L is each independently selected from the group consisting of: absence, O, NR^{d5}, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl;

R^e is each independently selected from the group consisting of hydrogen, deuterium, Na, K, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, and heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, and halogenated C1-C6 alkyl;

R^h is each independently selected from the group consisting of: C1-C6 alkyl, $-NHC(O)R^{g1}$, $-OC(O)R^{g2}$, $-OP(O)(ONa)_2$, $-NHC(O)OR^{d6}$, $-OC(O)OR^{d7}$, $-OC(O)NHR^{d8}$;

R^{d1}, R^{d2}, R^{d3}, R^{d4}, R^{d5}, R^{d6}, R^{d7}, R^{d8} are each independently selected from the group consisting of: hydrogen, deuterium, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more R^f groups;

R^f is each independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C6-C10 aryl, halogenated C6-C10 aryl, C3-C7 cycloalkyl, 3- to 15-membered heterocyclyl, $-NR^{g3}R^{g4}$, $-OR^{g5}$, $-NHC(O)R^{g6}$, $-OC(O)R^{g7}$;

R^{g1}, R^{g2}, R^{g3}, R^{g4}, R^{g5}, R^{g6}, and R^{g7} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

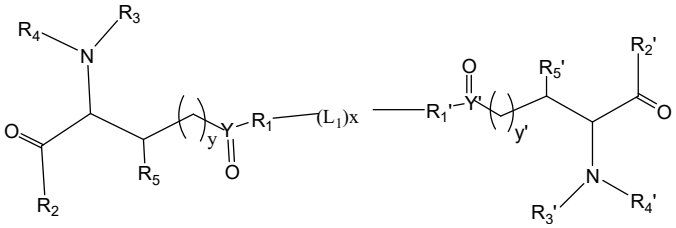
R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, amino; or, R_5' is selected from the group consisting of hydrogen and amino;

Y' is C or S;

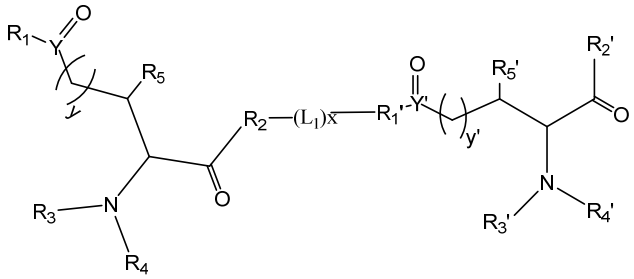
y' is an integer of 0 and above; or y' is selected from the group consisting of 0, 1, 2, and 3; or y' is 0 or 1;

n is 0 or 1;

or, Formula I is:



(Formula I-1)



(Formula I-2)

for A, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, -$NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, amino; or, R_5 is selected from the group consisting of hydrogen, amino; or, R_5 is selected from the group consisting of hydrogen;

Y is C;

y is selected from the group consisting of 0, 1, 2, 3; or y is 0 or 1.

In some embodiments, in the above Formula I, when x is 1 or 2 (or x is 1), A is the same as or different from A', wherein

for A', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, -$NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogen, C1-C6 alkyl, aryl (or C6-C12 aryl) or heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, amino; or, R_5' is selected from the group consisting of hydrogen, amino; or, R_5' is selected from the group consisting of hydrogen;

Y' is C;

y' is selected from the group consisting of 0, 1, 2, 3; or y' is 0 or 1.

In some embodiments, in the above Formula I, when x is 0, A' is absent; for A, wherein:

R_1 is selected from the group consisting of:

C1-C6 alkyl,

-O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6

alkyl)$_n$-O-(CO)-R^{b3}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

-$NR^{a2}R^{a3}$, wherein, R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl) -(3- to 15-membered heterocyclyl);

R^{b1} and R^{b3} are each independently selected from the group consisting of: hydrogen, hydroxyl, amino, C1-C6 alkyl, C6-C10 aryl, the alkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, C6-C10 aryl.

In some embodiments, in the above Formula I, when x is 0, A' is absent; for A, wherein:

R_1 is selected from the group consisting of:

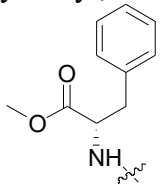
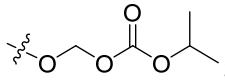
hydroxyl,

C1-C6 alkyl,

-O-R^{a1}, wherein R^{a1} is selected from the group consisting of: C1-C6 alkyl, C3-C7 cycloalkyl, C2-C6 alkenyl, -(C1-C6 alkyl)$_n$-O-(CO)-O-R^{b4}, which are optionally further substituted with one or more C6-C10 aryl groups, wherein R^{b4} is selected from the group consisting of C1-C6 alkyl, n is 1;

-$NR^{a2}R^{a3}$, wherein R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen; C1-C6 alkyl, which is optionally further substituted with one or more C6-C10 aryl groups; -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, R^{b3} is C1-C6 alkyl, which is further substituted with C6-C10 aryl; -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, R^{b1} is hydroxyl, n is 1.

In some embodiments, in the above Formula I, when x is 0, A' is absent; for A, wherein:

R_1 is selected from the group consisting of: hydroxyl, methoxy, -$OCH_2CH{=}CH_2$, ethoxy, -$OC(CH_3)_3$, -$OCH_2C_6H_5$, -OC_6H_{11}, Trt-NH-, , CH_3-NH-, $HOCOCH_2NH$-, -$OCH(CH_3)_2$, -CH_3, ; wherein, Trt represents trityl.

In some embodiments, in the above Formula I, when x is 0, A' is absent; for A, wherein:

R_2 is selected from the group consisting of:

C1-C6 alkyl,

-O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C6-C10 aryl, -(C1-C6 alkyl)$_n$-O-(CO)-O-R^{b4}, and the alkyl, alkenyl, aryl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, -(C1-C6 alkyl)-(C6-C10 aryl);

-$NR^{a2}R^{a3}$, wherein, R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, -(C1-C6 alkyl)$_n$-(CO)-O-R^{b2}, -(C1-C6 alkyl)$_n$-(CO)-$NR^{b5}R^{b6}$, 3- to 15-membered heterocyclyl, the alkyl and heterocyclyl are optionally

of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, -O-R^{a1}; R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH$(CH_3)_2$;

Y is C;

y is 0;

R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, methoxy;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, amino; or, R_5 is selected from the group consisting of hydrogen, amino; or, R_5 is selected from the group consisting of hydrogen.

In some embodiments, in the above Formula I, when x is 1, A is the same as or different from A', wherein

for A', wherein:

R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH$(CH_3)_2$;

Y' is C;

y' is 0;

R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, methoxy;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen.

In some embodiments, in the above Formula I, when x is 2, A is the same as or different from A', wherein

any one of R_1, R_2, R_3, and R_4 of a unit A is connected to any one of R_1', R_2', R_3', and R_4' of an adjacent unit A' through L_1;

each L_1 is independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), heteroalkyl (or 3- to 7-membered heteroalkyl; for example, -O-alkyl-O- (or -O-C1-C6 alkyl-O-)), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), heterocyclyl;

or, L_1 is selected from the group consisting of: absence, -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, $-C-(CH_3)_2$;

or, L_1 is selected from the group consisting of: $-CH_2-$.

In some embodiments, in the above Formula I, when x is 2, A is the same as or different from A', wherein

for A, wherein:

R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, $-OCH(CH_3)_2$;

or, R_1 is selected from the group consisting of: methoxy;

Y is C;

y is 0;

R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, methoxy;

or, R_2 is selected from the group consisting of: -O-;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, amino; or, R_5 is selected from the group consisting of hydrogen, amino; or, R_5 is selected from the group consisting of hydrogen.

