OC_2-C_3 alkylOH, OC_2-C_3 alkyl-O-C_1-C_6 alkyl, or SF_5;

Cy^3 is independently selected from C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-10 membered heterocycloalkyl; wherein the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl can be unsubstituted or substituted with 1, 2, 3, 4 or 5 substituents independently selected from R^{12};

each R^{11} is independently selected from H, D, halo, CN, NO_2, N_3, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, OC_1-C_6 alkylOH, OC_1-C_6 alkyl-O-C_1-C_6 alkyl, OR^{a1}, SR^{a1}, SF_5, $NHOR^{a1}$, $C(O)R^{b1}$, $C(O)NR^{c1}R^{d1}$, $C(O)OR^{a1}$, $OC(O)OR^{a1}$, $OC(O)R^{b1}$, $OC(O)NR^{c1}R^{d1}$, $NR^{c1}R^{d1}$, $NR^{c1}C(O)R^{b1}$, $NR^{c1}C(O)NR^{c1}R^{d1}$, $NR^{c1}C(O)OR^{a1}$, $B(OR^{c1})(OR^{d1})$, $C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})R^{b1}$, $P(O)OR^{e1}OR^{f1}$, $OP(O)OR^{e1}OR^{f1}$, $S(O)(=NR^{b1})R^{b1}$, $S(O)R^{b1}$, $S(O)NR^{c1}R^{d1}$, $S(O)_2R^{b1}$, $NR^{c1}S(O)_2R^{b1}$, $S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)(=NR^{b1})R^{b1}$, C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, and 4-10 membered heterocycloalkyl, wherein, the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl can be unsubstituted or substituted by 1, 2, 3, 4 or 5 substituents independently selected from D, halo, CN, NO_2, NH_2, NHC_1-C_4 alkyl, $N(C_1$-C_4 alkyl$)_2$, C_1-C_3 alkyl, C_1-C_3 haloalkyl, OC_1-C_3 alkyl, OC_1-C_3 haloalkyl, OC_2-C_3 alkylOH, OC_2-C_3 alkyl-O-C_1-C_6 alkyl, or SF_5;

each R^{12} is independently selected from D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_1-C_6 alkylOH, C_1-C_6 alkyl-O-C_1-C_6 alkyl, CN, NO_2, N_3, OR^{a1}, SR^{a1}, SF_5, $NHOR^{a1}$, $C(O)R^{b1}$, $C(O)NR^{c1}R^{d1}$, $C(O)OR^{a1}$, $OC(O)R^{b1}$, $OC(O)NR^{c1}R^{d1}$, $NR^{c1}R^{d1}$, $NR^{c1}C(O)R^{b1}$, $NR^{c1}C(O)NR^{c1}R^{d1}$, $NR^{c1}C(O)OR^{a1}$, $B(OR^{c1})(OR^{d1})$, $C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})R^{b1}$, $P(O)R^{e1}R^{f1}$, $P(O)OR^{e1}OR^{f1}$, $OP(O)OR^{e1}OR^{f1}$, $S(O)(=NR^{b1})R^{b1}$, $S(O)R^{b1}$, $S(O)NR^{c1}R^{d1}$, $S(O)_2R^{b1}$, $NR^{c1}S(O)_2R^{b1}$, $S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)(=NR^{b1})R^{b1}$, C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered

heteroaryl, and 4-10 membered heterocycloalkyl; wherein, the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl can be unsubstituted or substituted by 1, 2, 3, 4 or 5 substituents independently selected from D, halo, CN, NO_2, NH_2, NHC_1-C_4 alkyl, $N(C_1$-C_4 alkyl$)_2$, C_1-C_3 alkyl, C_1-C_3 haloalkyl, OC_1-C_3 alkyl, OC_1-C_3 haloalkyl, OC_2-C_3 alkylOH, OC_2-C_3 alkyl-O-C_1-C_6 alkyl, or SF_5;

each R^{13} is independently selected from H, D, OH, CN, halo, oxo, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 cyanoalkyl, OC_1-C_4 alkyl, OC_1-C_4 haloalkyl, OC_1-C_4 alkylOH, OC_1-C_4 alkyl-O-C_1-C_4 alkyl, OC_1-C_4 alkyl-O-C_1-C_4 haloalkyl, C_1-C_4 alkyl-O-C_1-C_4 alkyl, C_1-C_4 alkyl-O-C_1-C_4 haloalkyl, optionally substituted C_3-C_7 cycloalkyl, or optionally substituted 4-7 membered heterocycloalkyl, SF_5, OR^a, SR^a, $C(O)R^b$, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $NR^cC(O)NR^cR^d$, $NR^cC(O)OR^a$, $S(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, or $B(OR^c)(OR^d)$; wherein, the optionally substituted substituent is selected from D, halo, CN, OH, C_1-C_4 alkyl, C_1-C_4 haloalkyl, -O-C_1-C_4 alkyl, -OC_1-C_4 haloalkyl;

R^{14} and R^{16} are each selected from H, D, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 alkyl-OH, C_1-C_6 alkyl-CN, C_1-C_6 alkyl-O-C_1-C_6 alkyl;

R^A is independently selected from H, D, C_1-C_6 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein, the C_1-C_6 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocyclalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from D, OH, CN, halo, C_1-C_4 alkyl, NO_2, oxo, OR^a, SR^a, SF_5, $NHOR^a$, $C(O)R^b$, $C(O)NR^cR^d$, $C(O)OR^a$, $OC(O)R^b$, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $NR^cC(O)NR^cR^d$, $NR^cC(O)OR^a$, $B(OR^c)(OR^d)$, $C(=NR^c)NR^cR^d$, $NR^dC(=NR^c)NR^cR^d$, $NR^dC(=NR^c)R^b$, $P(O)R^eR^f$, $P(O)OR^eOR^f$, $OP(O)OR^eOR^f$, $S(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, or $NR^cS(O)(=NR^b)R^b$;

R^B is independently selected from H, D, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from R^{13};

R^C and R^D are each independently selected from H, D, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_7 cycloalkyl, 4-7 membered heterocycloalkyl, phenyl, 5-6 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_7 cycloalkyl, 4-7 membered heterocycloalkyl, phenyl, 5-6 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from D, OH, CN, halo, oxo, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 cyanoalkyl, OC_1-C_4 alkyl, OC_1-C_4 haloalkyl, OC_2-

C_4 alkylOH, OC_2-C_4 alkyl-O-C_1-C_4 alkyl, OC_2-C_4 alkyl-O-C_1-C_4 haloalkyl, C_1-C_4 alkyl-O-C_1-C_4 alkyl, C_1-C_4 alkyl-O-C_1-C_4 haloalkyl, SF_5, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, or $B(OR^c)(OR^d)$;

or R^C and R^D together with the N atom to which they are attached form a 4-7 membered heterocycloalkyl optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from D, OH, oxo, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, or C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 cyanoalkyl, OC_1-C_4 alkyl, or OC_1-C_4 haloalkyl, OC_2-C_4 alkylOH, OC_2-C_4 alkyl-O-C_1-C_4 alkyl, OC_2-C_4 alkyl-O-C_1-C_4 haloalkyl;

R^a and R^{a1} are each independently selected from H, D, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl, wherein the C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, or C_1-C_4 haloalkoxy;

R^b and R^{b1} are each independently selected from H, D, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-10 membered heterocycloalkyl;

R^c and R^d are each independently selected from H, D, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, heterocycloalkylalkyl, arylcycloalkyl, arylheterocycloalkyl, arylheteroaryl, biaryl, heteroarylcycloalkyl, heteroarylheterocycloalkyl, heteroarylaryl, or biheteroaryl; wherein the C_{1-4} alkyl, C_{2-4} alkenyl, C_{2-4} alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, heterocycloalkylalkyl, arylcycloalkyl, arylheterocycloalkyl, arylheteroaryl, biaryl, heteroarylcycloalkyl, heteroarylheterocycloalkyl, heteroarylaryl, or biheteroaryl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 hydroxyalkyl, C_1-C_4 cyanoalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, $C(O)OR^{a1}$, $C(O)R^{b1}$, $S(O)_2R^{b1}$, C_1-C_4 alkyl-O-C_1-C_4 alkyl, and C_1-C_4 alkyl-O-C_1-C_4 alkyl-O-;

or R^c and R^d together with the N atom to which they are attached form a 4-7 membered heterocycloalkyl optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4

haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 hydroxyalkyl, C_1-C_4 cyanoalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, $C(O)OR^{a1}$, $C(O)R^{b1}$, $S(O)_2R^{b1}$, C_1-C_4 alkoxy-C_1-C_4 alkyl, and C_1-C_4 alkoxy-C_1-C_4 alkoxy;

R^{c1} and R^{d1} are each independently selected from H, D, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl or heterocycloalkylalkyl; wherein the C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl or heterocycloalkylalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, $-NH_2$, $-NH(C_1$-C_4 alkyl), $-N(C_1$-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, or C_1-C_4 haloalkoxy;

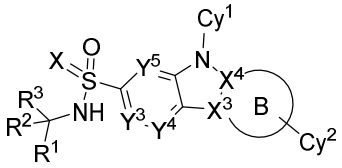
or R^{c1} and R^{d1} together with the N atom to which they are attached form a 4-7 membered heterocycloalkyl optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, $-NH_2$, $-NH(C_1$-C_4 alkyl), $-N(C_1$-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, and C_{1-4} haloalkoxy;

R^E, R^e and R^{e1} are each independently selected from H, D, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, (C_1-C_4 alkoxy)-C_1-C_4 alkyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 3-10 membered heterocycloalkyl, C_6-C_{10} aryl-C_1-C_4 alkyl, C_3-C_{10} cycloalkyl-C_1-C_4 alkyl, 5-10 membered heteroaryl-C_1-C_4 alkyl, or 4-10 membered heterocycloalkyl-C_1-C_4 alkyl;

R^F, R^f and R^{f1} are each independently selected from H, D, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, or 4-10 membered heterocycloalkyl;

R^G, R^H and R^I are each independently selected from C_1-C_4 alkyl or phenyl.

2. The compound of claim 1, wherein, the compounds of Formula (I) are represented by compounds of Formula (Ia), (Ib), (Ic), (Id), (Ie), (If), (Ig), (Ih), (Ii), (Ij), (Ik), (Il), (Im), (In), (Io), (Ip) or (Iq):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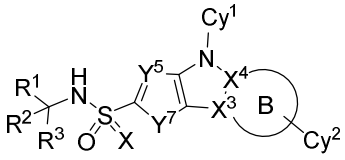
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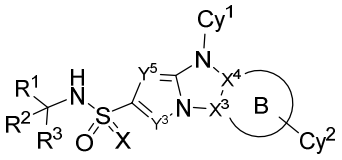
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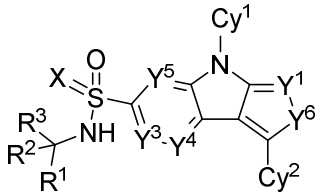
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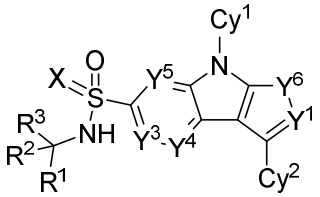
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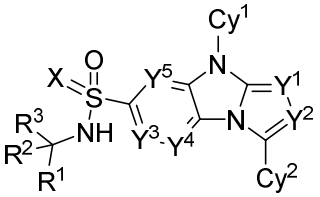
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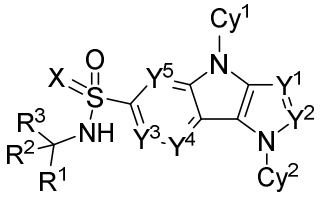
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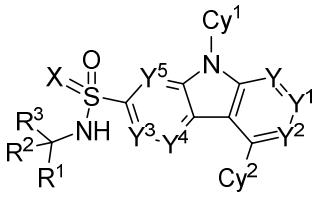
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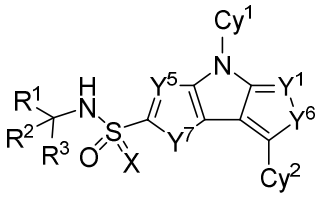
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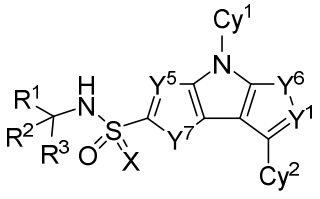
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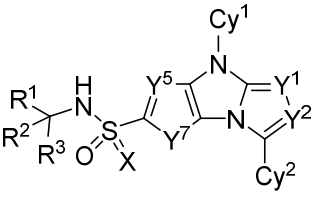
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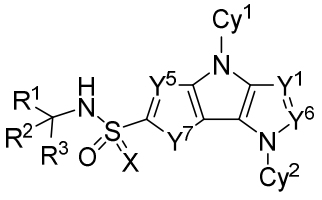
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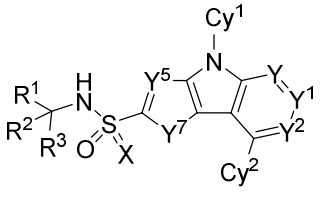
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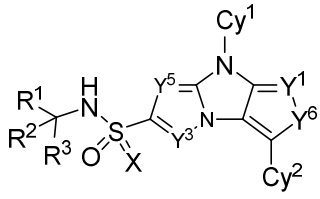
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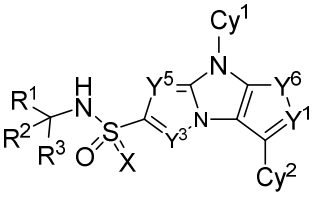
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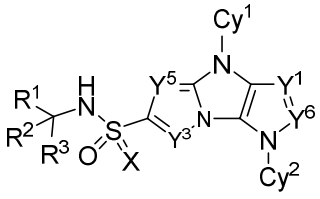
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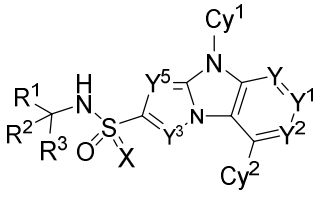
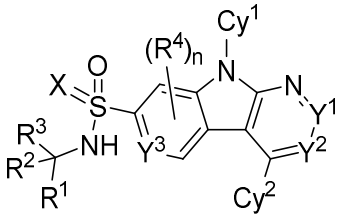

(Iq);

or a pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof;

wherein, R^1, R^2, R^3, X, X^1, X^2, X^3, X^4, Y, Y^1, Y^2, Y^3, Y^4, Y^5, Y^6, Y^7, Cy^1, and Cy^2 are defined with respect to Formula (I).

3. The compound of claim 1 or 2, wherein, the compounds of Formula (I) are represented by compounds of Formula (II):


(II)

wherein,

X is O or NR^5;

Y^1 is N or CR^6;

Y^2 is N, or CR^7, and at most one of Y^1 or Y^2 is N;

Y^3 is N, or CR^8;

n is 0, 1 or 2;

Cy^1 is 5-10 membered heteroaryl optionally substituted by 1, 2, 3, 4, or 5 substituents independently selected from R^9;

Cy^2 is independently selected from C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-14 membered heterocycloalkyl, wherein, the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-14 membered heterocycloalkyl is optionally substituted by 1, 2, 3, 4, or 5 substituents independently selected from R^{10};

R^1, R^2 and R^3 are each independently selected from H, D, CN, C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl, C_3-C_7 cycloalkyl, or 4-7 membered heterocycloalkyl, wherein the C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl, C_3-C_7 cycloalkyl, or 4-7 membered heterocycloalkyl is optionally substituted by 1, 2, 3, 4, or 5 substituents independently selected from D, halo, CN, OH, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

or R^2 and R^3 together with the carbon atom to which they are attached form C_3-C_7 cycloalkyl, or 4-7 membered heterocycloalkyl, wherein, the C_3-C_7 cycloalkyl, 4-7 membered heterocycloalkyl is optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halo, CN, NO_2, oxo, OH, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

R^4 is selected from H, D, halo, OH, CN, NO_2, SF_5, C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl, -O-C_1-C_3 alkyl, or NR^CR^D; wherein, the C_1-C_3 alkyl, C_2-C_3 alkenyl, C_2-C_3 alkynyl is optionally substituted with halogen or CN;

R^5 is selected from H, D, CN, OR^B, or C_1-C_4 alkyl optionally substituted with at least one of R^{5A}; wherein, each R^{5A} is independently selected from D, F, Cl, CN, NH_2, OH, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl, optionally substituted C_3-C_7 cycloalkyl, or optionally substituted 4-7 membered heterocycloalkyl; wherein, the optionally substituted substituent is selected from D, halo, CN, OH, C_1-C_4 alkyl, C_1-C_4 haloalkyl, -O-C_1-C_4 alkyl, -OC_1-C_4 haloalkyl;

or R^1 and R^5 together with the atoms to which they are attached form 5-7 membered partially saturated heterocycloalkyl optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halogen, CN, CF_3, NO_2, oxo, OH, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

R^6 and R^7 are each independently selected from H, D, halogen, CN, NO_2, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, OR^A, SR^A, SF_5, $NHOR^A$, $C(O)OR^A$, $C(O)R^B$, $C(O)NR^CR^D$, $OC(O)NR^CR^D$, NR^CR^D, $NR^CC(O)R^B$, $NR^CC(O)NR^CR^D$, $NR^CC(O)OR^A$, $NR^CS(O)_2R^B$, $B(OR^C)(OR^D)$, $C(=NR^C)NR^CR^D$, $NR^DC(=NR^C)NR^CR^D$, $NR^DC(=NR^C)R^B$, $P(O)R^ER^F$, $P(O)OR^EOR^F$, $OP(O)OR^EOR^F$, $S(O)(=NR^B)R^B$, $S(O)R^B$, $S(O)NR^CR^D$, $S(O)_2R^B$, $S(O)_2NR^CR^D$, $NR^CS(O)_2NR^CR^D$, or $NR^CS(O)(=NR^B)R^B$; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, or C_2-C_6 alkynyl is optionally substituted with 1, 2, or 3 R^{11};

R^8 is selected from H, D, CN, halo, OH, C_1-C_3 alkyl, C_1-C_3 haloalkyl, -O-C_1-C_3 alkyl, -OC_1-C_3 haloalkyl, C_1-C_3 cyanoalkyl, or SF_5;

each R^9 is independently selected H, D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_3-C_7 cycloalkyl, OC_1-C_6 alkyl, OC_1-C_6 haloalkyl, OC_3-C_7 cycloalkyl, CN, NO_2, N_3, SF_5; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-

C_7 cycloalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from R^{11};

each R^{10} is independently selected H, D, halo, CN, NO_2, N_3, oxo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, OR^A, SR^A, SF_5, NR^COR^A, $C(O)R^B$, $C(=S)R^B$, $C(O)NR^CR^D$, $C(O)N(R^C)OR^A$, $C(O)OR^A$, $OC(O)R^B$, $OC(O)NR^CR^D$, NR^CR^D, $NR^CC(O)R^D$, $NR^CC(O)NR^CR^D$, $NR^CC(O)OR^A$, $B(OR^C)(OR^D)$, $C(=NR^C)NR^CR^D$, $NR^DC(=NR^C)NR^CR^D$, $NR^DC(=NR^C)R^B$, $SiR^GR^HR^I$, $P(O)R^ER^F$, $P(O)OR^EOR^F$, $OP(O)OR^EOR^F$, $S(O)(=NR^B)R^B$, $S(O)R^B$, $S(O)NR^CR^D$, $S(O)_2R^B$, $NR^CS(O)_2R^B$, $S(O)_2NR^CR^D$, $NR^CS(O)_2NR^CR^D$, $NR^CS(O)(=NR^B)R^B$, Cy^3, C_1-C_6 alkyl-Cy^3, OCy^3, or O-C_1-C_6 alkyl-Cy^3; wherein, the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl is optionally substituted with 1, 2, 3, 4 or 5 R^{11}; or

two R^{10} together with the atoms to which they are attached form oxo, C_3-C_{10} cycloalkyl or 4-10 membered heterocycloalkyl, wherein, the C_3-C_{10} cycloalkyl or 4-10 membered heterocycloalkyl optionally substituted by 1, 2, or 3 substituents independently selected from D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_1-C_6 cyanoalkyl, CN, NO_2, oxo, OR^a, SR^a, SF_5, $NHOR^a$, $C(O)R^b$, $C(O)NR^cR^d$, $C(O)OR^a$, $OC(O)R^b$, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $NR^cC(O)NR^cR^d$, $NR^cC(O)OR^a$, $B(OR^c)(OR^d)$, $C(=NR^c)NR^cR^d$, $NR^dC(=NR^c)NR^cR^d$, $NR^dC(=NR^c)R^b$, $OP(O)OR^eOR^f$, $P(O)OR^eOR^f$, $S(O)(=NR^b)R^b$, $S(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, $NR^cS(O)(=NR^b)R^b$, Cy^4; wherein, Cy^4 is C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, and 4-10 membered heterocycloalkyl, wherein the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl is optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halo, CN, NO_2, NH_2, NHC_1-C_4 alkyl, $N(C_1$-C_4 alkyl$)_2$, C_1-C_3 alkyl, C_1-C_3 haloalkyl, OC_1-C_3 alkyl, OC_1-C_3 haloalkyl, OC_2-C_3 alkylOH, OC_2-C_3 alkyl-O-C_1-C_6 alkyl, or SF_5;

Cy^3 is independently selected from C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-10 membered heterocycloalkyl; wherein the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl can be unsubstituted or substituted with 1, 2, 3, 4 or 5 substituents independently selected from R^{12};

each R^{11} is independently selected from H, D, halo, CN, NO_2, N_3, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, OC_1-C_6 alkylOH, OC_1-C_6 alkyl-O-C_1-C_6 alkyl, OR^{a1}, SR^{a1}, SF_5, $NHOR^{a1}$, $C(O)R^{b1}$, $C(O)NR^{c1}R^{d1}$, $C(O)OR^{a1}$, $OC(O)OR^{a1}$, $OC(O)R^{b1}$, $OC(O)NR^{c1}R^{d1}$, $NR^{c1}R^{d1}$, $NR^{c1}C(O)R^{b1}$, $NR^{c1}C(O)NR^{c1}R^{d1}$, $NR^{c1}C(O)OR^{a1}$, $B(OR^{c1})(OR^{d1})$, $C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})R^{b1}$, $P(O)OR^{e1}OR^{f1}$, $OP(O)OR^{e1}OR^{f1}$, $S(O)(=NR^{b1})R^{b1}$, $S(O)R^{b1}$, $S(O)NR^{c1}R^{d1}$, $S(O)_2R^{b1}$, $NR^{c1}S(O)_2R^{b1}$, $S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)(=NR^{b1})R^{b1}$, C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, and 4-10 membered heterocycloalkyl, wherein the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl can be unsubstituted or substituted independently selected from D, halo,

CN, NO_2, NH_2, NHC_1-C_4 alkyl, $N(C_1$-C_4 alkyl$)_2$, C_1-C_3 alkyl, C_1-C_3 haloalkyl, OC_1-C_3 alkyl, OC_1-C_3 haloalkyl, OC_2-C_3 alkylOH, OC_2-C_3 alkyl-O-C_1-C_6 alkyl, or SF_5;

each R^{12} is independently selected from D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_1-C_6 alkylOH, C_1-C_6 alkyl-O-C_1-C_6 alkyl, CN, NO_2, N_3, OR^{a1}, SR^{a1}, SF_5, $NHOR^{a1}$, $C(O)R^{b1}$, $C(O)NR^{c1}R^{d1}$, $C(O)OR^{a1}$, $OC(O)R^{b1}$, $OC(O)NR^{c1}R^{d1}$, $NR^{c1}R^{d1}$, $NR^{c1}C(O)R^{b1}$, $NR^{c1}C(O)NR^{c1}R^{d1}$, $NR^{c1}C(O)OR^{a1}$, $B(OR^{c1})(OR^{d1})$, $C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})NR^{c1}R^{d1}$, $NR^{d1}C(=NR^{c1})R^{b1}$, $P(O)R^{e1}R^{f1}$, $P(O)OR^{e1}OR^{f1}$, $OP(O)OR^{e1}OR^{f1}$, $S(O)(=NR^{b1})R^{b1}$, $S(O)R^{b1}$, $S(O)NR^{c1}R^{d1}$, $S(O)_2R^{b1}$, $NR^{c1}S(O)_2R^{b1}$, $S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)_2NR^{c1}R^{d1}$, $NR^{c1}S(O)(=NR^{b1})R^{b1}$, C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, and 4-10 membered heterocycloalkyl, wherein the C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, 4-10 membered heterocycloalkyl can be unsubstituted or substituted independently selected from D, halo, CN, NO_2, NH_2, NHC_1-C_4 alkyl, $N(C_1$-C_4 alkyl$)_2$, C_1-C_3 alkyl, C_1-C_3 haloalkyl, OC_1-C_3 alkyl, OC_1-C_3 haloalkyl, OC_2-C_3 alkylOH, OC_2-C_3 alkyl-O-C_1-C_6 alkyl, or SF_5;

R^A is independently selected from H, D, C_1-C_6 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_6 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocyclalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from D, OH, CN, halo, C_1-C_4 alkyl, NO_2, oxo, OR^a, SR^a, SF_5, $NHOR^a$, $C(O)R^b$, $C(O)NR^cR^d$, $C(O)OR^a$, $OC(O)R^b$, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $NR^cC(O)NR^cR^d$, $NR^cC(O)OR^a$, $B(OR^c)(OR^d)$, $C(=NR^c)NR^cR^d$, $NR^dC(=NR^c)NR^cR^d$, $NR^dC(=NR^c)R^b$, $P(O)R^eR^f$, $P(O)OR^eOR^f$, $OP(O)OR^eOR^f$, $S(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, or $NR^cS(O)(=NR^b)R^b$;

R^B is independently selected from H, D, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from R^{13};

each R^{13} is independently selected from H, D, OH, CN, halo, oxo, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 cyanoalkyl, OC_1-C_4 alkyl, OC_1-C_4 haloalkyl, C_1-C_4 alkyl-O-C_1-C_4 alkyl, C_1-C_4 alkyl-O-C_1-C_4 haloalkyl, OC_2-C_4 alkylOH, OC_2-C_4 alkyl-O-C_1-C_4 alkyl, OC_2-C_4 alkyl-O-C_1-C_4 haloalkyl, optionally substituted C_3-C_7 cycloalkyl, or optionally substituted 4-7 membered heterocycloalkyl, SF_5, OR^a, SR^a, $C(O)R^b$, $OC(O)NR^cR^d$, NR^cR^d, $NR^cC(O)R^b$, $NR^cC(O)NR^cR^d$, $NR^cC(O)OR^a$, $S(O)R^b$, $S(O)NR^cR^d$, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, or $B(OR^c)(OR^d)$; wherein, the optionally substituted

substituent is selected from D, halo, CN, OH, C_1-C_4 alkyl, C_1-C_4 haloalkyl, -O-C_1-C_4 alkyl, -OC_1-C_4 haloalkyl;

R^C and R^D are each independently selected from H, D, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_7 cycloalkyl, 4-7 membered heterocycloalkyl, phenyl, 5-6 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_7 cycloalkyl, 4-7 membered heterocycloalkyl, phenyl, 5-6 membered heteroaryl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from D, OH, CN, halo, oxo, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 cyanoalkyl, OC_1-C_4 alkyl, OC_1-C_4 haloalkyl, C_1-C_4 alkyl-O-C_1-C_4 alkyl, C_1-C_4 alkyl-O-C_1-C_4 haloalkyl, OC_2-C_4 alkylOH, OC_2-C_4 alkyl-O-C_1-C_4 alkyl, OC_2-C_4 alkyl-O-C_1-C_4 haloalkyl, SF_5, OC(O)NR^cR^d, NR^cR^d, $NR^cC(O)R^b$, S(O)NR^cR^d, $S(O)_2R^b$, $NR^cS(O)_2R^b$, $S(O)_2NR^cR^d$, $NR^cS(O)_2NR^cR^d$, or B(OR^c)(OR^d);

or R^C and R^D together with the N atom to which they are attached form a 4-7 membered heterocycloalkyl optionally substituted with 1, 2, 3, 4 or 5 substituents independently selected from D, OH, oxo, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, or C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 cyanoalkyl, OC_1-C_4 alkyl, or OC_1-C_4 haloalkyl, OC_2-C_4 alkylOH, OC_2-C_4 alkyl-O-C_1-C_4 alkyl, OC_2-C_4 alkyl-O-C_1-C_4 haloalkyl;

R^a and R^{a1} are each independently selected from H, D, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl, wherein the C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, or C_1-C_4 haloalkoxy;

R^b and R^{b1} are each independently selected from H, D, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl; wherein the C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, phenyl, C_3-C_7 cycloalkyl, 5-6 membered heteroaryl, or 4-7 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, or heterocycloalkylalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_6-C_{10} aryl, C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, or 4-10 membered heterocycloalkyl;

R^c and R^d are each independently selected from H, D, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, heterocycloalkylalkyl, arylcycloalkyl, arylheterocycloalkyl, arylheteroaryl, biaryl, heteroarylcycloalkyl, heteroarylheterocycloalkyl, heteroarylaryl, or biheteroaryl; wherein

the C_{1-4} alkyl, C_{2-4} alkenyl, C_{2-4} alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl, heterocycloalkylalkyl, arylcycloalkyl, arylheterocycloalkyl, arylheteroaryl, biaryl, heteroarylcycloalkyl, heteroarylheterocycloalkyl, heteroarylaryl, or biheteroaryl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 hydroxyalkyl, C_1-C_4 cyanoalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C(O)OR^{a1}, C(O)R^{b1}, S(O)$_2R^{b1}$, C_1-C_4 alkyl-O-C_1-C_4 alkyl, and C_1-C_4 alkyl-O-C_1-C_4 alkyl-O-;

or R^c and R^d together with the N atom to which they are attached form a 4-7 membered heterocycloalkyl optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 hydroxyalkyl, C_1-C_4 cyanoalkyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C(O)OR^{a1}, C(O)R^{b1}, S(O)$_2R^{b1}$, C_1-C_4 alkoxy-C_1-C_4 alkyl, and C_1-C_4 alkoxy-C_1-C_4 alkoxy;

R^{c1} and R^{d1} are each independently selected from H, D, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl or heterocycloalkylalkyl; wherein the C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl, arylalkyl, heteroarylalkyl, cycloalkylalkyl or heterocycloalkylalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, or C_1-C_4 haloalkoxy;

or R^{c1} and R^{d1} together with the N atom to which they are attached form a 4-7 membered heterocycloalkyl optionally substituted with 1, 2, or 3 substituents independently selected from D, OH, CN, -NH_2, -NH(C_1-C_4 alkyl), -N(C_1-C_4 alkyl)$_2$, halo, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, and C_{1-4} haloalkoxy;

R^E, R^e and R^{e1} are each independently selected from H, D, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_2-C_4 alkenyl, (C_1-C_4 alkoxy)-C_1-C_4 alkyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 3-10 membered heterocycloalkyl, C_6-C_{10} aryl-C_1-C_4 alkyl, C_3-C_{10} cycloalkyl-C_1-C_4 alkyl, 5-10 membered heteroaryl-C_1-C_4 alkyl, or 4-10 membered heterocycloalkyl-C_1-C_4alkyl;

R^F, R^f and R^{f1} are each independently selected from H, D, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_6-C_{10} aryl, 5-10 membered heteroaryl, C_3-C_{10} cycloalkyl, 4-10 membered heterocycloalkyl;

R^G, R^H and R^I are each independently selected from C_1-C_4 alkyl or phenyl;

preferably, X is O;

preferably, X is NR^5; and R^5 is selected from H, D, CN, OR^B, C_1-C_4 alkyl optionally substituted with at least one of R^{5A}; wherein, each R^{5A} is independently selected from D, F, Cl, CN, NH_2, OH, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl, optionally substituted C_3-C_7 cycloalkyl, or optionally substituted 4-7 membered heterocycloalkyl; wherein, the optionally substituted substituent is selected from D, halo, CN, OH, C_1-C_4 alkyl, C_1-C_4 haloalkyl, -O-C_1-C_4 alkyl, -OC_1-C_4 haloalkyl;

preferably, Y^3 is N;

preferably, Y^3 is CR^8; and R^8 is selected from H, D, CN, halo, OH, NH_2, C_1-C_3 alkyl, C_1-C_3 haloalkyl, -O-C_1-C_3 alkyl, -OC_1-C_3 haloalkyl, C_1-C_3 cyanoalkyl, or SF_5; preferably, R^8 is selected from H, D, F, Cl, OH, NH_2, CN, CH_3, CH_2CH_3, $CH_2CH_2CH_3$, $CH(CH_3)_2$, CF_3, CHF_2, CH_2F, OMe, OCH_2CH_3, $OCH_2CH_2CH_3$, $OCH(CH_3)_2$, OCF_3, or SF_5;

preferably, Y^1 is N and Y^2 is CR^7;