In some embodiments, in the above Formula I, when x is 2, A is the same as or different from A', wherein

For A', wherein:

R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$;

or, R_1' is selected from the group consisting of: methoxy;

Y' is C;

y' is 0;

R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, methoxy;

more furthermore, R_2' is selected from the group consisting of: -O-;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen.

In some embodiments, the present invention provides a use of a compound represented by the following Formula I, or pharmaceutically acceptable salt, ester, prodrug, stereoisomer, hydrate, solvate, isotopic compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, in the manufacture of a medicament or agent, and the medicament is used for at least one of the following:

1) treating, improving, or preventing a liver disease (e.g., NAFLD, NASH, liver fibrosis);

R_2 is each independently selected from the group consisting of: -O-R^{a1}, -N$R^{a2}R^{a3}$;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C3 alkyl, C2-C4 alkenyl, C2-C4 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_2 is each independently selected from the group consisting of: -OH, -O-(C1-C3 alkyl), -O-(C1-C3 alkenyl), -NH_2, -NH(C1-C3 alkyl), -N(C1-C3 alkyl)$_2$;

or, R_2 is each independently selected from the group consisting of: -OH, methoxy, ethoxy, -$OCH(CH_3)_2$, -NH_2;

In some embodiments, in the above Formula I, when x is 1, A is the same as or different from A', wherein:

any one of R_1 and R_2 of a unit A is connected to any one of R_1' and R_2' of an adjacent unit A' through L_1;

each L_1 is independently a unit-connecting group selected from the group consisting of: absence, O, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkyl-O- (or -O-C1-C6 alkyl-O-), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-);

or, L_1 is selected from the group consisting of: absence, alkyl (or C1-C3 alkyl), alkenyl (or C2-C3 alkenyl);

or, L_1 is selected from the group consisting of: absence, -CH_2-, -$CH(CH_3)$-, -C-$(CH_3)_2$;

or, L_1 is selected from the group consisting of: -CH_2-.

In some embodiments, in the above Formula I, when x is 1, A is the same as or different from A', wherein:

for A, wherein:

R_1 is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -$OCH(CH_3)_2$;

R_2 is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_2 is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_2 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -$OCH(CH_3)_2$.

In some embodiments, in the above Formula I, when x is 1, A is the same as or different from A', wherein:

for A', wherein:

R_1' is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -$OCH(CH_3)_2$;

R_2' is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_2' is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_2' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$.

In some embodiments, in the above Formula I, when x is 2, A is the same as or different from A', wherein:

any one of R_1 and R_2 of a unit A is connected to any one of R_1' and R_2' of an adjacent unit A' through L_1;

each L_1 is independently a unit-connecting group selected from the group consisting of: absence, O, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkyl-O- (or -O-C1-C6 alkyl-O-), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-);

or, L_1 is selected from the group consisting of: absence, alkyl (or C1-C3 alkyl), alkenyl (or C2-C3 alkenyl);

or, L_1 is selected from the group consisting of: absence, -CH_2-, -CH(CH_3)-, -C-(CH_3)$_2$;

or, L_1 is selected from the group consisting of: -CH_2-.

In some embodiments, in the above Formula I, when x is 2, A is the same as or different from A', wherein:

for A, wherein:

R_1 is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$;

R_2 is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_2 is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_2 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$;

In some embodiments, in the above Formula I, when x is 2, A is the same as or different from A', wherein:

for A', wherein:

R_1' is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$;

R_2' is selected from the group consisting of: -O-, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C3 alkyl, C2-C4 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl;

or, R_2' is selected from the group consisting of: -O-, hydroxyl, -O-(C1-C3 alkyl);

or, R_2' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$.

or, L_1 is selected from the group consisting of: absence, -CH_2-, -$CH(CH_3)$-, -C-$(CH_3)_2$;

for A_1, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, -$NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -$(C1\text{-}C6\ alkyl)_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -$OCH(CH_3)_2$;

or, R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -$(C1\text{-}C6\ alkyl)_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, methoxy,

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5 is selected from the group consisting of hydrogen and amino;

or, R_5 is selected from the group consisting of hydrogen;

Y is C;

y is selected from the group consisting of 0, 1, 2, 3; or y is 0 or 1; or y is 0;

for A_1', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, -$NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl) or heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$;

or, R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, methoxy;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen;

Y' is C;

y' is selected from the group consisting of 0, 1, 2, 3; or y' is 0 or 1; or y' is 0;

3) when x is 2, A_1 and A_1' are the same or different, wherein

any one of R_1, R_2, R_3 and R_4 of a unit A_1 is connected to any one of R_1', R_2', R_3' and R_4' of an adjacent unit A_1' through L_1;

each L_1 is independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkyl-O- (or -O-C1-C6 alkyl-O-), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), heteroalkyl (or 3- to 7-membered

heteroalkyl), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), heterocyclyl;

or, L_1 is selected from the group consisting of: absence, -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, $-C-(CH_3)_2$;

or, L_1 is selected from the group consisting of: $-CH_2-$;

for A_1, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, $-O-R^{a1}$, $-NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b1}$, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, $-OCH(CH_3)_2$;

or, R_1 is selected from the group consisting of: methoxy;

or, R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b1}$, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, methoxy,

or, R_2 is selected from the group consisting of: -O-;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5 is selected from the group consisting of hydrogen and amino;

or, R_5 is selected from the group consisting of hydrogen;

Y is C;

y is selected from the group consisting of 0, 1, 2, 3; or y is 0 or 1; or y is 0;

for A_1', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, -$NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl) and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, -OCH(CH_3)$_2$;

or, R_1' is selected from the group consisting of: methoxy;

or, R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, methoxy;

or, R_2' is selected from the group consisting of: -O-;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

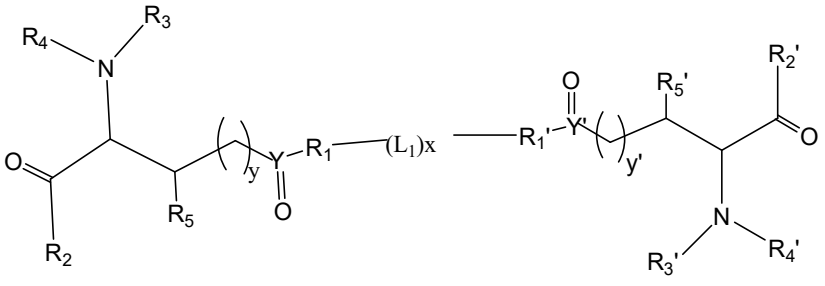
or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen;

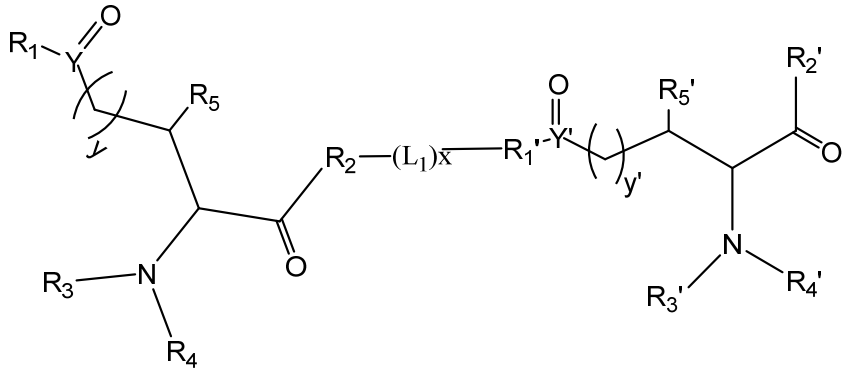
Y is C;

y' is selected from the group consisting of 0, 1, 2, 3; or y' is 0 or 1; or y' is 0;