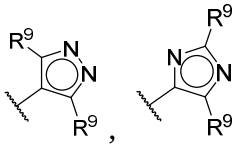
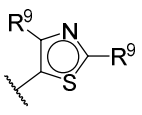
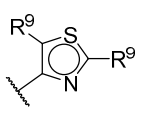
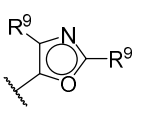
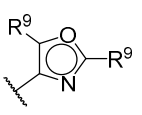
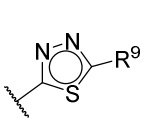
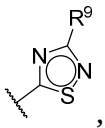
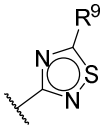
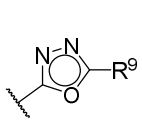
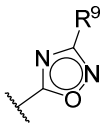
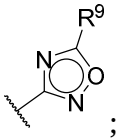
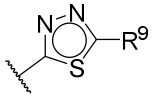
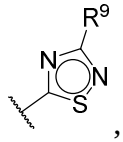
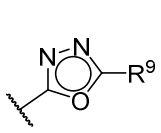
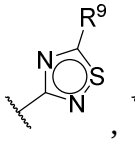
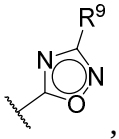
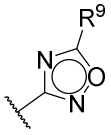
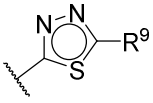
preferably, Y^1 is CR^6 and Y^2 is N;

preferably, Y^1 is CR^6 and Y^2 is CR^7;

preferably, R^6 is selected from H, D, halogen, CN, NO_2, OR^A, SR^A, SF_5, C_1-C_6 alkyl or C_1-C_6 haloalkyl; preferably, R^6 is selected from H, D. F, Cl, Br, I, CH_3, CF_3, -CHF_2, -CH_2F, OH, -OCH_3, OCF_3, -SMe, $B(OH)_2$, CN, NO_2, or SF_5;

preferably, R^7 is selected from H, D, halogen, CN, NO_2, OR^A, SF_5, C_1-C_6 alkyl or C_1-C_6 haloalkyl; preferably, R^7 is selected from H, D. F, Cl, OH, CN, NO_2, SF_5, CH_3, CF_3 or -OCH_3;

preferably, Cy^1 is 5-6 membered heteroaryl optionally substituted by 1, 2, 3 or 4 R^9; preferably, Cy^1 is 5 membered heteroaryl optionally substituted by 1, 2, or 3 R^9;

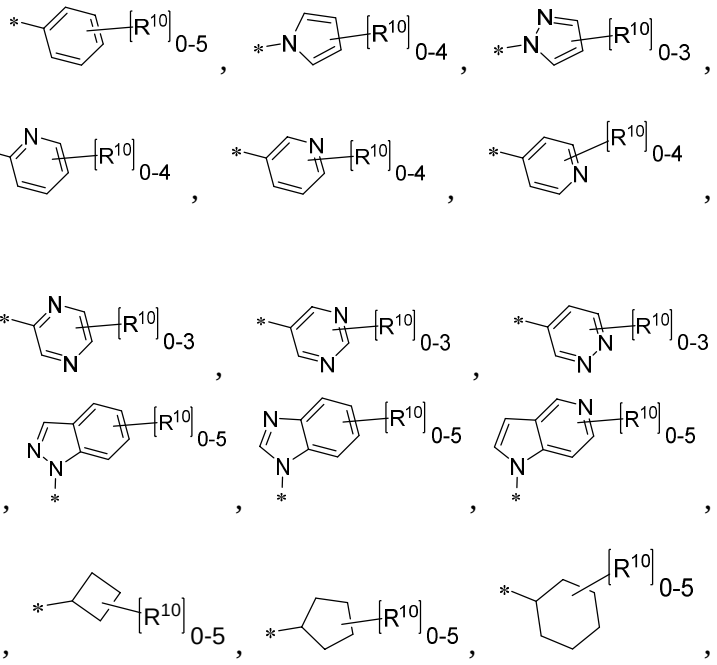
preferably, Cy^1 is , , , , , , , , , , , ; preferably, Cy^1 is , , , , , ; preferably, Cy^1 is ;

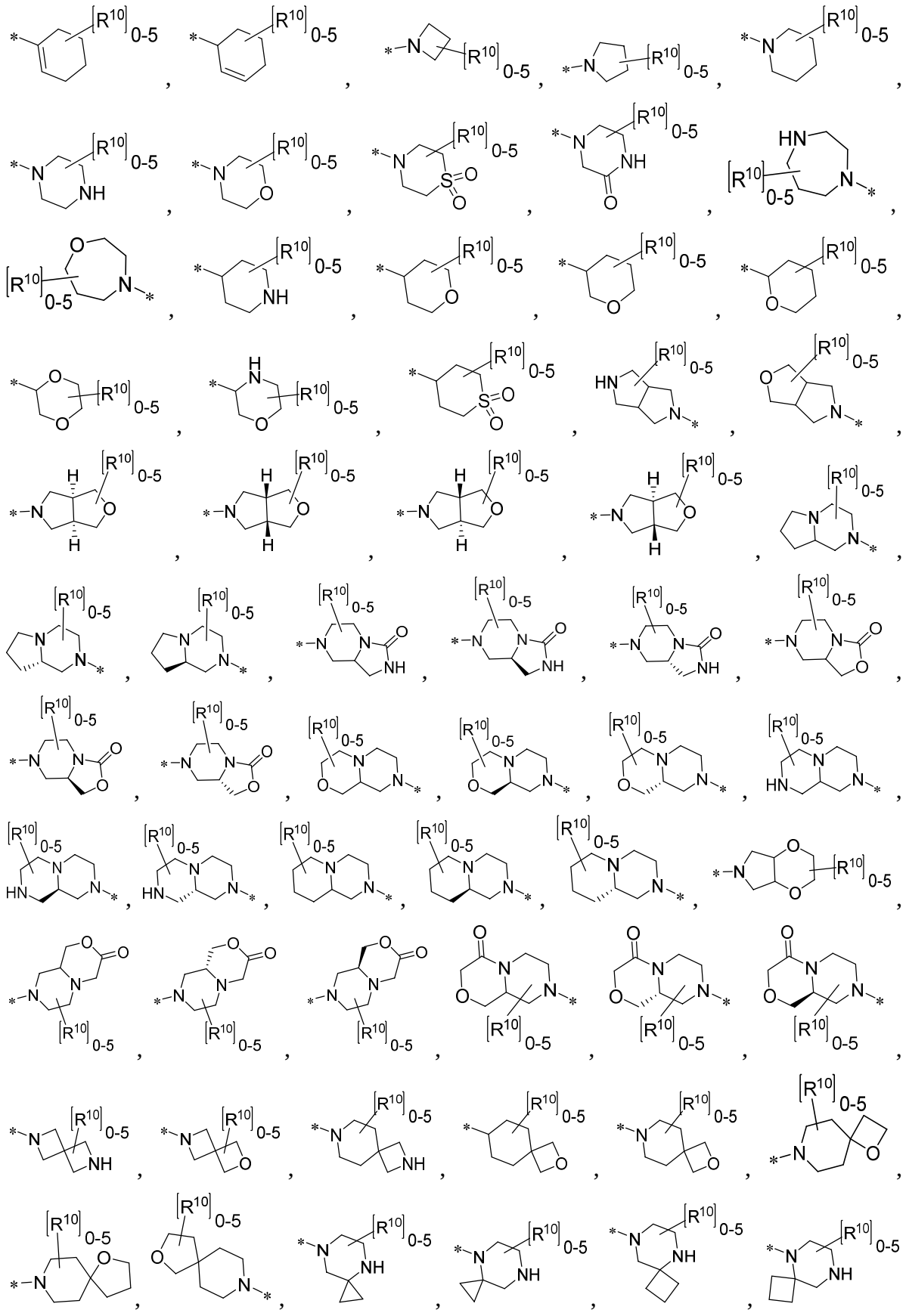
preferably, each R^9 is independently selected from H, D, halo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, OC_1-C_6 alkyl, C_1-C_6 haloalkyl, OC_3-C_7 cycloalkyl, C_3-C_7 cycloalkyl, CN, NO_2, N_3, or SF_5; wherein the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_7 cycloalkyl is optionally substituted with 1, 2, or 3 substituents independently selected from R^{11}; preferably, each R^9 is independently selected from H, D, halo, C_1-C_6 alkyl, C_1-C_6 haloalkyl; preferably, each R^9 is independently selected from methyl, ethyl, isopropyl, t-butyl, cyclopropyl, CF_3, CHF_2, CH_2F or CDF_2;

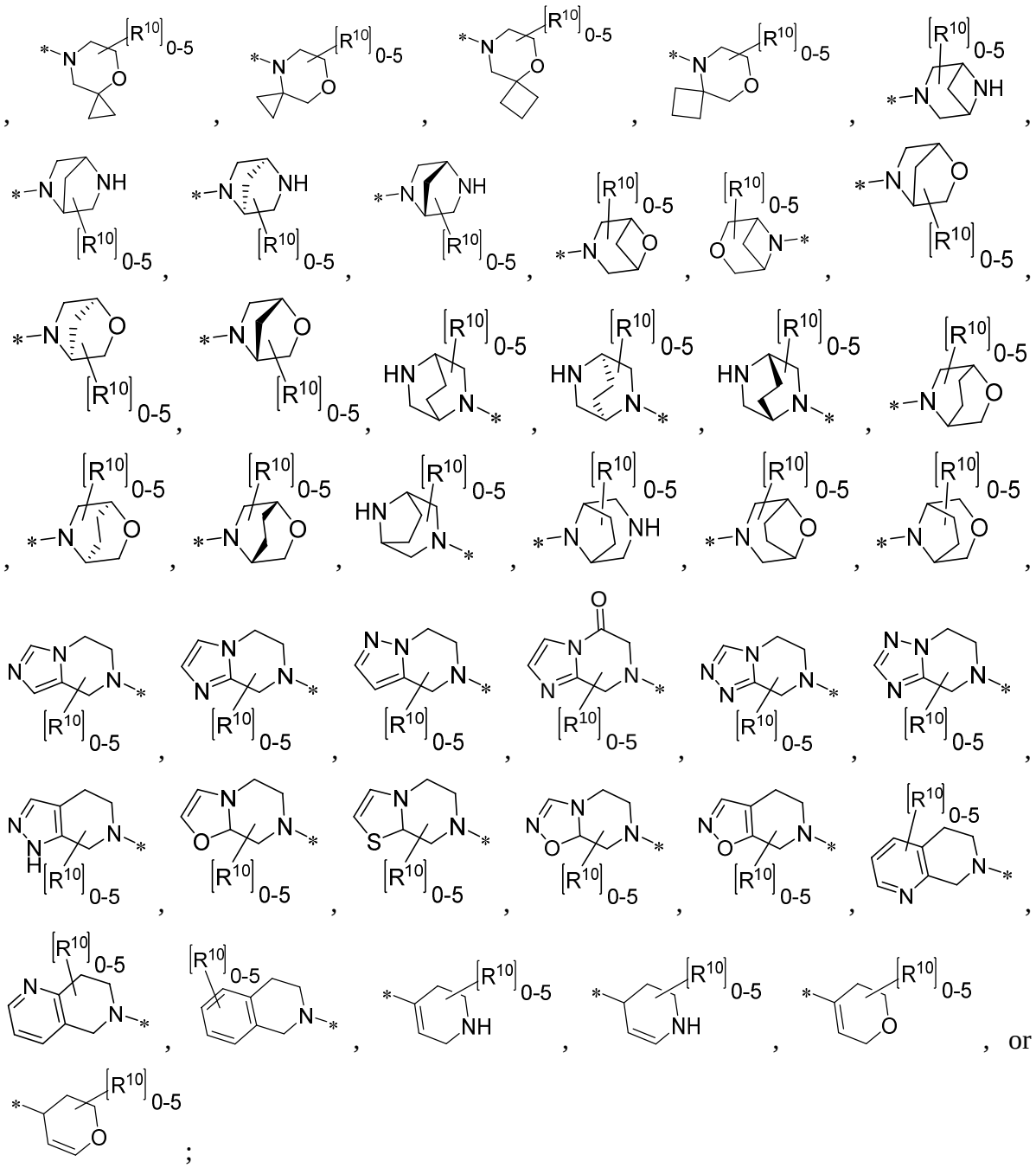
preferably, Cy^2 is selected from C_6-C_{10} aryl, saturated C_3-C_{10} cycloalkyl, partially unsaturated C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, saturated 4-14 membered heterocycloalkyl or partially unsaturated 4-14 membered heterocycloalkyl; wherein, the C_6-C_{10} aryl, saturated C_3-C_{10} cycloalkyl, partially unsaturated C_3-C_{10} cycloalkyl, 5-10 membered heteroaryl, saturated 4-14 membered heterocycloalkyl or partially unsaturated 4-14 membered heterocycloalkyl optionally substituted by 1, 2, 3, 4 or 5 R^{10}; preferably, Cy^2 is selected from C_6-C_{10} aryl, 5-10 membered heteroaryl, saturated C_3-C_{10} mono-cycloalkyl, saturated C_4-C_{10} bicycloalkyl, saturated C_5-C_{10} spirocycloalkyl, saturated C_4-C_{10} bridged cycloalkyl, C_7-C_{10} fused cycloalkyl, partially unsaturated C_3-C_{10} mono-cycloalkyl, partially unsaturated C_4-C_{10} bicycloalkyl, partially unsaturated C_5-C_{10} spirocycloalkyl, partially unsaturated C_4-C_{10} bridged cycloalkyl, saturated 4-14 membered mono-heterocycloalkyl, saturated 4-14 membered bicyclic heterocycloalkyl, saturated 5-14 membered spiro-heterocycloalkyl, saturated 4-14 membered bridged heterocycloalkyl, 7-14 membered fused heterocycloalkyl, partially unsaturated 4-14 membered mono-heterocycloalkyl, partially unsaturated 4-14 membered bicyclic heterocycloalkyl, partially unsaturated 4-14 membered spiro-heterocycloalkyl, partially unsaturated 4-14 membered bridged heterocycloalkyl; each ring is optionally substituted by 1, 2, 3, 4 or 5 R^{10};

preferably, Cy^2 is selected from phenyl, pyrrolyl, furanyl, thiophenyl, imidazolyl, oxazolyl, thiazolyl, pyrazolyl, triazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl, indazolyl, benzo[d]imidazolyl, quinolinyl, quinoxalinyl, pyrrolo[3,2-b]pyridinyl, indolizinyl, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, or cycloheptyl, cyclopropenyl, cyclobutenyl, cyclopentenyl, cyclopentadienyl, cyclohexenyl, azetidinyl, oxetanyl, thietanyl, pyrrolidinyl, tetrahydrofuranyl, tetrahydrothiophenyl, piperidinyl, dioxanyl tetrahydropyranyl, tetrahydrothiopyranyl, piperazinyl, morpholinyl, azepanyl, diazocanyl, diazepanyl, oxazepanyl, azepanyl, thiomorpholine 1,1-dioxidyl, piperazinonyl, tetrahydro-2H-thiopyran 1,1-dioxidyl, octahydropyrrolo[3,4-c]pyrrolyl, hexahydrofuro[3,4-c]pyrrolyl, hexahydrothieno[3,4-c]pyrrolyl, octahydrocyclopenta[b]pyrrolyl, octahydropyrrolo[3,2-b]pyrrolyl, hexahydrofuro[3,2-b]pyrrolyl, octahydropyrano[3,2-b]pyrrolyl, octahydropyrrolo[3,2-b]pyridinyl, hexahydropyrrolo[1,2-a]imidazolyl, octahydropyrrolo[2,3-c]pyridinyl, octahydropyrrolo[3,2-c]pyridinyl, octahydroimidazo[1,2-a]pyridinyl, octahydropyrrolo[3,4-c]pyridinyl, decahydroquinolinyl, octahydrochromenyl, decahydroquinoxalinyl, octahydropyrido[1,2-a]pyrazinyl, octahydropyrazino[2,1-c][1,4]oxazinyl, octahydropyrido[2,1-c][1,4]oxazinyl, octahydropyrano[3,2-c]pyridinyl, decahydro-2,6-naphthyridinyl, octahydropyrano[3,4-c]pyridinyl, octahydropyrrolo[1,2-a]pyrazinyl, hexahydrooxazolo[3,4-a]pyrazinyl, hexahydro-5H-cyclopenta[b][1,4]dioxinyl, hexahydroimidazo[1,5-a]pyrazin-3(2H)-only, hexahydro [1,4]dioxino[2,3-c]pyrrol, hexahydro-oxazolo[3,4-a]pyrazin-3-onyl, octahydro-2H-pyrazino[1,2-a]pyrazinyl, hexahydropyrazino[2,1-c][1,4]oxazin-3(4H)-onyl, hexahydropyrazino[2,1-c][1,4]oxazin-4(3H)-only, 2,6-diazaspiro[3.3]heptanyl, 2-oxa-6-azaspiro[3.3]heptanyl, 2,6-