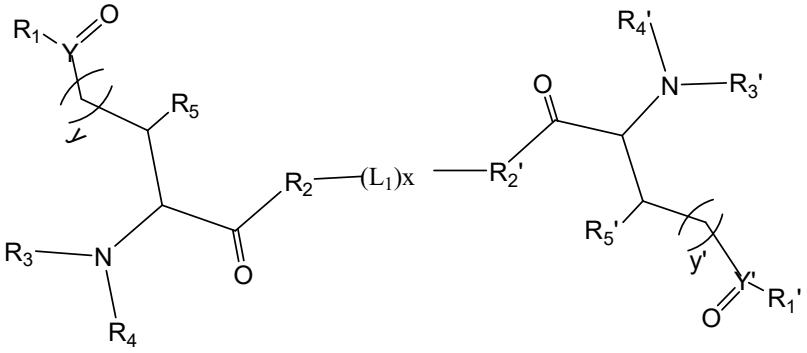
or, Formula II is:



(Formula II-1)

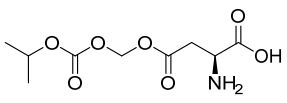


(Formula II-2)

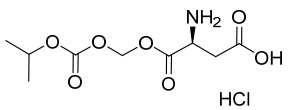


(Formula II-3).

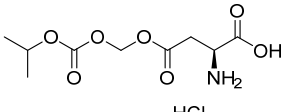
In some embodiments, the compound represented by Formula II or II-1, II-2, II-3 is selected from the group consisting of the following:



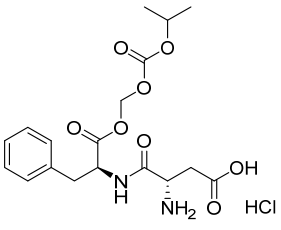
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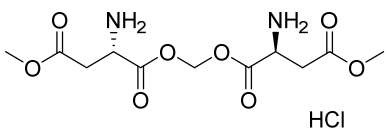
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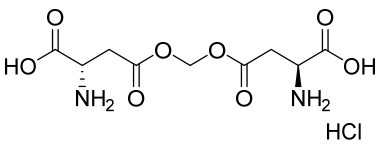
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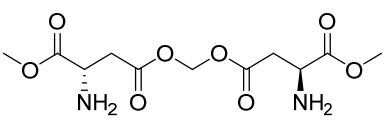
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What is claimed is:

1. Use of a compound represented by the following Formula I, or pharmaceutically acceptable salt, ester, prodrug, stereoisomer, hydrate, solvate, isotopic compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, in the manufacture of a medicament or agent, wherein the medicament is used for at least one of the following:

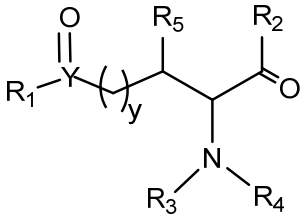
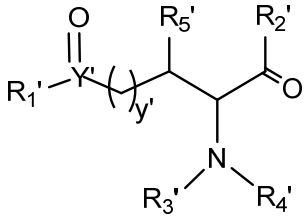
1) treating, improving, or preventing a liver disease (e.g., NAFLD, NASH, liver fibrosis);

2) alleviating a mammalian liver fibrosis, liver steatosis, or inflammation;

3) inhibiting the activation of hepatica stellate cells;

4) regulating the expression of NS3TP1;

$A\text{-}(L_1)_x\text{-}A'$ (Formula I)

wherein, A is  , A' is  , A and A' are the same or different;

wherein:

x is selected from the group consisting of 0, 1 and 2;

1) when x is 0, A' is absent; for A, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, $-O-R^{a1}$, and $-NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-C(R^h)_2-R^{d1}$, $-(CO)-(L)_n-R^{d2}$, $-(CO)O-(L)_n-R^{d3}$, $-(SO_2)-(L)_n-R^{d4}$, and $-P(O)(OR^e)_2$, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-(CO)-R^{b1}$, $-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{b2}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b3}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{b4}$, $-(C1\text{-}C6\ alkyl)_n-(CO)-NR^{b5}R^{b6}$, $-(C1\text{-}C6\ alkyl)_n-NR^{b7}-(CO)-R^{b8}$, and $-(C1\text{-}C6\ alkyl)_n-NR^{b9}-(CO)-O-R^{b10}$, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R^{b1}, R^{b2}, R^{b3}, R^{b4}, R^{b5}, R^{b6}, R^{b7}, R^{b8}, R^{b9}, R^{b10} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{c1}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{c2}$, and $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{c3}$, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, and C6-C10 aryl;

R^{c1}, R^{c2}, and R^{c3} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

L is each independently selected from the group consisting of: absence, O, NR^{d5}, C1-C6 alkyl, C2-C6 alkenyl, and C2-C6 alkynyl;

R^e is each independently selected from the group consisting of hydrogen, deuterium, Na, K, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl and heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, and halogenated C1-C6 alkyl;

R^h is each independently selected from the group consisting of: C1-C6 alkyl, $-NHC(O)R^{g1}$, $-OC(O)R^{g2}$, $-OP(O)(ONa)_2$, $-NHC(O)OR^{d6}$, $-OC(O)OR^{d7}$, and $-OC(O)NHR^{d8}$;

R^{d1}, R^{d2}, R^{d3}, R^{d4}, R^{d5}, R^{d6}, R^{d7}, R^{d8} are each independently selected from the group consisting of: hydrogen, deuterium, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more R^f groups;

R^f is each independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C6-C10 aryl, halogenated C6-C10 aryl, C3-C7 cycloalkyl, 3- to 15-membered heterocyclyl, $-NR^{g3}R^{g4}$, $-OR^{g5}$, $-NHC(O)R^{g6}$, and $-OC(O)R^{g7}$;

R^{g1}, R^{g2}, R^{g3}, R^{g4}, R^{g5}, R^{g6}, and R^{g7} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5 is selected from the group consisting of hydrogen and amino;

Y is C or S;

y is an integer of 0 or above; or y is selected from the group consisting of 0, 1, 2, and 3; or y is 0 or 1;

n is 0 or 1;

2) when x is 1 or 2, A and A' are the same or different, wherein:

any one of R_1, R_2, R_3, and R_4 of a unit A is connected to any one of R_1', R_2', R_3', and R_4' of an adjacent unit A' through L_1;

each L_1 is independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), and heteroalkyl (or 3- to 7-membered heteroalkyl; for example, -O-alkyl-O- (or -O-C1-C6 alkyl-O-)), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), and heterocyclyl;

or, L_1 is selected from the group consisting of: absence and -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, and $-C-(CH_3)_2$;

for A, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, $-O-R^{a1}$, and $-NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-C(R^h)_2-R^{d1}$, $-(CO)-(L)_n-R^{d2}$, $-(CO)O-(L)_n-R^{d3}$, $-(SO_2)-(L)_n-R^{d4}$, and $-P(O)(OR^e)_2$, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-(CO)-R^{b1}$, $-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{b2}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b3}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{b4}$, $-(C1\text{-}C6\ alkyl)_n-(CO)-NR^{b5}R^{b6}$, $-(C1\text{-}C6\ alkyl)_n-NR^{b7}-(CO)-R^{b8}$, and $-(C1\text{-}C6\ alkyl)_n-NR^{b9}-(CO)-O-R^{b10}$, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R^{b1}, R^{b2}, R^{b3}, R^{b4}, R^{b5}, R^{b6}, R^{b7}, R^{b8}, R^{b9}, R^{b10} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{c1}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{c2}$, and $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{c3}$, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, and C6-C10 aryl;