diazaspiro[3.4]octanyl, 2,7-diazaspiro[3.5]nonanyl, 2,7-diazaspiro[4.4]nonanyl, 3,9-diazaspiro[5.5]undecanyl, 2-oxa-7-azaspiro[3.5]nonanyl, 2-oxa-6-azaspiro[3.4]octanyl, 7-oxa-2-azaspiro[3.5]nonanyl, 6-oxa-2-azaspiro[3.4]octanyl, 1-oxa-8-azaspiro[4.5]decanyl, 2-oxa-8-azaspiro[4.5]decanyl, 2-oxaspiro[3.5]nonanyl, 4,7-diazaspiro[2.5]octanyl, 1-oxa-7-azaspiro[3.5]nonanyl, 5,8-diazaspiro[3.5]nonanyl, 7-oxa-4-azaspiro[2.5]octanyl, 4-oxa-7-azaspiro[2.5]octanyl, 8-oxa-5-azaspiro[3.5]nonanyl, 5-oxa-8-azaspiro[3.5]nonanyl, 2-azabicyclo[1.1.1]pentanyl, 5-azabicyclo[2.1.1]hexanyl, 2-azabicyclo[2.2.1]heptanyl, 2-azabicyclo[2.2.2]octanyl, 6-azabicyclo[3.1.1]heptanyl, 3-azabicyclo[3.2.1]octanyl, 3-azabicyclo[3.3.1]nonanyl, 3-azabicyclo[3.3.2]decanyl, 3-azabicyclo[3.3.3]undecanyl, 3,6-diazabicyclo[3.1.1]heptanyl, 3,8-diazabicyclo[3.2.1]octanyl, 2,5-diazabicyclo[2.2.2]octanyl, 3,6-diazabicyclo[3.1.1]heptanyl, 6-oxa-3-azabicyclo[3.1.1]heptanyl, 3-oxa-6-azabicyclo[3.1.1]heptanyl, 2,5-diazabicyclo[2.2.1]heptanyl, 2-oxa-5-azabicyclo[2.2.1]heptanyl, 2-oxa-5-azabicyclo[2.2.2]octanyl, 3,8-diazabicyclo[3.2.1]octanyl, 8-oxa-3-azabicyclo[3.2.1]octanyl, 3-oxa-8-azabicyclo[3.2.1]octanyl, 5,6,7,8-tetrahydroimidazo[1,5-a]pyrazinyl, 5,6,7,8-tetrahydroimidazo[1,2-a]pyrazinyl, 5,6,7,8-tetrahydro-[1,2,4]triazolo[4,3-a]pyrazinyl, 4,5,6,7-tetrahydro-1H-pyrazolo[3,4-c]pyridinyl, 6,7,8,8a-tetrahydro-5H-[1,2,4]oxadiazolo[4,5-a]pyrazinyl, 4,5,6,7-tetrahydroisoxazolo[5,4-c]pyridinyl, 5,6,7,8-tetrahydro-1,7-naphthyridinyl, 5,6,7,8-tetrahydro-1,6-naphthyridinyl, 1,2,3,4-tetrahydro-2,7-naphthyridinyl, 1,2,3,4-tetrahydroisoquinolinyl, 4,5,6,7-tetrahydropyrazolo[1,5-a]pyrazinyl, 5,6,7,8-tetrahydropyrido[3,4-d]pyrimidinyl, 1,2,3,6-tetrahydropyridinyl, 3,6-dihydro-2H-pyranyl, 1,2,3,4-tetrahydropyridinyl, 3,4-dihydro-2H-pyranyl, 2,3-dihydro-1H-pyrrolyl, 2,5-dihydro-1H-pyrrolyl, 2,3-dihydrofuranyl, 2,5-dihydrofuranyl; each ring optionally substituted by 1, 2, 3, 4 or 5 R^{10};

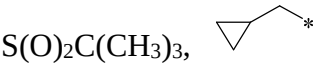
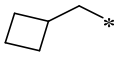
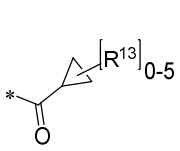
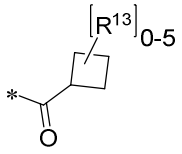
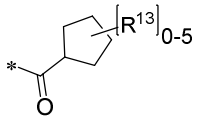
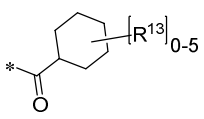
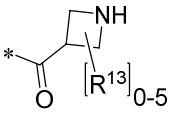
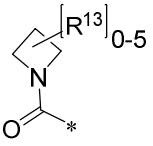
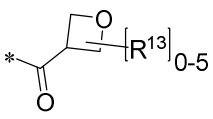
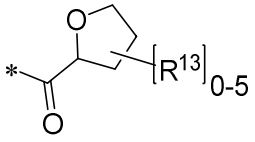
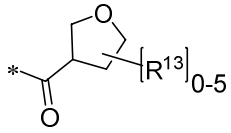
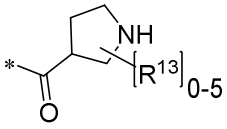
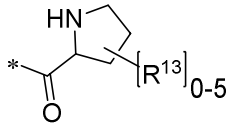
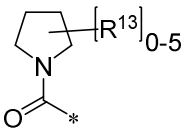
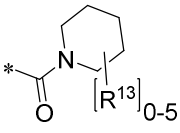
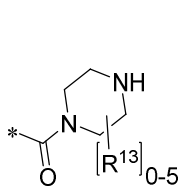
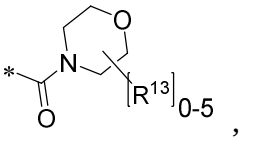
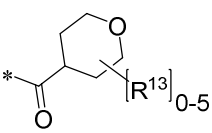
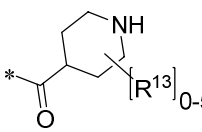
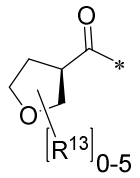
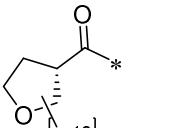
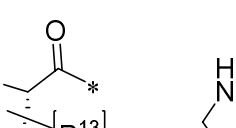
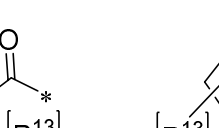
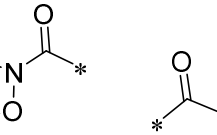
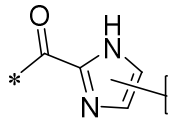
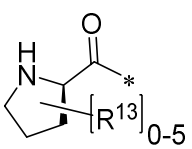
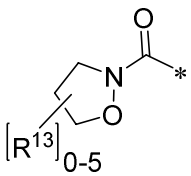
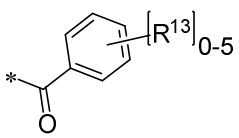
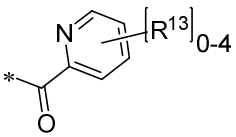
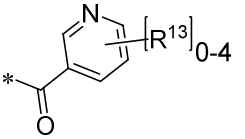
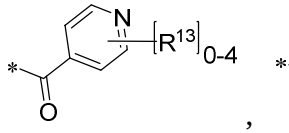
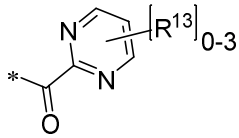
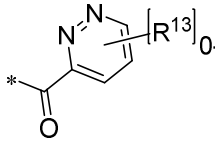
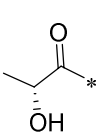
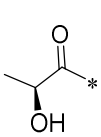
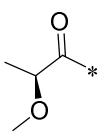
preferably, Cy^2 is selected from 

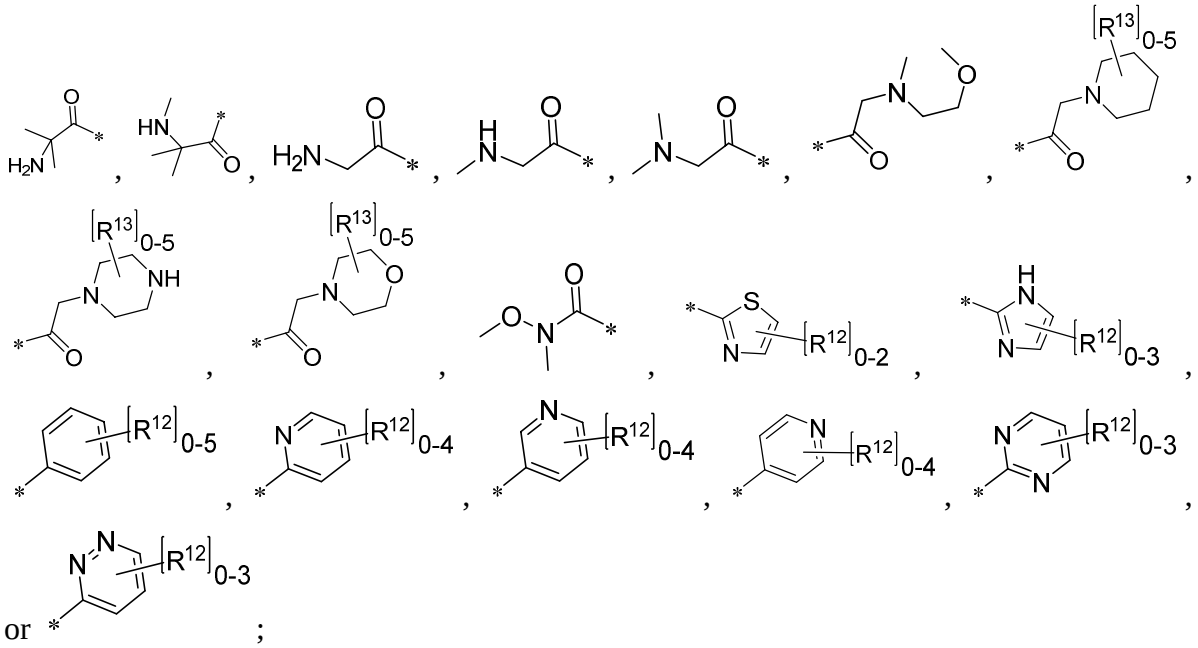




preferably, R^{10} is H, D, halo, CN, NO_2, N_3, oxo, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, OR^A, SR^A, SF_5, NR^COR^A, $C(O)R^B$, $C(=S)R^B$, $C(O)NR^CR^D$, $C(O)NR^COR^A$, $OC(O)R^B$, $OC(O)NR^CR^D$, $OC(O)NR^CR^D$, NR^CR^D, $NR^CC(O)R^D$, $NR^CC(O)NR^CR^D$, $NR^CC(O)OR^A$, $B(OR^C)(OR^D)$, $S(O)(=NR^B)R^B$, $S(O)R^B$, $S(O)NR^CR^D$, $S(O)_2R^B$, $NR^CS(O)_2R^B$, $S(O)_2NR^CR^D$, $NR^CS(O)_2NR^CR^D$, $SiR^GR^HR^I$, $P(O)R^ER^F$, Cy^3, C_1-C_6 alkyl-Cy^3, OCy^3, or O-C_1-C_6 alkyl-Cy^3; wherein, the C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl is optionally substituted 1, 2, 3, 4 or 5 R^{11};

preferably, each R^{10} is independently selected from H, D, halo, CN, NO_2, N_3, oxo, SF_5, NHOH, methyl, ethyl, n-propyl, i-propyl, n-butyl, i-butyl, t-butyl, pentyl, hexyl, CH_2F, CHF_2, CF_3, CH_2CH_2F, CH_2CHF_2, CH_2CF_3, CH_2OH, CH_2OCH_3, $CH_2CH_2OCH_3$, CH_2SCH_3,

$CH_2CH_2NCH_3$, CH_2CN, NH_2, $NHCH_3$, $N(CH_3)_2$, $N(CH_3)CH_2CH_3$, $N(CH_3)CH_2CF_3$, OH, OCH_3, OCH_2CH_3, OCF_3, OCH_2CF_3, $C(=S)CH_3$, $C(=S)CH_2CH_3$, $C(=S)CH_2CH_2CH_3$, $C(=S)CH(CH_3)_2$, $C(=S)C(CH_3)_3$, $C(O)NH_2$, $C(O)NHCH_3$, $C(O)N(CH_3)_2$, $C(O)N(CH_3)CH_2CH_3$, $C(O)N(CH_3)CH_2CF_3$, $C(O)N(CH_3)CH_2CH_2OH$, $C(O)N(CH_3)CH_2CH_2OCH_3$, $C(O)N(CH_3)OCH_3$, $C(O)N(CH_3)CH_2CH(CH_3)OH$, C(O)OH, $C(O)OCH_3$, $C(O)OCH_2CH_3$, $C(O)OCH_2CH_2CH_3$, $C(O)OCH(CH_3)_2$, $C(O)OC(CH_3)_3$, CHO, $C(O)CH_3$, $C(O)CH_2CH_3$, $C(O)CH_2CH_2CH_3$, $C(O)CH(CH_3)_2$, $C(O)CH_2CH(CH_3)_2$, $C(O)C(CH_3)_3$, $C(O)CF_3$, $C(O)CH_2CF_3$, $C(O)CH_2OH$, $C(O)CH_2OCH_3$, $S(O)CH_3$, $S(O)CH_2CH_3$, $S(O)CH(CH_3)_2$, $S(O)C(CH_3)_3$, $S(O)_2CH_3$, $S(O)_2CH_2CH_3$, $S(O)_2CH(CH_3)_2$, $S(O)_2C(CH_3)_3$, , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , ,



or ;

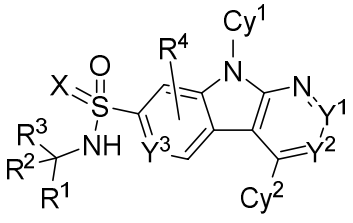
preferably, each R^1 is independently selected from H, D, CN, or C_1-C_3 alkyl optionally substituted by 1-5 substituents independently selected from D, halo, CN, OH, C_1-C_6 alkyl, C_1-C_6 haloalkyl, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl; preferably, R^1 is H, D, CN, CH_3, CD_3, CH_2CH_3, CF_3, CHF_2, CH_2F, CH_2CH_2F, CH_2OH, CH_2OCH_3 or CH_2CN;

preferably, each R^2 and R^3 is independently selected from H, D, CN, or C_1-C_3 alkyl optionally substituted by 1-5 substituents independently selected from D, halo, CN, OH, C_1-C_6 alkyl, C_1-C_6 haloalkyl, -O-C_1-C_6 alkyl, -OC_1-C_6 haloalkyl;

preferably, R^2 and R^3 together with the carbon atom to which they are attached form a C_3-C_6 cycloalkyl, or 4-6 membered heterocycloalkyl, wherein, the C_3-C_6 cycloalkyl, or 4-6 membered heterocycloalkyl is optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halo, CN, NO_2, oxo, OH, OMe, OCF_3, or OEt; preferably, R^2 and R^3 together with the carbon atom to which they are attached is cyclopropyl, cyclobutyl, each is optionally substituted by 1, 2, 3 or 4 substituents independently selected from D, halo, CN, NO_2, oxo, OH, OMe, OCF_3, or OEt;

preferably, each R^4 is independently selected from H, D, OH, CN, NO_2, SF_5, halo, NR^CR^D or C_1-C_3 alkyl optionally substituted with halogen or CN; preferably, each R^4 is independently selected from H, D, OH, CN, or halo;

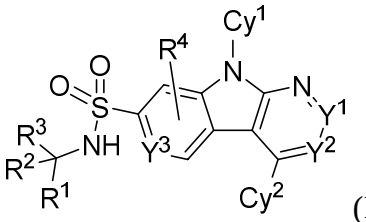
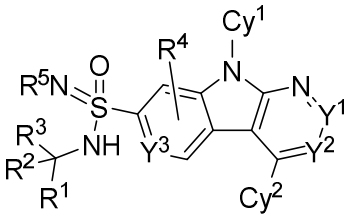
preferably, the compound is represented by compounds of Formula (IIA):



(IIA)

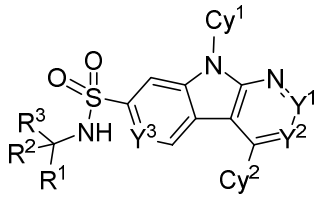
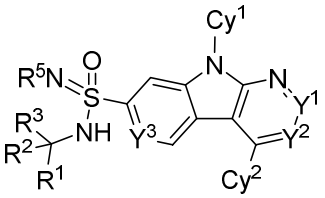
or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^4, Cy^1, Cy^2, X, Y^1, Y^2 and Y^3 are defined with respect to Formula (I);

preferably, the compound is represented by compounds of Formula (IIa) or (IIb):


(IIa),

(IIb);

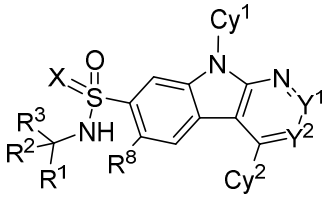
or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^4, R^5, Cy^1, Cy^2, Y^1, Y^2 and Y^3 are defined with respect to Formula (I);

preferably, the compound is represented by compounds of Formula (IIIa) or (IIIb):