R^{c1}, R^{c2}, and R^{c3} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

L is each independently selected from the group consisting of: absence, O, NR^{d5}, C1-C6 alkyl, C2-C6 alkenyl, and C2-C6 alkynyl;

R^e is each independently selected from the group consisting of hydrogen, deuterium, Na, K, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, and halogenated C1-C6 alkyl;

R^h is each independently selected from the group consisting of: C1-C6 alkyl, $-NHC(O)R^{g1}$, $-OC(O)R^{g2}$, $-OP(O)(ONa)_2$, $-NHC(O)OR^{d6}$, $-OC(O)OR^{d7}$, and $-OC(O)NHR^{d8}$;

R^{d1}, R^{d2}, R^{d3}, R^{d4}, R^{d5}, R^{d6}, R^{d7}, R^{d8} are each independently selected from the group consisting of: hydrogen, deuterium, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more R^f groups;

R^f is each independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C6-C10 aryl, halogenated C6-C10 aryl, C3-C7 cycloalkyl, 3- to 15-membered heterocyclyl, $-NR^{g3}R^{g4}$, $-OR^{g5}$, $-NHC(O)R^{g6}$, and $-OC(O)R^{g7}$;

R^{g1}, R^{g2}, R^{g3}, R^{g4}, R^{g5}, R^{g6}, and R^{g7} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5 is selected from the group consisting of hydrogen and amino;

Y is C or S;

y is an integer of 0 or above; or y is selected from the group consisting of 0, 1, 2 and 3; or y is 0 or 1;

n is 0 or 1;

for A', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, and -$NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -$C(R^h)_2$-R^{d1}, -(CO)-$(L)_n$-R^{d2}, -(CO)O-$(L)_n$-R^{d3}, -(SO_2)-$(L)_n$-R^{d4}, and -$P(O)(OR^e)_2$, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -$(C1\text{-}C6\ alkyl)_n$-(CO)-R^{b1}, -$(C1\text{-}C6\ alkyl)_n$-(CO)-O-R^{b2}, -$(C1\text{-}C6\ alkyl)_n$-O-(CO)-R^{b3}, -$(C1\text{-}C6\ alkyl)_n$-O-(CO)-O-R^{b4}, -$(C1\text{-}C6\ alkyl)_n$-(CO)-$NR^{b5}R^{b6}$, -$(C1\text{-}C6\ alkyl)_n$-NR^{b7}-(CO)-R^{b8}, and -$(C1\text{-}C6\ alkyl)_n$-NR^{b9}-(CO)-O-R^{b10}, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R^{b1}, R^{b2}, R^{b3}, R^{b4}, R^{b5}, R^{b6}, R^{b7}, R^{b8}, R^{b9}, R^{b10} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -$(C1\text{-}C6\ alkyl)_n$-(CO)-O-R^{c1}, -$(C1\text{-}C6\ alkyl)_n$-O-(CO)-R^{c2}, and -$(C1\text{-}C6\ alkyl)_n$-O-(CO)-O-R^{c3}, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, and C6-C10 aryl;

R^{c1}, R^{c2}, and R^{c3} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

L is each independently selected from the group consisting of: absence, O, NR^{d5}, C1-C6 alkyl, C2-C6 alkenyl, and C2-C6 alkynyl;

R^e is each independently selected from the group consisting of hydrogen, deuterium, Na, K, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, and heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, and halogenated C1-C6 alkyl;

R^h is each independently selected from the group consisting of: C1-C6 alkyl, -$NHC(O)R^{g1}$, -$OC(O)R^{g2}$, -$OP(O)(ONa)_2$, -$NHC(O)OR^{d6}$, -$OC(O)OR^{d7}$, and -$OC(O)NHR^{d8}$;

R^{d1}, R^{d2}, R^{d3}, R^{d4}, R^{d5}, R^{d6}, R^{d7}, R^{d8} are each independently selected from the group consisting of: hydrogen, deuterium, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more R^f groups;

R^f is each independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C6-C10 aryl, halogenated C6-C10 aryl, C3-C7 cycloalkyl, 3- to 15-membered heterocyclyl, -$NR^{g3}R^{g4}$, -OR^{g5}, -$NHC(O)R^{g6}$, and -$OC(O)R^{g7}$;

R^{g1}, R^{g2}, R^{g3}, R^{g4}, R^{g5}, R^{g6}, and R^{g7} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

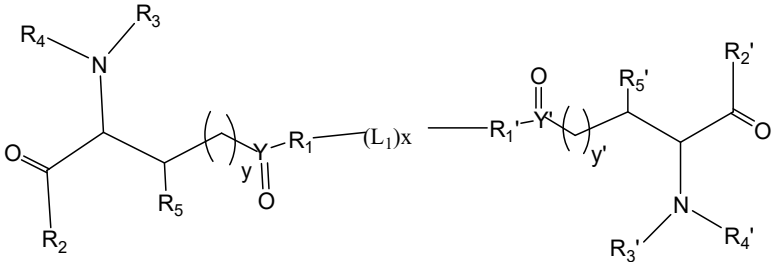
R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5' is selected from the group consisting of hydrogen and amino;

Y' is C or S;

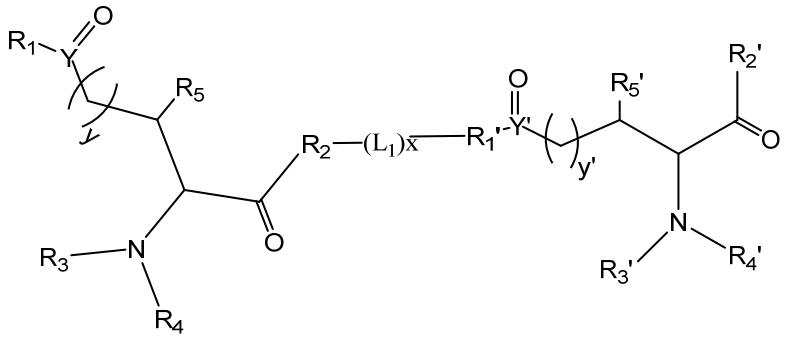
y' is an integer of 0 and above; or y' is selected from the group consisting of 0, 1, 2, and 3; or y' is 0 or 1;

n is 0 or 1;

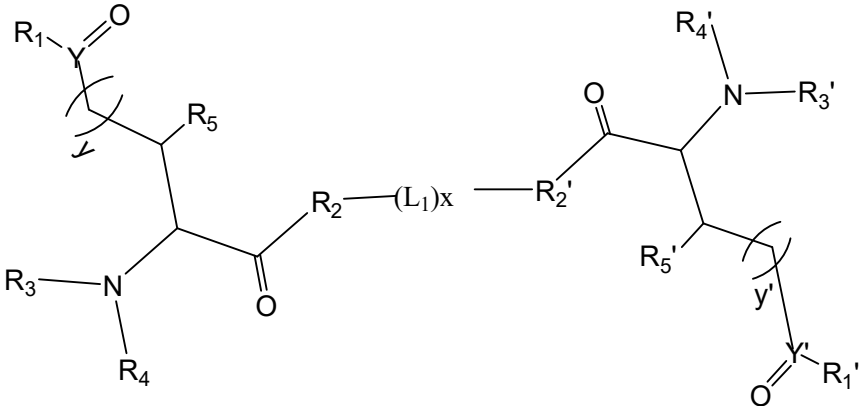
or, Formula I is:



(Formula I-1)



(Formula I-2)



(Formula 1-3).