(IIIa),

(IIIb);

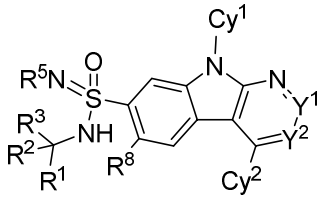
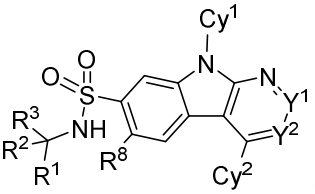
or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^5, Cy^1, Cy^2, Y^1, Y^2 and Y^3 are defined with respect to Formula (I);

preferably, the compounds are represented by compounds of Formula (IV):


(IV);

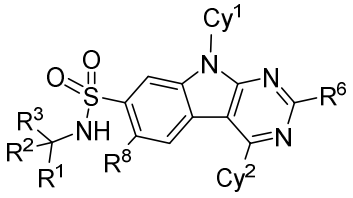
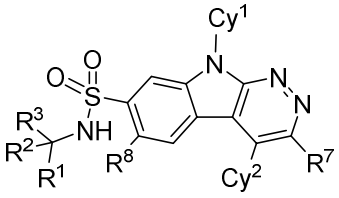
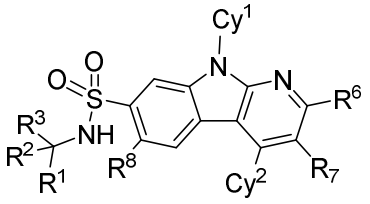
or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^8, Cy^1, Cy^2, X, Y^1, and Y^2 are defined with respect to Formula (I);

preferably, the compounds are represented by compounds of Formula (IVa) or (IVb):


(IVa),

(IVb);

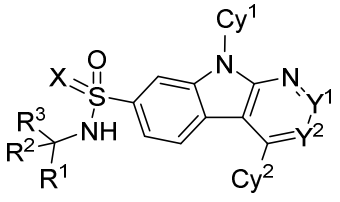
or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^5, R^8, Cy^1, Cy^2, Y^1, and Y^2 are defined with respect to Formula (I);

preferably, the compounds are represented by compounds of Formula (Va), (Vb), or (Vc):


(Va);

(Vb);

(Vc);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^6, R^7, R^8, Cy^1, and Cy^2, are defined with respect to Formula (I);

preferably, the compound is represented by compounds of Formula (VI):

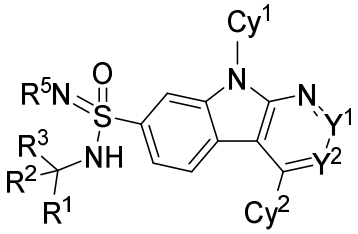
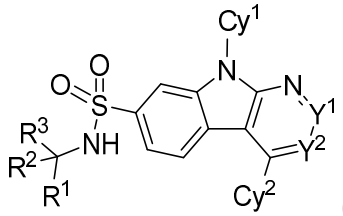

(VI);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof;

wherein, Cy^1 is a 5 membered heteroaryl having 1, 2, 3 or 4 heteroatoms independently selected from N, O and S, wherein, the 5 membered heteroaryl optionally substituted by 1, 2, 3, or 4 R^9;

each R^1, R^2, R^3, R^9, Cy^2, X, Y^1, and Y^2 are defined with respect to Formula (I);

preferably, the compound is represented by compounds of Formula (VIa) or (VIb):

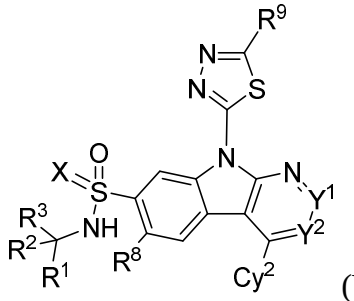

(VIa),

(VIb);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof;

wherein, Cy^1 is a 5 membered heteroaryl having 1, 2, 3 or 4 heteroatoms independently selected from N, O and S; wherein, the 5 membered heteroaryl optionally substituted by 1, 2, 3, or 4 R^9;

each R^1, R^2, R^3, R^5, R^9, Cy^2, Y^1, and Y^2 are defined with respect to Formula (I);

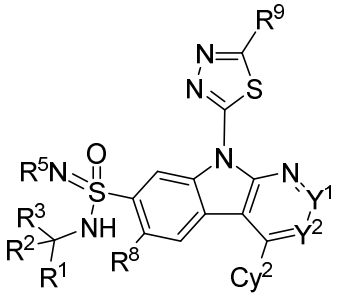
preferably, the compound is represented by compounds of Formula (VII):



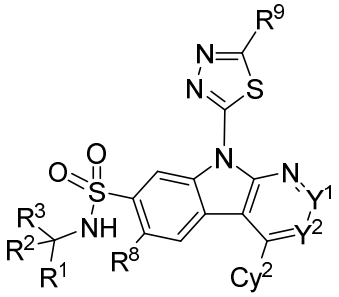
(VII);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^8, R^9, Cy^2, X, Y^1, and Y^2 are defined with respect to Formula (I);

preferably, the compound is represented by compounds of Formula (VIIa) or (VIIb):



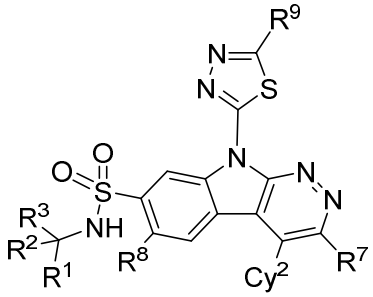
(VIIa),



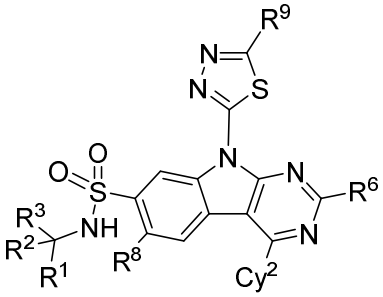
(VIIb);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^5, R^8, R^9, Cy^2, Y^1, and Y^2 are defined with respect to Formula (I);

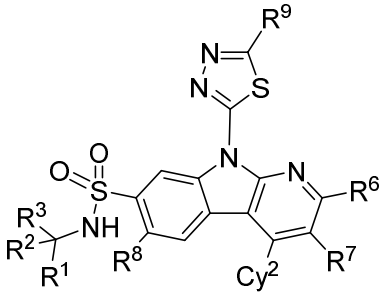
preferably, the compound is represented by compounds of Formula (VIIIa), (VIIIb), or (VIIIc):



(VIIIa),



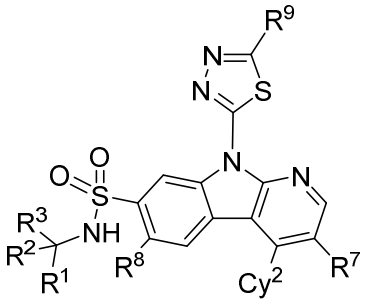
(VIIIb);

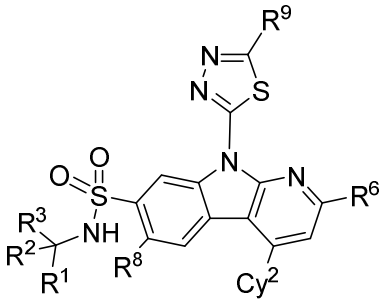


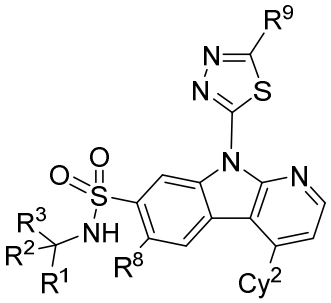
(VIIIc);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^6, R^7, R^8, R^9, and Cy^2 are defined with respect to Formula (I);

preferably, the compound is represented by compounds of Formula (IXa), (IXb), or (IXc):

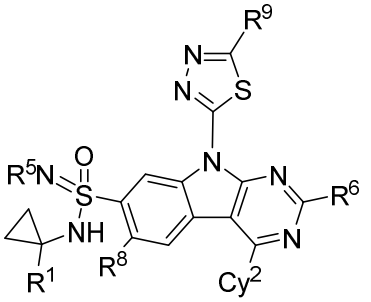

(IXa),

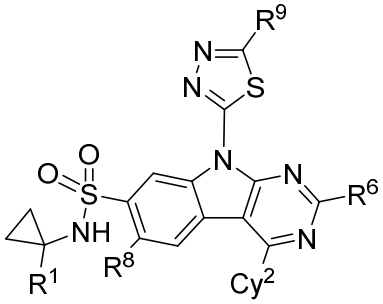

(IXb),


(IXc);

or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^2, R^3, R^6, R^7, R^8, R^9, and Cy^2 are defined with respect to Formula (I);or

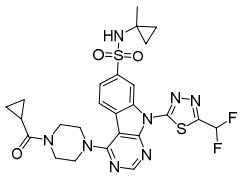
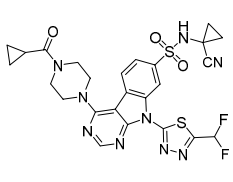
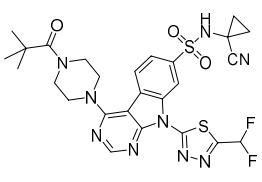
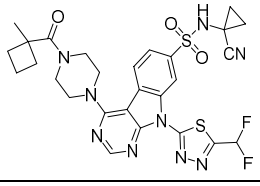
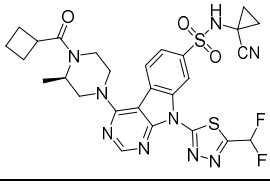
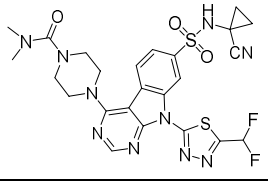
preferably, the compounds of Formula (I) are represented by compounds of Formula (Xa), or (Xb):

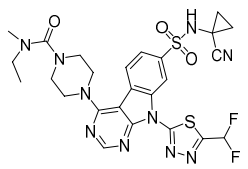
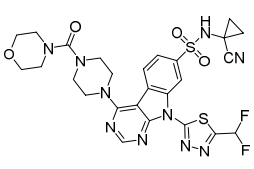
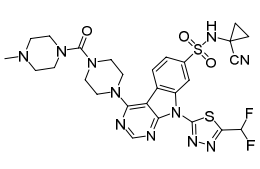
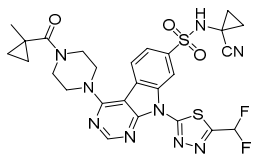
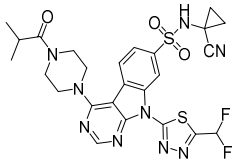
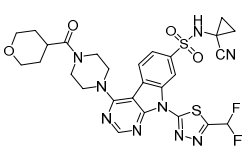
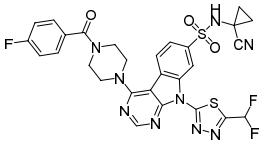
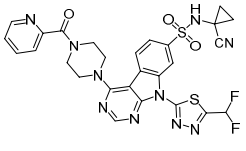
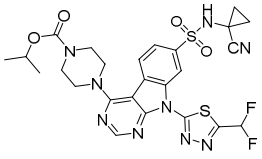
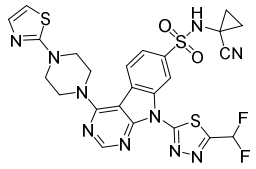
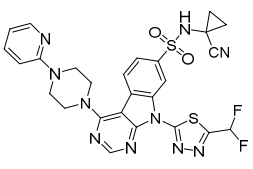
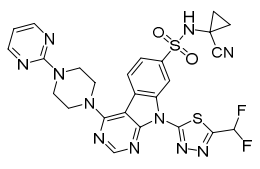
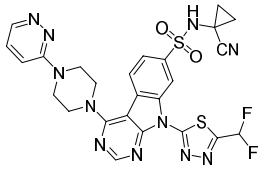
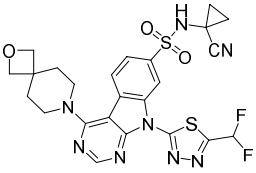
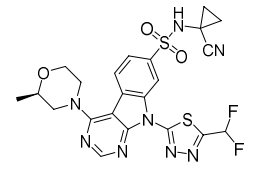
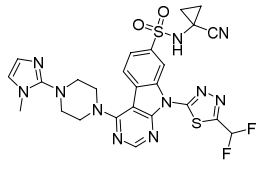
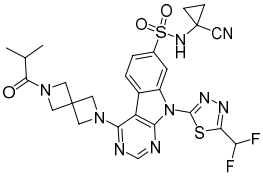
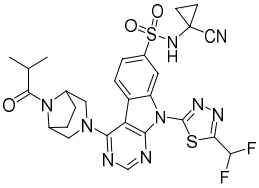
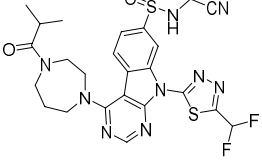
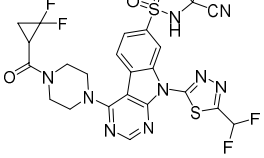
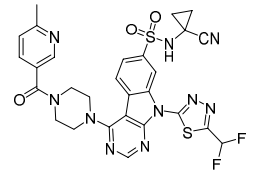
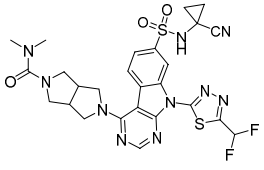
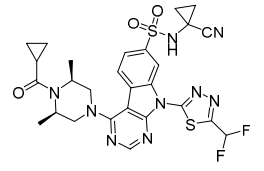
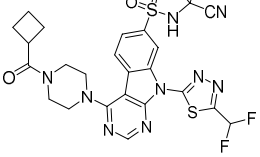
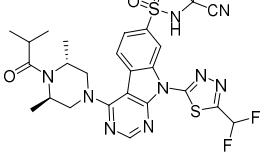
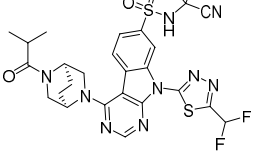
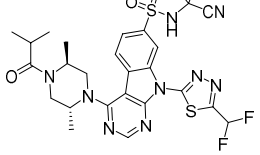