2. The use according to claim 1, wherein,

1) when x is 0, A' is absent; for A, wherein:

R_1 and R_2 are each independently selected from the group consisting of:

C1-C6 alkyl,

-O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, -(C1-C6 alkyl)$_n$-(CO)-O-R^{b2}, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, and -(C1-C6 alkyl)$_n$-O-(CO)-O-R^{b4}, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl); and

$-NR^{a2}R^{a3}$, wherein R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-(CO)-R^{b1}$, $-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{b2}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b3}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{b4}$, and $-(C1\text{-}C6\ alkyl)_n-(CO)-NR^{b5}R^{b6}$, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R^{b1}, R^{b2}, R^{b3}, R^{b4}, R^{b5} and R^{b6} are each independently selected from the group consisting of: hydrogen, hydroxyl, amino, C1-C6 alkyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, $-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{c1}$, $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{c2}$, and $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{c3}$, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, and C6-C10 aryl;

R^{c1}, R^{c2} and R^{c3} are each independently selected from the group consisting of: hydrogen, hydroxyl, amino, C1-C6 alkyl, and C3-C7 cycloalkyl;

or, R_1 and R_2 are each independently selected from the group consisting of:

hydroxyl,

C1-C6 alkyl,

$-O-R^{a1}$, wherein, R^{a1} is selected from the group consisting of: C1-C6 alkyl, C3-C7 cycloalkyl, C2-C6 alkenyl, and $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{b4}$, which are optionally further substituted with one or more C6-C10 aryl groups, wherein R^{b4} is selected from the group consisting of C1-C6 alkyl, n is 1; and

$-NR^{a2}R^{a3}$, wherein R^{a2} and R^{a3} are each independently selected from the group consisting of:

hydrogen,

C1-C6 alkyl, wherein C1-C6 alkyl is optionally further substituted with one or more C6-C10 aryl groups;

$-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b3}$, wherein R^{b3} is C1-C6 alkyl, which is further substituted with C6-C10 aryl;

$-(C1\text{-}C6\ alkyl)_n-(CO)-R^{b1}$, wherein R^{b1} is hydroxyl, n or 1;

$-(C1\text{-}C6\ alkyl)_n-(CO)-NR^{b5}R^{b6}$, wherein n is 1, R^{b5} and R^{b6} are each independently hydrogen, or a 3- to 15-membered heterocyclyl, and the heterocyclic ring is further substituted with one or more C1-C6 alkyl groups; and

$-(C1\text{-}C6\ alkyl)_n-(CO)-O-R^{b2}$, wherein the alkyl is substituted with one or more C6-C10 aryl groups, n is 1, R^{b2} is C1-C6 alkyl or $-(C1\text{-}C6\ alkyl)_n-O-(CO)-O-R^{c}$, R^{c} is C1-C6 alkyl;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl, $-(CO)-(L)_n-R^{d2}$, and $-(CO)O-(L)_n-R^{d3}$, the alkyl, aryl and heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

L is each independently selected from the group consisting of: absence, O, NR^{d5}, and C1-C6 alkyl;

R^{d5}, R^{d2} and R^{d3} are each independently selected from the group consisting of: hydrogen, amino, C1-C6 alkyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more R^f groups;

R^f is each independently selected from the group consisting of amino, halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, C6-C10 aryl, halogenated C6-C10 aryl, C3-C7 cycloalkyl, and 3- to 15-membered heterocyclyl;

or, R_3 and R_4 are each independently selected from the group consisting of:

hydrogen,

hydroxyl,

C1-C6 alkyl,

-(CO)-$(L)_n$-R^{d2}: wherein, the combination option of $(L)_n$ and R^{d2} is selected from the group consisting of the following combinations:

1) L is absent, R^{d2} is C1-C6 alkyl that is further substituted with one or more R^f groups, R^f is amino;

2) L is absent, R^{d2} is H;

3) L is absent, R^{d2} is C1-C6 alkyl;

4) L is absent, R^{d2} is C1-C6 alkyl that is further substituted with one or more R^f groups, R^f is selected from the group consisting of C1-C6 alkyl and amino;

5) L is absent, R^{d2} is 3- to 15-membered heterocyclyl; and

6) L is NR^{d5}, R^{d5} is C1-C6 alkyl, n is 1, R^{d2} is H; and

-(CO)O-$(L)_n$-R^{d3}: wherein, the combination option of $(L)_n$ and R^{d3} is selected from the group consisting of: L is absent, R^{d3} is C1-C6 alkyl, which is optionally further substituted with one or more R^f groups, and R^f is selected from the group consisting of C1-C6 alkyl, C6-C10 aryl, and polycyclic aromatic hydrocarbonyl (e.g., fluorenyl);

2) when x is 1 or 2, A and A' are the same or different, wherein

for A, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, and -$NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5 is selected from the group consisting of hydrogen and amino; or, R_5 is selected from the group consisting of hydrogen;

Y is C;

y is selected from the group consisting of 0, 1, 2, and 3; or y is 0 or 1;

for A', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, and -$NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to

15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogen, C1-C6 alkyl, aryl (or C6-C12 aryl) and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5' is selected from the group consisting of hydrogen and amino; or, R_5' is selected from the group consisting of hydrogen;

Y' is C;

y' is selected from the group consisting of 0, 1, 2, and 3; or y' is 0 or 1.

3. The use according to claim 1 or 2, wherein,

1) when x is 0, A' is absent; for A, wherein:

R_1 is selected from the group consisting of:

C1-C6 alkyl,

-O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl); and

-N$R^{a2}R^{a3}$, wherein, R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, and -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, the alkyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl) -(3- to 15-membered heterocyclyl);

R^{b1} and R^{b3} are each independently selected from the group consisting of: hydrogen, hydroxyl, amino, C1-C6 alkyl, and C6-C10 aryl, the alkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, and C6-C10 aryl;

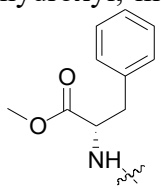
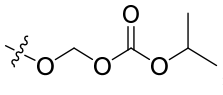
or, R_1 is selected from the group consisting of:

hydroxyl,

C1-C6 alkyl,

-O-R^{a1}, wherein R^{a1} is selected from the group consisting of: C1-C6 alkyl, C3-C7 cycloalkyl, C2-C6 alkenyl, and -(C1-C6 alkyl)$_n$-O-(CO)-O-R^{b4}, which are optionally further substituted with one or more C6-C10 aryl groups, wherein R^{b4} is selected from the group consisting of C1-C6 alkyl, n is 1; and

-N$R^{a2}R^{a3}$, wherein R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen; C1-C6 alkyl, which is optionally further substituted with one or more C6-C10 aryl groups; -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, R^{b3} is C1-C6 alkyl, which is further substituted with C6-C10 aryl; and -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, R^{b1} is hydroxyl, n is 1;

or, R_1 is selected from the group consisting of: hydroxyl, methoxy, $-OCH_2CH=CH_2$, ethoxy, $-OC(CH_3)_3$, $-OCH_2C_6H_5$, $-OC_6H_{11}$, Trt-NH-, , CH_3-NH-, $HOCOCH_2NH-$, $-OCH(CH_3)_2$, $-CH_3$, and ; wherein, Trt represents trityl;