(Xa),

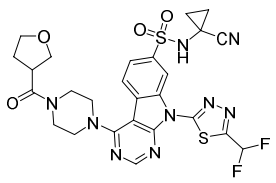
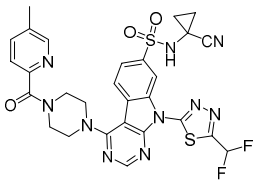
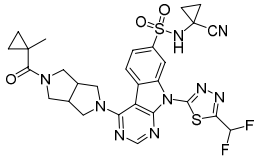
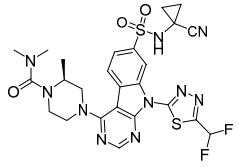
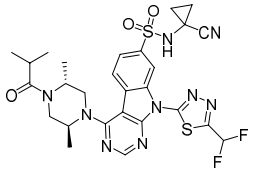
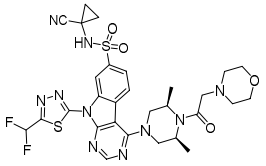
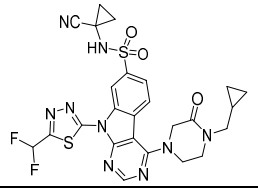
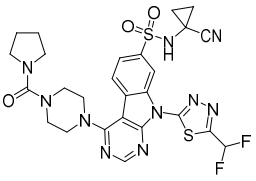
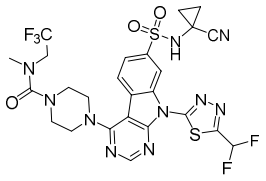
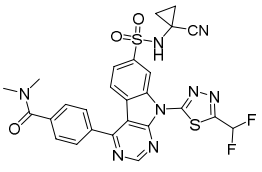
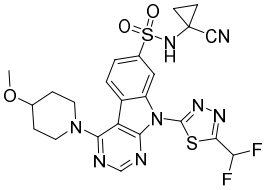
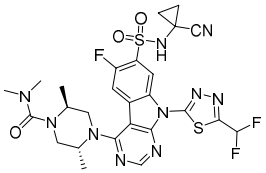
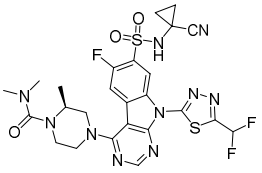
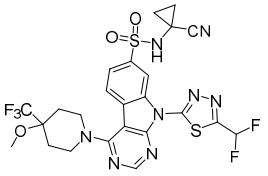
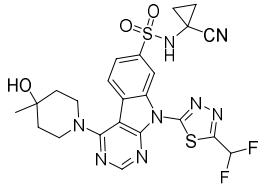
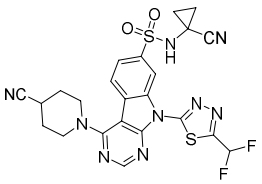
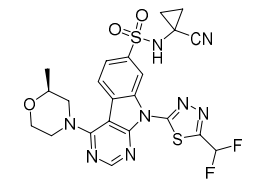
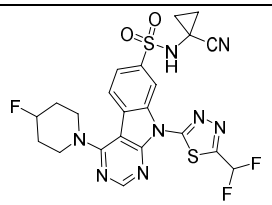
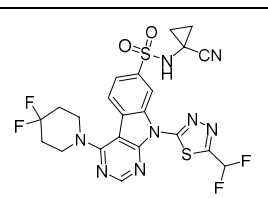
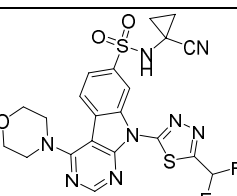
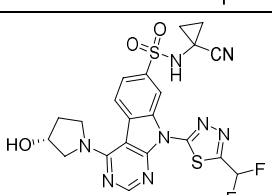
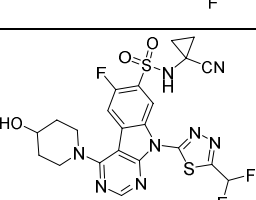
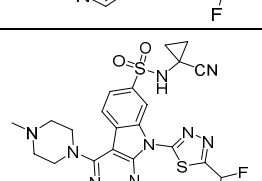
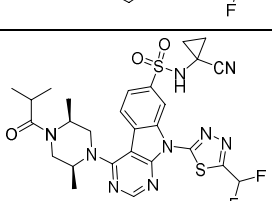
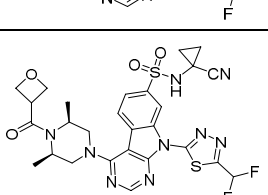
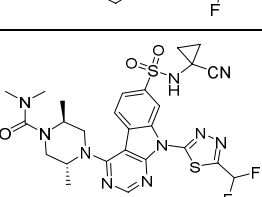
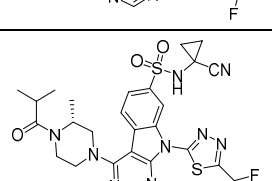
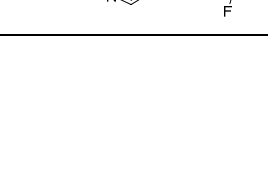
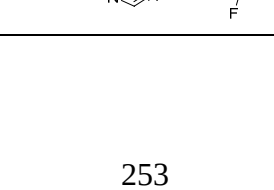
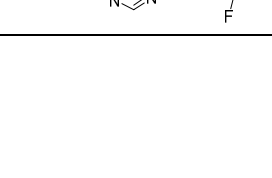

(Xb);

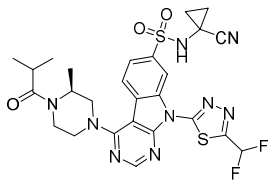
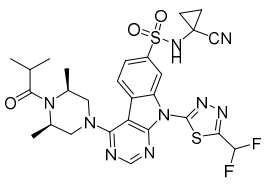
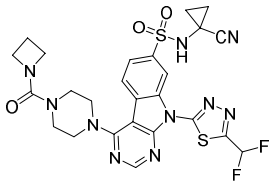
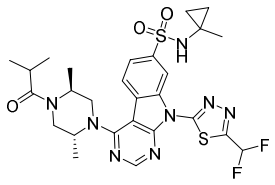
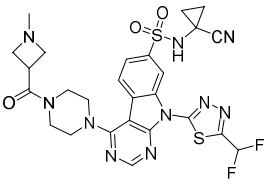
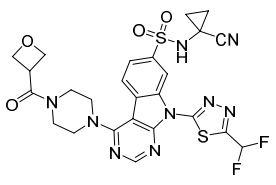
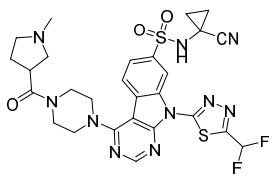
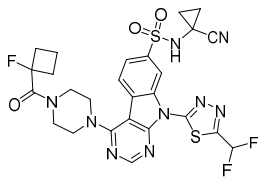
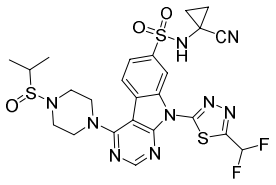
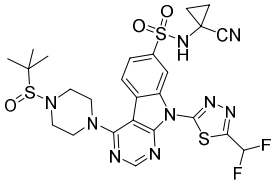
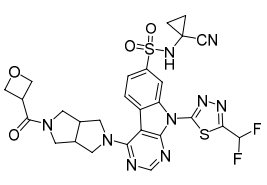
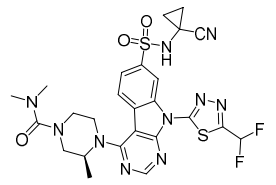
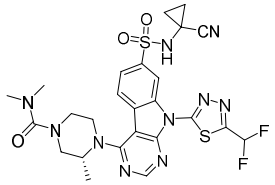
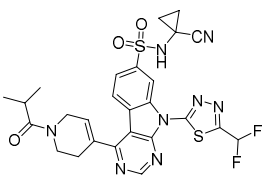
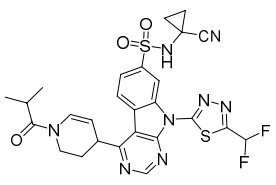
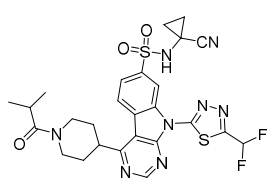
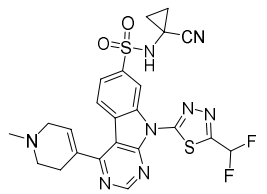
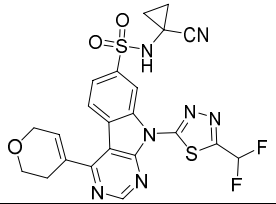
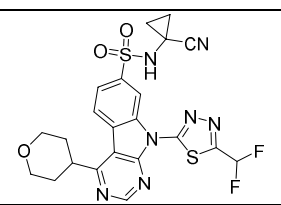
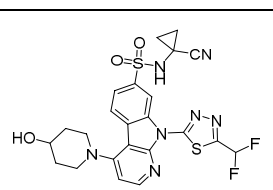
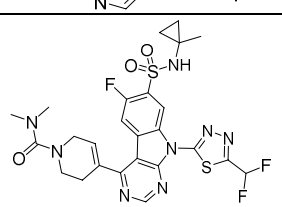
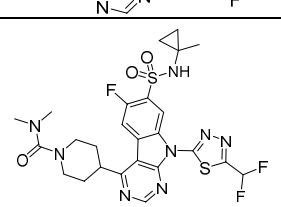
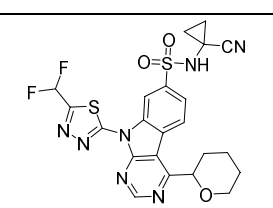
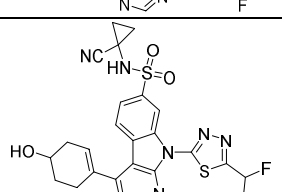
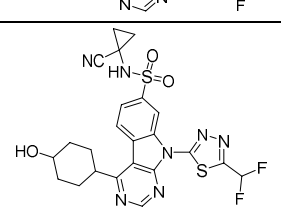
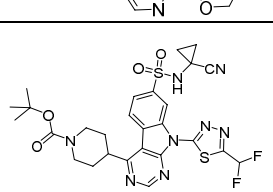
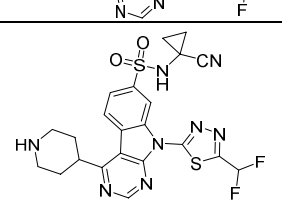
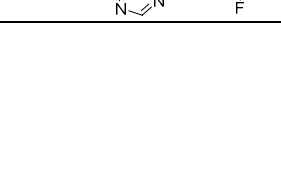
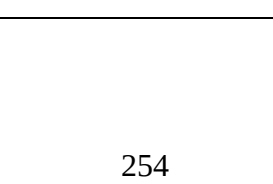
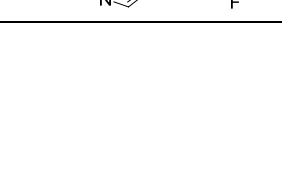
or pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof; wherein each R^1, R^5, R^6, R^8, R^9, and Cy^2 are defined with respect to Formula (I).

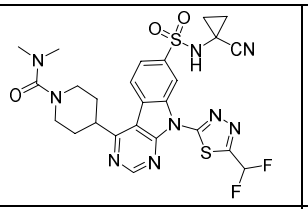
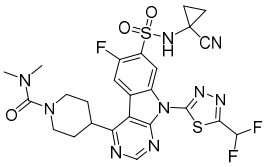
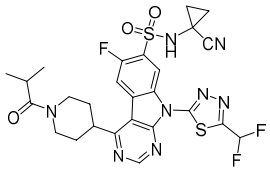
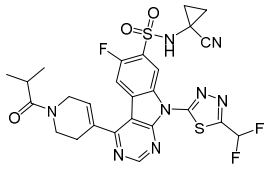
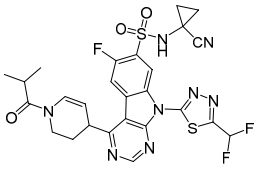
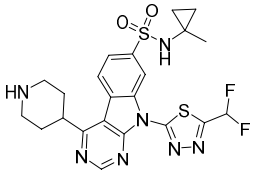
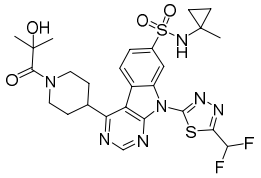
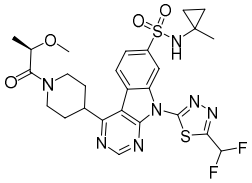
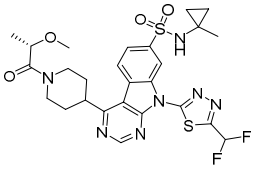
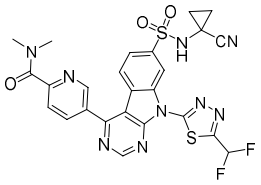
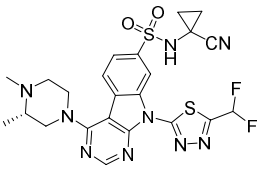
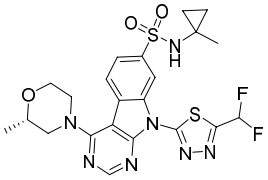
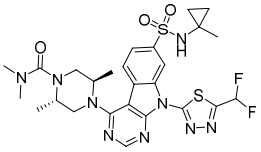
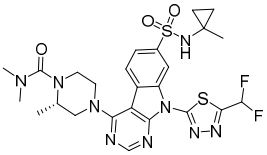
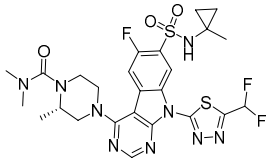
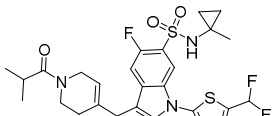
4. The compound of anyone of claim 1-3, wherein, the compound of Formula (I) is:

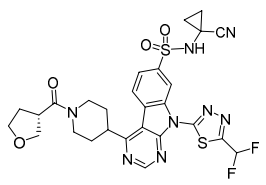
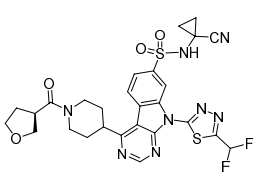
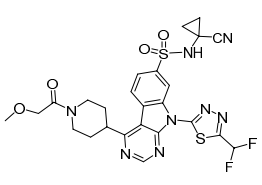
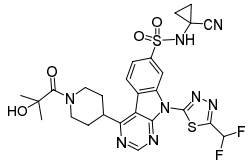
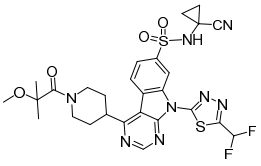
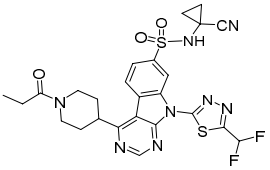
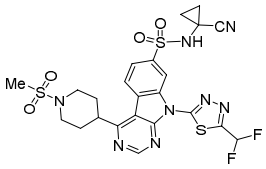
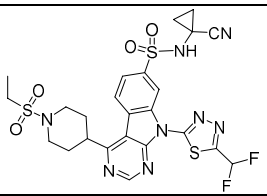
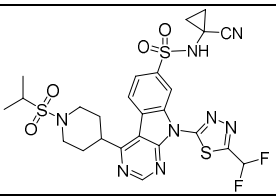
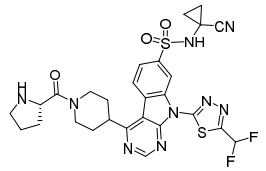
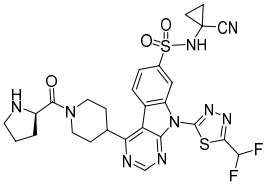
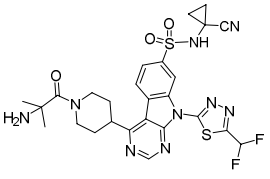
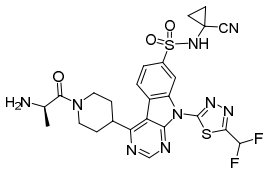
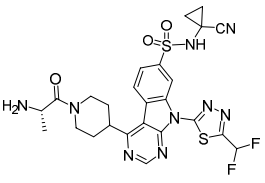
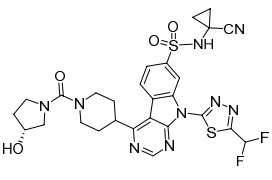
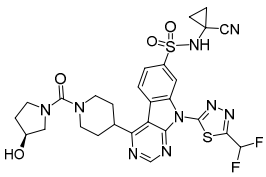
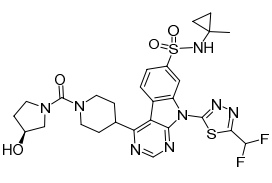
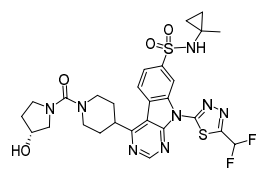
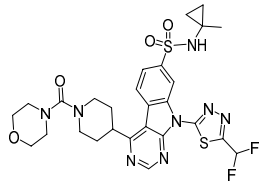
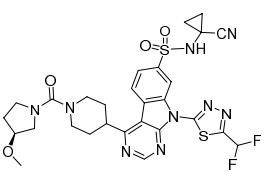
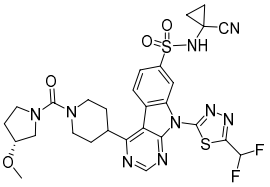
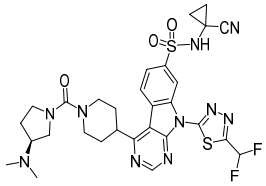
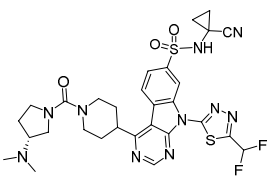
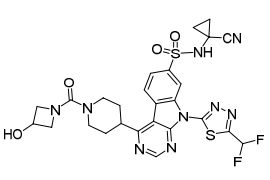
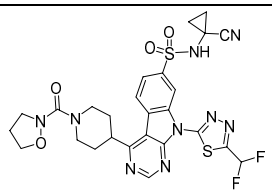
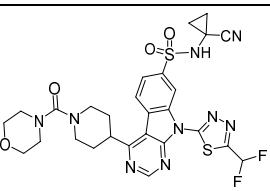
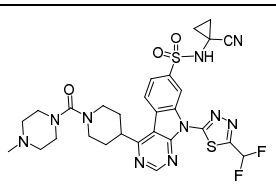
		
		

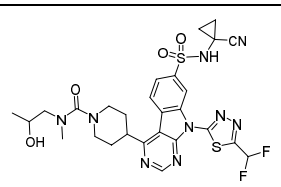
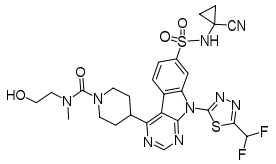
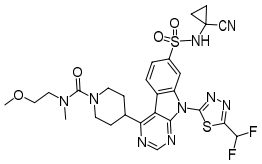
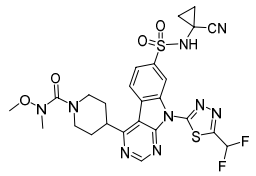
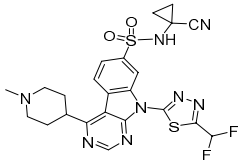
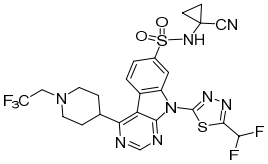
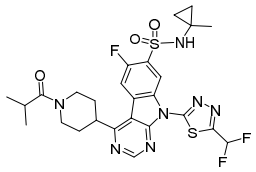
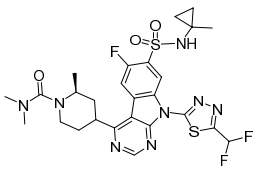
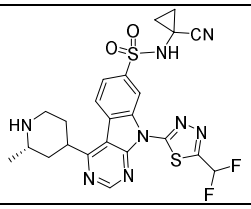
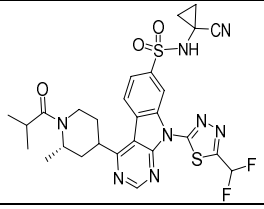
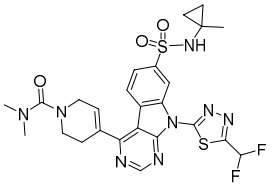
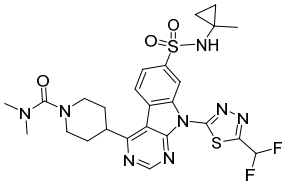
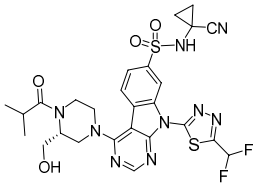
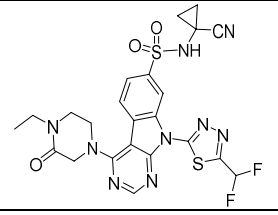
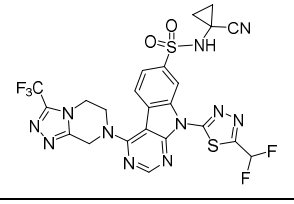
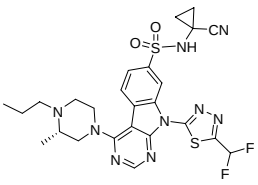
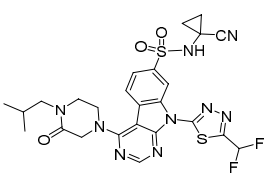
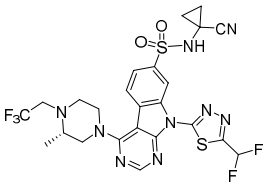
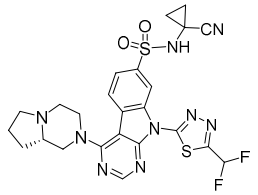
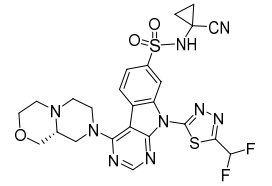
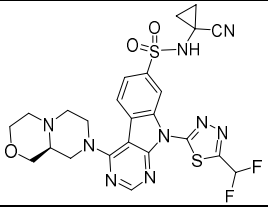
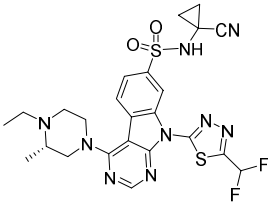
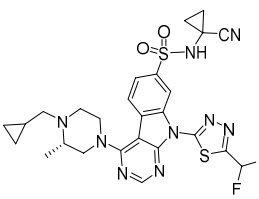
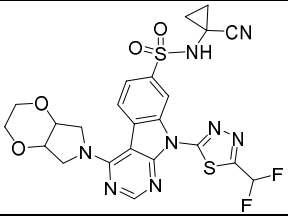
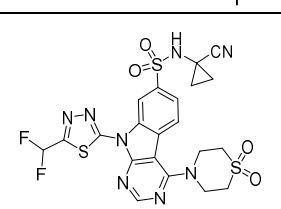
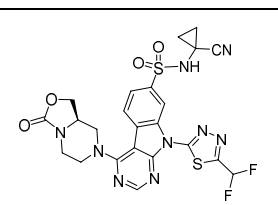
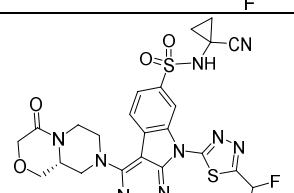
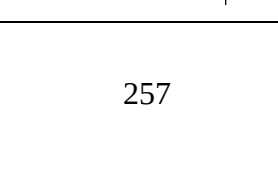
		
		
		
		
		
		
		
		
		
		

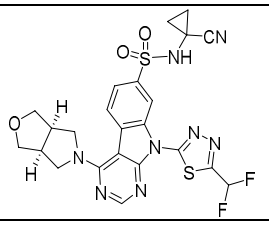
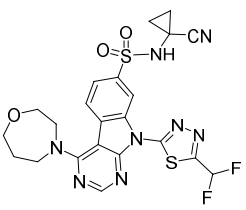
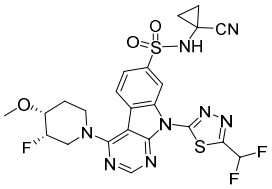
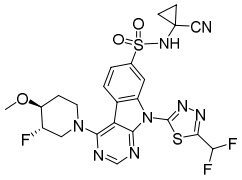
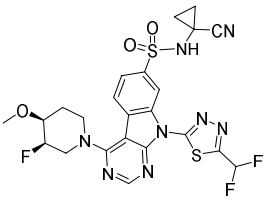
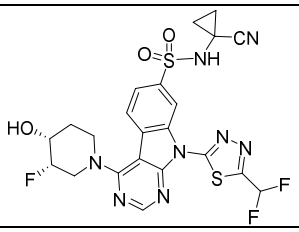
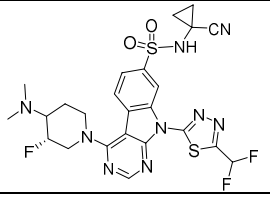
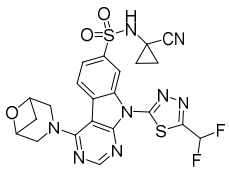
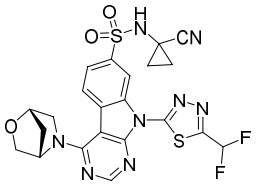
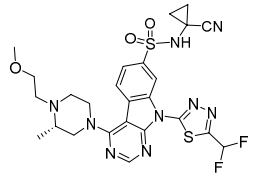
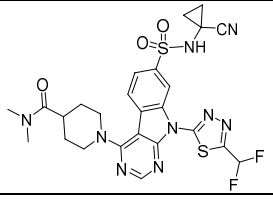
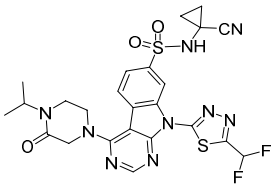
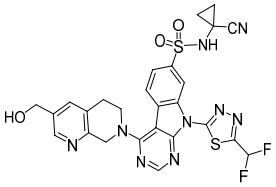
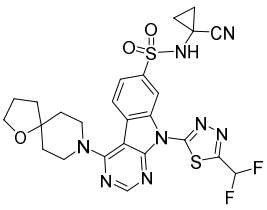
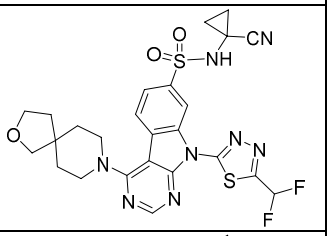
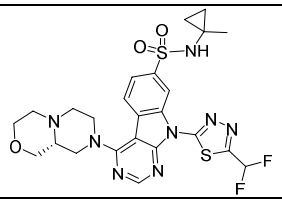
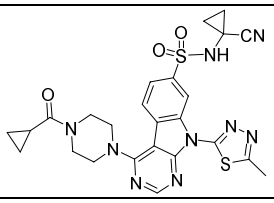
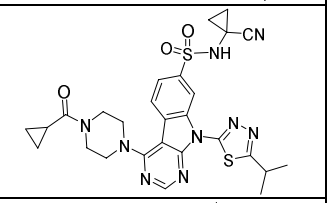
		
		
		
		
		
		
		
		
		
		

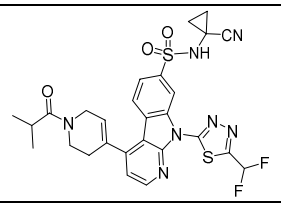
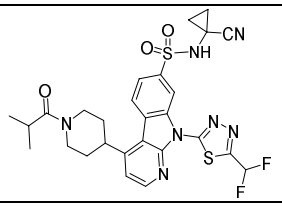
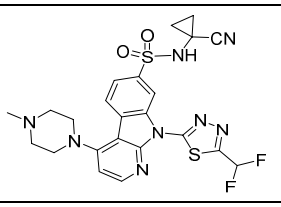
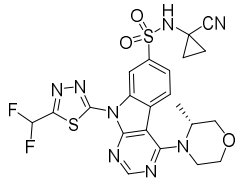
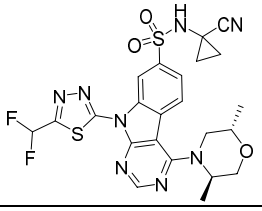
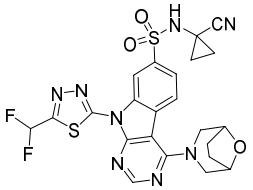
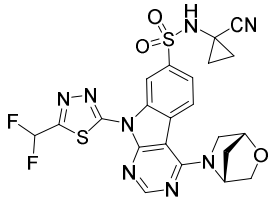
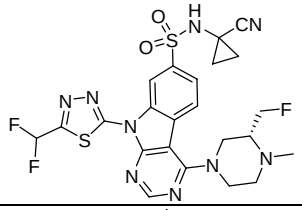
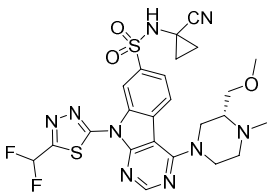
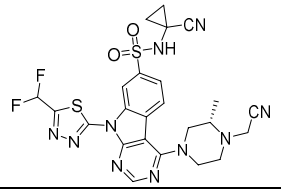
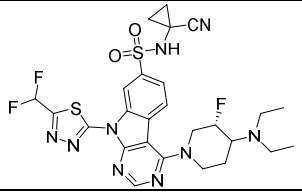
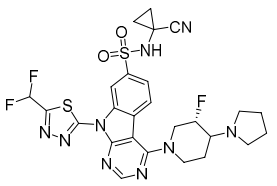
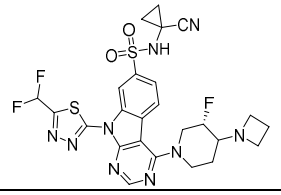
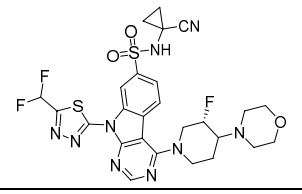
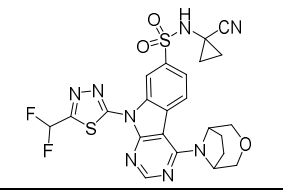
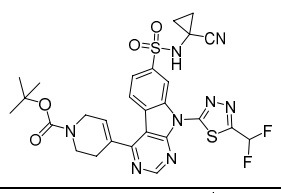
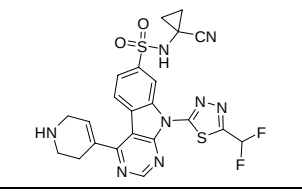
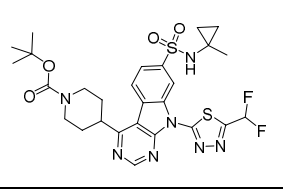
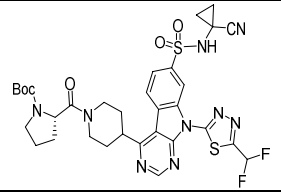
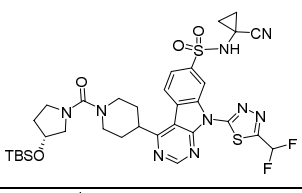
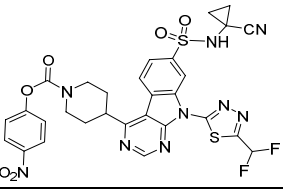
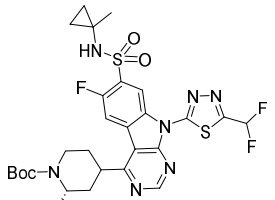
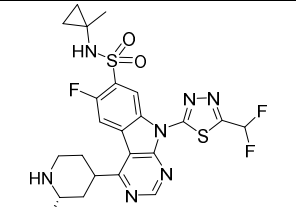
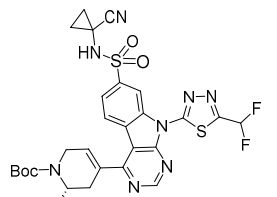
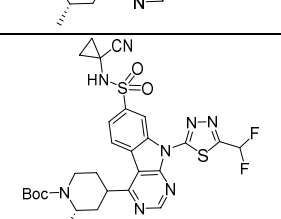
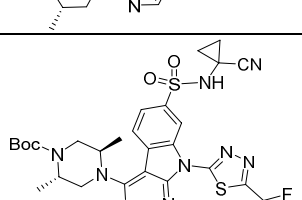
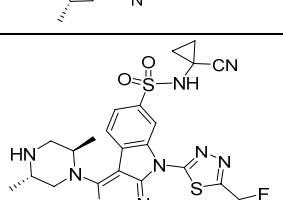
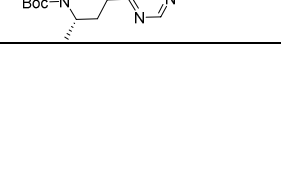
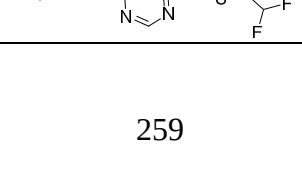
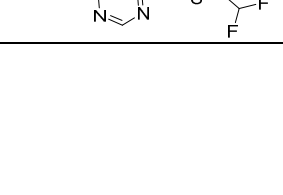
		
		
		
		
		
		
		
		
		
		