R_2 is selected from the group consisting of:

C1-C6 alkyl,

$-O-R^{a1}$, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C6-C10 aryl, and $-(C1-C6\ alkyl)_n-O-(CO)-O-R^{b4}$, and the alkyl, alkenyl, aryl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, and -(C1-C6 alkyl)-(C6-C10 aryl); and

$-NR^{a2}R^{a3}$, wherein, R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, $-(C1-C6\ alkyl)_n-(CO)-R^{b1}$, $-(C1-C6\ alkyl)_n-(CO)-O-R^{b2}$, $-(C1-C6\ alkyl)_n-(CO)-NR^{b5}R^{b6}$, and 3- to 15-membered heterocyclyl, the alkyl and heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, and C1-C6 alkyl;

R^{b1}, R^{b2}, R^{b4}, R^{b5} and R^{b6} are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl, C3-C7 cycloalkyl, and $-(C1-C6\ alkyl)_n-O-(CO)-O-R^{c3}$, the cycloalkyl is optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, carboxyl, C1-C6 alkyl, and C6-C10 aryl;

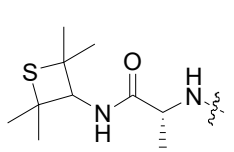
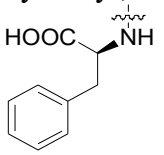
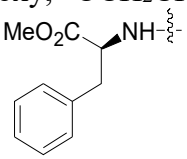
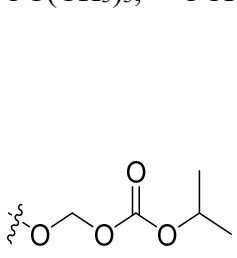
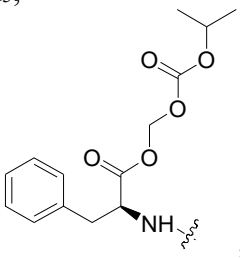
R^{c3} is each independently selected from the group consisting of: hydrogen, hydroxyl, amino, C1-C6 alkyl, and C3-C7 cycloalkyl;

or, R_2 is selected from the group consisting of:

hydroxyl,

$-O-R^{a1}$: wherein, R^{a1} is selected from the group consisting of: C1-C6 alkyl, C2-C6 alkenyl, and $-(C1-C6\ alkyl)_n-O-(CO)-O-R^{b4}$, which are optionally further substituted with one or more C6-C10 aryl groups, wherein R^{b4} is selected from the group consisting of C1-C6 alkyl, n is 1; and

$-NR^{a2}R^{a3}$: R^{a2} and R^{a3} are each independently selected from the group consisting of: hydrogen; $-(C1-C6\ alkyl)_n-(CO)-NR^{b5}R^{b6}$, n is 1, R^{b5} and R^{b6} are each independently hydrogen, or 3- to 15-membered heterocyclyl, the heterocyclyl is further substituted with one or more C1-C6 alkyl groups; $-(C1-C6\ alkyl)_n-(CO)-R^{b1}$, n is 1, R^{b1} is hydroxyl; and $-(C1-C6\ alkyl)_n-(CO)-O-R^{b2}$, the alkyl is substituted with one or more C6-C10 aryl groups, n is 1, R^{b2} is C1-C6 alkyl or $-(C1-C6\ alkyl)_n-O-(CO)\ -O-R^{c3}$, R^{c3} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, methoxy, $-OCH_2CH=CH_2$, ethoxy, $-OC(CH_3)_3$, $-OCH_2C_6H_5$, , , , $-OCH(CH_3)_2$, , and ;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, Boc, Cbz, $-CH_3$, Fmoc, $-COOCH_2C_6H_5$, $-COCH_2NH_2$, -CHO, $-COCH_3$, , $-COCH_2CH_3$, $-COCH(CH_3)_2$, $-COCH(CH_2)_2$, $-COOCH_3$, $-CON(CH_3)_2$, and $-COCH(CH_3)(NH_2)$; wherein, Boc represents tert-butoxycarbonyl, Cbz represents benzyloxycarbonyl, and Fmoc represents fluorenylmethoxycarbonyl;

2) when x is 1, A and A' are the same or different, wherein

any one of R_1, R_2, R_3, and R_4 of a unit A is connected to any one of R_1', R_2', R_3', and R_4' of an adjacent unit A' through L_1;

L_1 is each independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), and heteroalkyl (or 3- to 7-membered heteroalkyl; for example, -O-alkyl-O- (or -O-C1-C6 alkyl-O-)), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), and heterocyclyl;

or, L_1 is selected from the group consisting of: absence and -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, and $-C-(CH_3)_2$;

for A, wherein:

R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, and $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and $-OCH(CH_3)_2$;

Y is C;

y is 0;

R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and methoxy;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5 is selected from the group consisting of hydrogen and amino; or, R_5 is selected from the group consisting of hydrogen;

for A', wherein:

R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and -OCH(CH_3)$_2$;

Y' is C;

y' is 0;

R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein, R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and methoxy;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen;

3) when x is 2, A and A' are the same or different, wherein

any one of R_1, R_2, R_3, and R_4 of a unit A is connected to any one of R_1', R_2', R_3', and R_4' of an adjacent unit A' through L_1;

each L_1 is independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), and heteroalkyl (or 3- to 7-membered heteroalkyl; for example, -O-alkyl-O- (or -O-C1-C6 alkyl-O-)), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), and heterocyclyl;

or, L_1 is selected from the group consisting of: absence and -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, and $-C-(CH_3)_2$;

or, L_1 is selected from the group consisting of: $-CH_2-$;

for A, wherein:

R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, and $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and $-OCH(CH_3)_2$;

or, R_1 is selected from the group consisting of: methoxy;

Y is C;

y is 0;

R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and methoxy;

or, R_2 is selected from the group consisting of: -O-;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino; or, R_5 is selected from the group consisting of hydrogen and amino; or, R_5 is selected from the group consisting of hydrogen;

for A', wherein:

R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10

aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and -OCH(CH_3)$_2$;

or, R_1' is selected from the group consisting of: methoxy;

Y' is C;

y' is 0;

R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and methoxy;

more furthermore, R_2' is selected from the group consisting of: -O-;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen.