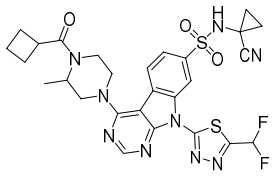
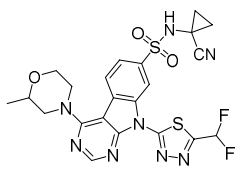
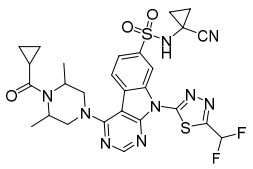
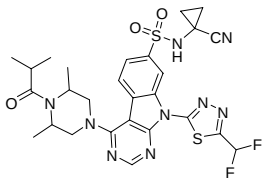
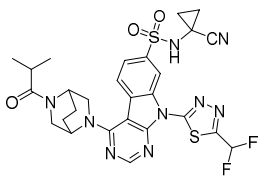
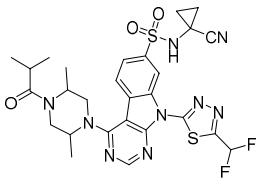
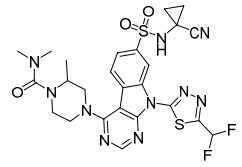
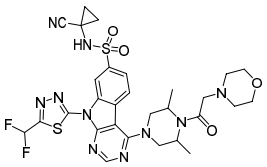
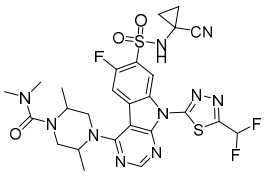
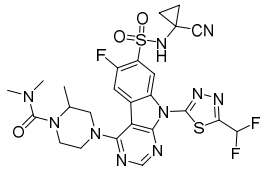
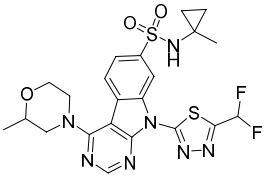
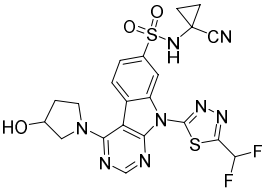
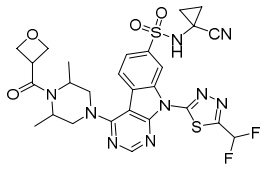
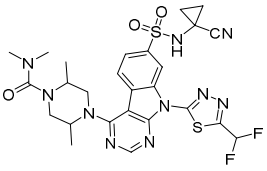
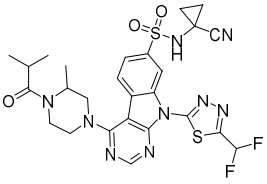
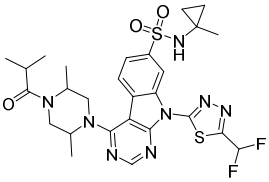
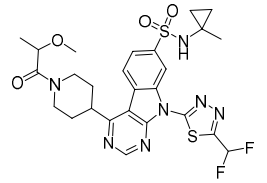
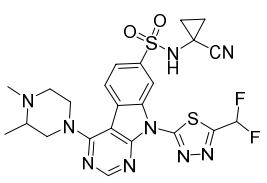
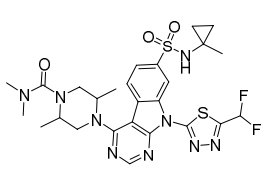
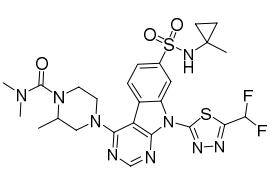
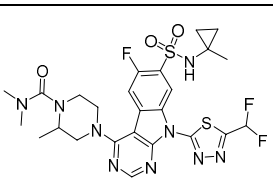
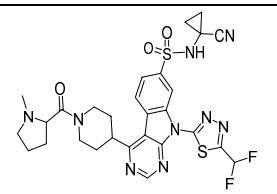
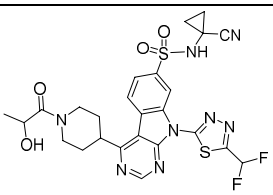
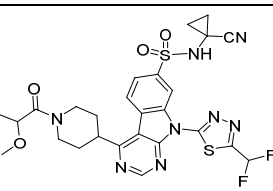
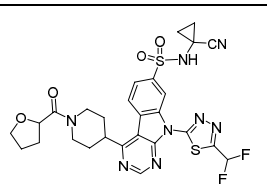
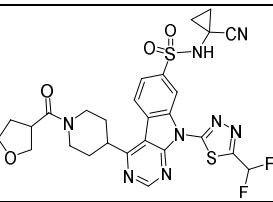
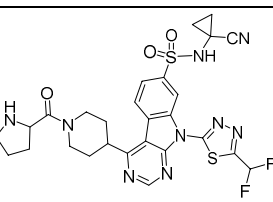
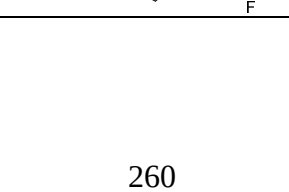
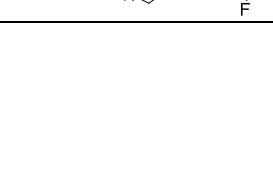
		
		
		
		
		
		

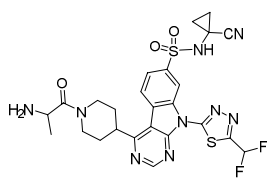
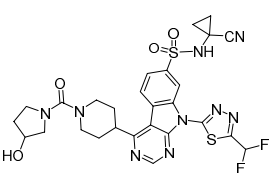
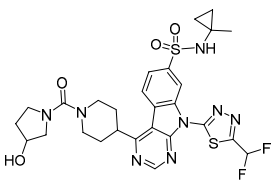
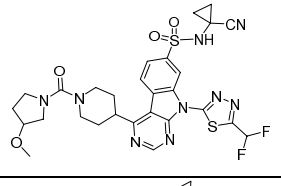
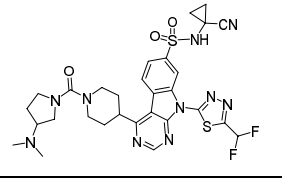
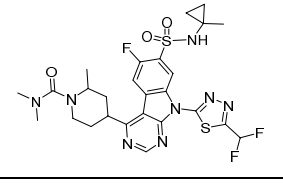
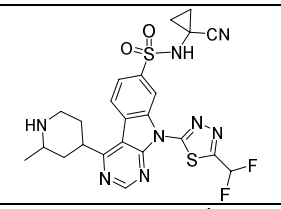
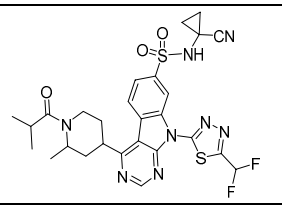
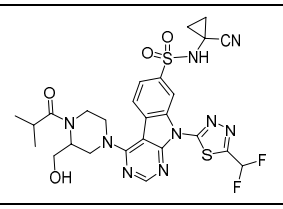
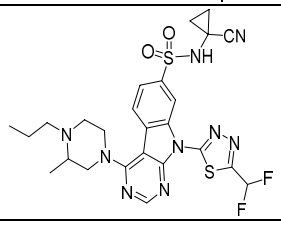
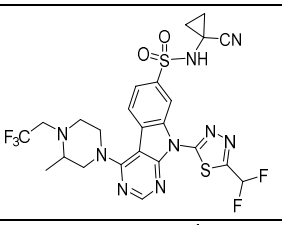
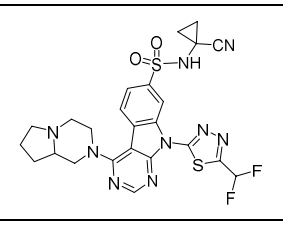
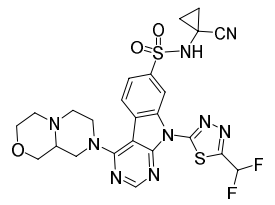
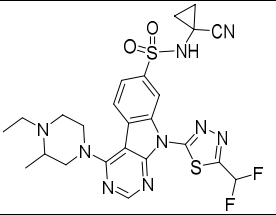
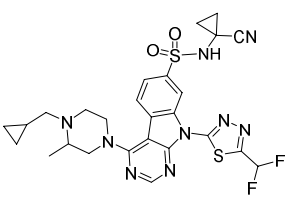
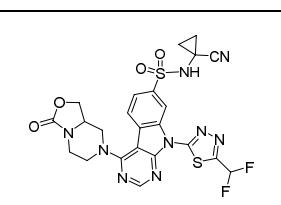
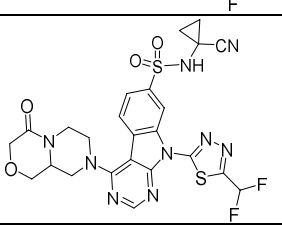
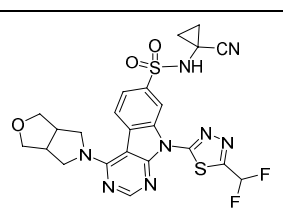
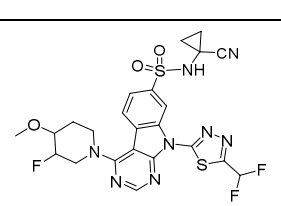
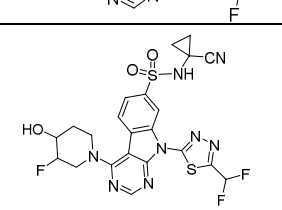
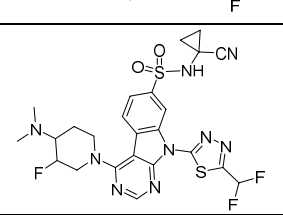
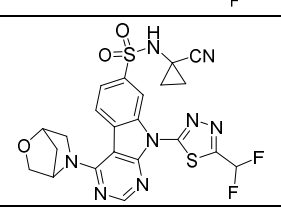
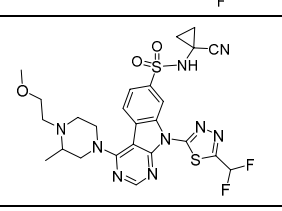
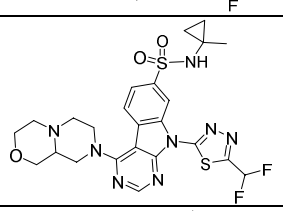
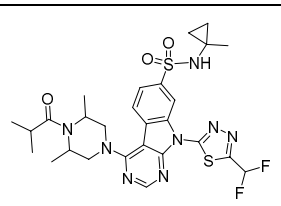
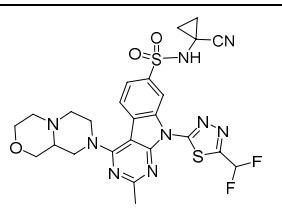
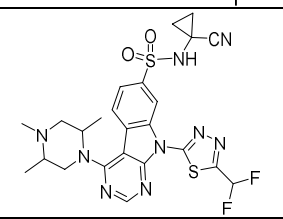
		
		
		
		
		
		
		
		
		

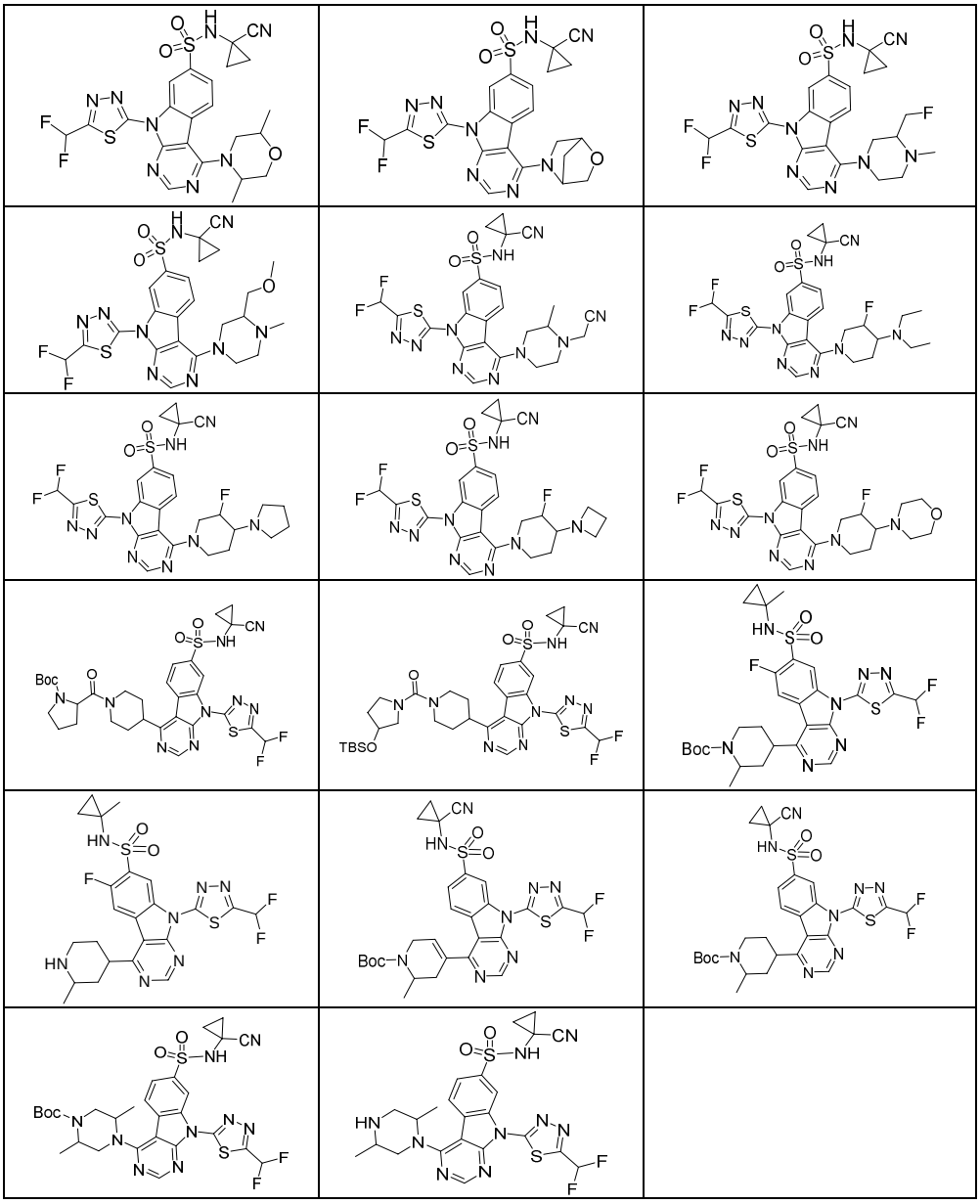
		
		
		
		
		
		
		
		
		
		



or a pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide, tautomeric, isotopic variants, prodrugs or deuterated compound thereof.

5. A pharmaceutical composition comprising the compound of anyone of claim 1-4, a pharmaceutically acceptable salt, stereoisomer, prodrug, chelate, or non-covalent complex, and at least one pharmaceutically acceptable carrier or excipient.

6. Use of the compound of anyone of claim 1-4, a pharmaceutically acceptable salt or stereoisomer, prodrug, chelate, or non-covalent complex thereof or the pharmaceutical composition of claim 5 for the preparation of a medicament;

preferably, the medicament is used as an inhibitor of PARG;

preferably, the medicament is used for the treatment of the cancer; or

preferably, the cancer is breast, ovarian, gastric, prostate, pancreatic, uterine, cervical, endometrial, lung, brain, bile duct and hematological cancer.

7. A method of inhibiting PARG, wherein, the method comprising: administering to the patient in need the compound of anyone of claim 1-4, a pharmaceutically acceptable salt or a pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide thereof or prodrugs, or the pharmaceutical composition of claim 5.

8. A method of treating a disease associated with inhibition of PARG, wherein, the method comprising administering to a patient in need thereof a therapeutically effective amount of a compound of anyone of claim 1-4, or a pharmaceutically acceptable salt, stereoisomer, solvate, N-oxide thereof or prodrugs or the pharmaceutical composition of claim 5;

preferably, the disease is a cancer; or

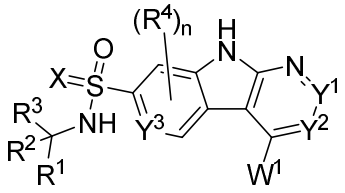
preferably, the cancer is breast, ovarian, gastric, prostate, pancreatic, uterine, cervical, endometrial, lung, brain, bile duct and hematological cancer.

9. Use of the compound of anyone of claim 1-4 in combination with surgery, chemotherapies, radiation therapies, targeted therapy, other DDR modulators, immunotherapies, and gene and cell therapy approaches for the treatment of the cancer;

preferably, the targeted therapy is a kinase inhibitor, growth factor inhibitor, cyclin dependent kinase inhibitor;

preferably, the DDR modulator is DNA-PK inhibitor, ATM inhibitor, ATR inhibitor, CHK1 inhibitor, WEE1 inhibitor, CDK1 inhibitor, LIG4 inhibitor, HIF-1 inhibitor, HDAC inhibitor, RAD51 inhibitor, Polθ inhibitor, WRN inhibitor, PRMT5 inhibitor, MAT2A inhibitor and PKMYT1 inhibitor.

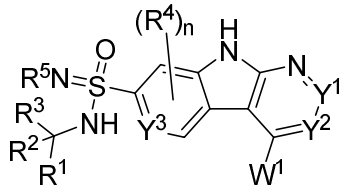
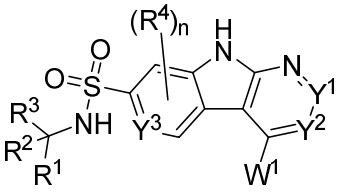
10. An intermediate compound of formula (A) or salts thereof, wherein:


(A)

W^1 is a leaving group;

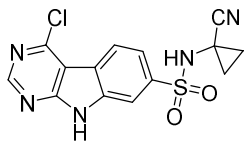
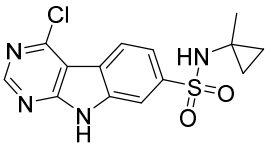
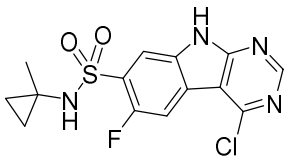
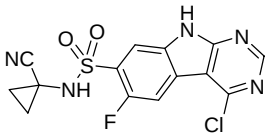
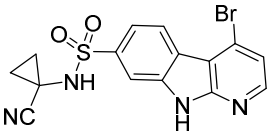
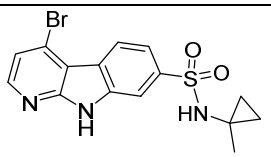
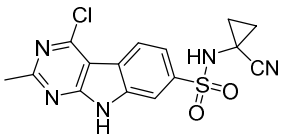
wherein R^1, R^2, R^3, R^4, X, Y^1, Y^2 and n are defined with respect to Formula (I);

preferably, the intermediate compounds of Formula (A) are represented by compounds of Formula (Aa), or (Ab):


(Aa),

(Ab);

wherein, R^1, R^2, R^3, R^4, R^5, Y^1, Y^2 and W^1 are defined with respect to Formula (A); or

preferably, the intermediate compounds are:

or salts thereof.