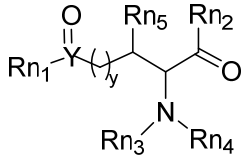
4. Use of a compound represented by the following Formula I-4, or pharmaceutically acceptable salt, ester, prodrug, stereoisomer, hydrate, solvate, isotopic compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, in the manufacture of a medicament or agent, wherein the medicament is used for at least one of the following:

1) treating, improving, or preventing a liver disease (e.g., NAFLD, NASH, liver fibrosis);

2) alleviating a mammalian liver fibrosis, liver steatosis, or inflammation;

3) inhibiting the activation of hepatica stellate cells;

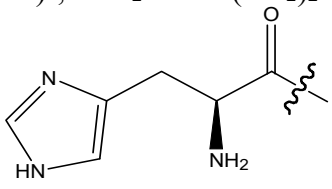
4) regulating the expression of NS3TP1;

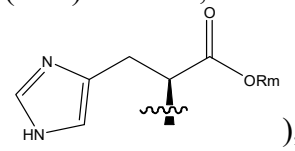


I-4

wherein:

Rn_1 and Rn_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-R^{a4}, -O-L_2-O-R^{a4}, and -$NR^{a5}R^{a6}$;

each R^{a4} is independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C3-C7 cycloalkyl-C1-C6 alkyl, C6-C10 aryl, C6-C10 aryl-C1-C6 alkyl, 3- to 15-membered heterocyclyl, 3- to 15-membered heterocyclyl-C1-C6 alkyl, C1-C6 alkoxyacyl, -(O=)C-CH_2-CH(NH_2)-$COOR_m$, -(O=)C-CH(NH_2)-CH_2-$COOR_m$, Ph-CH_2-CH(NH_2)-C(=O)-, NH_2-CH_2-C(=O)-, CH_3-CH(NH_2)-C(=O)-, R_mOOC-$(CH_2)_2$-CH(NH_2)-C(=O)-, -C(=O)-$(CH_2)_2$-CH(NH_2)-$COOR_m$, R_mOOC-CH(NH_2)-CH_2-S-S-CH_2-CH(NH_2)-C(=O)-, H_2N-CO-$(CH_2)_2$-CH(NH_2)-C(=O)-, *N=CH-NH-CH=*C-CH_2-CH(NH_2)-C(=O)- (or ), HO-p-Ph-CH_2-CH(NH_2)-C(=O)-, HO-CH_2-CH(NH_2)-C(=O)-, CH_3-S-$(CH_2)_2$-CH(NH_2)-C(=O)-, HN=C(NH_2)-NH-$(CH_2)_3$-CH(NH_2)-C(=O)-, and $(CH_3)_2$CH-CH_2-CH(NH_2)-C(=O)-; wherein Ph represents phenyl, HO-p-Ph-CH_2-CH(NH_2)-C(=O)- represents p-hydroxybenzylaminomethylcarbonyl;

R^{a5} and R^{a6} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, 3- to 15-membered heterocyclylaminoacyl-C1-C6 alkyl, Ph-CH_2-CH($COOR_m$)-, -CH_2-$COOR_m$, -CH($COOR_m$)-CH_2-$COOR_m$, -CH(CH_3)-$COOR_m$, R_mOOC-$(CH_2)_2$-CH($COOR_m$)-, -CH($COOR_m$)-CH_2-S-S-CH_2-CH(NH_2)-$COOR_m$, H_2N-CO-$(CH_2)_2$-CH($COOR_m$)-, *N=CH-NH-CH=*C-CH_2-CH($COOR_m$)- (or ), HO-p-Ph-CH_2-CH($COOR_m$)-, HO-CH_2-CH($COOR_m$)-, CH_3-S-$(CH_2)_2$-CH($COOR_m$)-, HN=C(NH_2)-NH-$(CH_2)_3$-CH($COOR_m$)-, and $(CH_3)_2$CH-CH_2-CH($COOR_m$)-;

each R_m is independently selected from the group consisting of: hydrogen, C1-C6 alkyl, and C1-C6 alkoxyacyl-O-L_3-;

L_2 and L_3 are each independently selected from the group consisting of: C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, and 3- to 7-membered heteroalkyl, L_2 and L_3 are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, and hydroxyl;

Rn_3 and Rn_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, H(C=O)-, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, aminoacyl, C1-C6 alkylacyl, C1-C6 alkoxyacyl, C1-C6 alkylaminoacyl, amino-C1-C6 alkanoyl, 3- to 15-membered heterocyclylacyl, C3-C7 cycloalkylacyl, and C6-C10 aryl-C1-C6 alkoxyacyl;

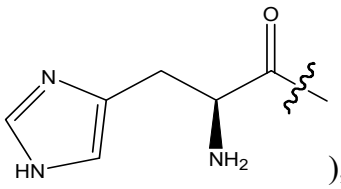
Y is C or S;

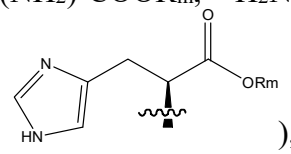
y is 0, 1, 2 or 3;

or

Rn_1 and Rn_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-R^{a4}, -O-L_2-O-R^{a4}, and -$NR^{a5}R^{a6}$;

each R^{a4} is independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C3-C7 cycloalkyl-C1-C6 alkyl, C6-C10 aryl, C6-C10 aryl-C1-C6 alkyl, 3- to 15-membered heterocyclyl, 3- to 15-membered heterocyclyl-C1-C6 alkyl, C1-C6 alkoxyacyl, -(O=)C-CH_2-CH(NH_2)-$COOR_m$, Ph-CH_2-CH(NH_2)-C(=O)-, NH_2-CH_2-C(=O)-, CH_3-CH(NH_2)-C(=O)-, R_mOOC-$(CH_2)_2$-CH(NH_2)-C(=O)-, R_mOOC-CH(NH_2)-CH_2-S-S-CH_2-CH(NH_2)-C(=O)-, H_2N-CO-$(CH_2)_2$-CH(NH_2)-C(=O)-, *N=CH-NH-CH=*C-CH_2-CH(NH_2)-C(=O)- (or


), HO-p-Ph-CH_2-$CH(NH_2)$-C(=O)-, HO-CH_2-$CH(NH_2)$-C(=O)-, CH_3-S-$(CH_2)_2$-$CH(NH_2)$-C(=O)-, HN=$C(NH_2)$-NH-$(CH_2)_3$-$CH(NH_2)$-C(=O)-, and $(CH_3)_2$CH-CH_2-$CH(NH_2)$-C(=O)-;

R^{a5} and R^{a6} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, 3- to 15-membered heterocyclylaminoacyl-C1-C6 alkyl, Ph-CH_2-$CH(COOR_m)$-, -CH_2-$COOR_m$, -$CH(COOR_m)$-CH_2-$COOR_m$, -$CH(CH_3)$-$COOR_m$, R_mOOC-$(CH_2)_2$-$CH(COOR_m)$-, -$CH(COOR_m)$-CH_2-S-S-CH_2-$CH(NH_2)$-$COOR_m$, H_2N-CO-$(CH_2)_2$-$CH(COOR_m)$-, *N=CH-NH-CH=*C-CH_2-$CH(COOR_m)$- (or 
), HO-p-Ph-CH_2-$CH(COOR_m)$-, HO-CH_2-$CH(COOR_m)$-, CH_3-S-$(CH_2)_2$-$CH(COOR_m)$-, HN=$C(NH_2)$-NH-$(CH_2)_3$-$CH(COOR_m)$-, and $(CH_3)_2$CH-CH_2-$CH(COOR_m)$-;

each R_m is independently selected from the group consisting of: hydrogen, C1-C6 alkyl, and C1-C6 alkoxyacyl-O-L_3-;

L_2 and L_3 are each independently selected from the group consisting of: C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, and 3- to 7-membered heteroalkyl, L_2 and L_3 are each optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, and hydroxyl;

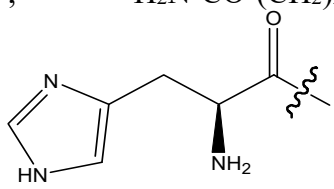
Rn_3 and Rn_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, H(C=O)-, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, aminoacyl, C1-C6 alkylacyl, C1-C6 alkoxyacyl, C1-C6 alkylaminoacyl, amino-C1-C6 alkanoyl, 3- to 15-membered heterocyclylacyl, C3-C7 cycloalkylacyl, and C6-C10 aryl-C1-C6 alkoxyacyl;

Y is C;

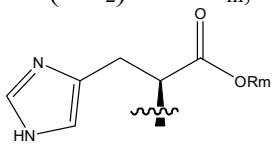
y is 0, 1 or 2;

or

Rn_1 and Rn_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-R^{a4}, -O-L2-O-R^{a4}, and -$NR^{a5}R^{a6}$;

each R^{a4} is independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, C6-C10 aryl-C1-C6 alkyl, 3- 15-membered heterocyclyl, 3- to 15-membered heterocyclyl-C1-C6 alkyl, -(O=)C-CH_2-$CH(NH_2)$-$COOR_m$, Ph-CH_2-$CH(NH_2)$-C(=O)-, NH_2-CH_2-C(=O)-, CH_3-$CH(NH_2)$-C(=O)-, R_mOOC-$(CH_2)_2$-$CH(NH_2)$-C(=O)-, R_mOOC-$CH(NH_2)$-CH_2-S-S-CH_2-$CH(NH_2)$-C(=O)-, H_2N-CO-$(CH_2)_2$-$CH(NH_2)$-C(=O)-, *N=CH-NH-CH=*C-CH_2-$CH(NH_2)$-C(=O)- (or 
), HO-p-Ph-CH_2-$CH(NH_2)$-C(=O)-, HO-CH_2-$CH(NH_2)$-C(=O)-, CH_3-S-$(CH_2)_2$-$CH(NH_2)$-C(=O)-, HN=$C(NH_2)$-NH-$(CH_2)_3$-$CH(NH_2)$-C(=O)-, and $(CH_3)_2$CH-CH_2-$CH(NH_2)$-C(=O)-;

R^{a5} and R^{a6} are each independently selected from the group consisting of: hydrogen, C1-C6 alkyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, 3- to 15-membered

heterocyclylaminoacyl-C1-C6 alkyl, Ph-CH_2-CH($COOR_m$)-, -CH_2-$COOR_m$, -CH($COOR_m$)-CH_2-$COOR_m$, -$CH(CH_3)$-$COOR_m$, R_mOOC-$(CH_2)_2$-CH($COOR_m$)-, -CH($COOR_m$)-CH_2-S-S-CH_2-$CH(NH_2)$-$COOR_m$, H_2N-CO-$(CH_2)_2$-CH($COOR_m$)-, *N=CH-NH-CH=*C-CH_2-CH($COOR_m$)- (or ), HO-p-Ph-CH_2-CH($COOR_m$)-, HO-CH_2-CH($COOR_m$)-, CH_3-S-$(CH_2)_2$-CH($COOR_m$)-, HN=C(NH_2)-NH-$(CH_2)_3$-CH($COOR_m$)-, and $(CH_3)_2$CH-CH_2-CH($COOR_m$)-;

each R_m is independently selected from the group consisting of: hydrogen, C1-C6 alkyl, and C1-C6 alkoxyacyl-O-L_3-;

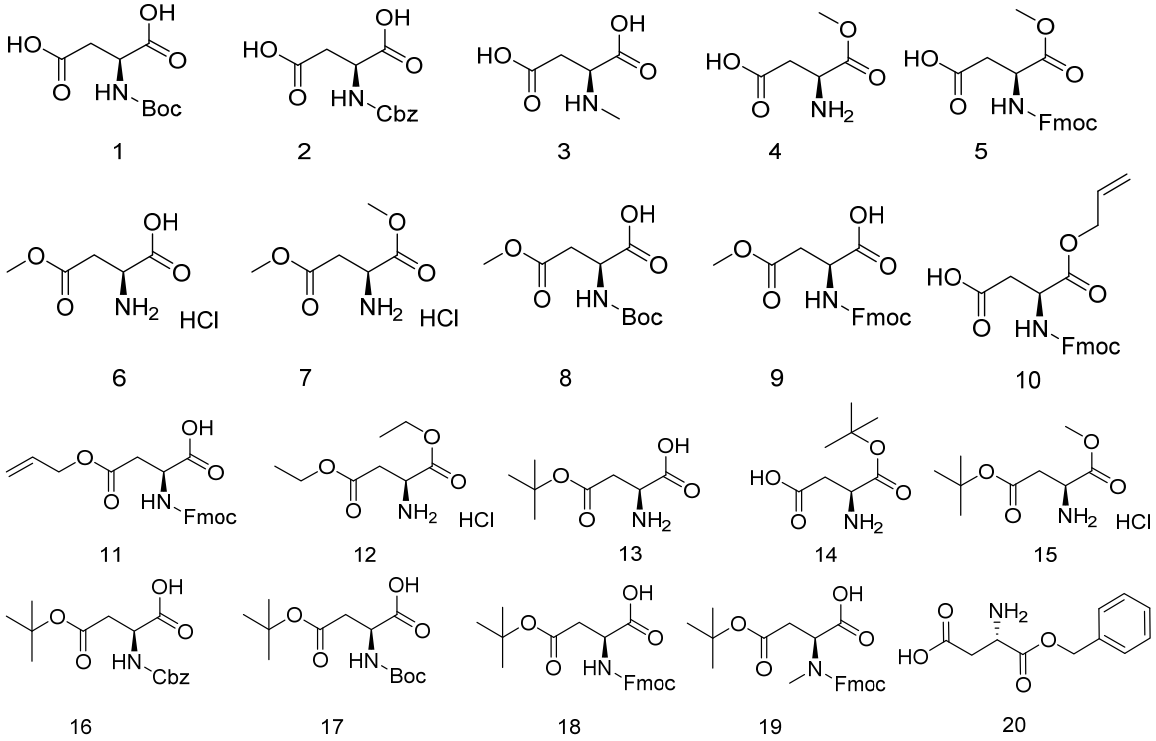
L_2 and L_3 are each independently selected from the group consisting of: C1-C6 alkyl, L_2 and L_3 are each optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, and hydroxyl;

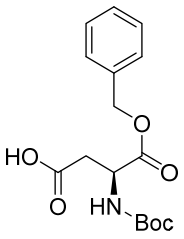
Rn_3 and Rn_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, aminoacyl, C1-C6 alkylacyl, C1-C6 alkoxyacyl, C1-C6 alkylaminoacyl, amino-C1-C6 alkanoyl, 3- to 15-membered heterocyclylacyl, C3-C7 cycloalkylacyl, and C6-C10 aryl-C1-C6 alkoxyacyl;

Y is C;

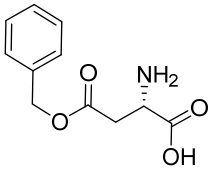
y is 0, 1 or 2.

5. The use according to any one of claims 1 to 4, wherein the compound represented by Formula I or I-1, I-2, I-3, I-4 is selected from the group consisting of the following:

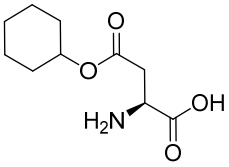




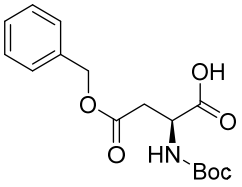
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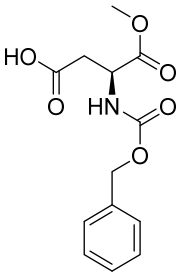
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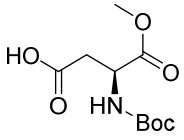
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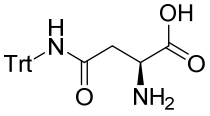
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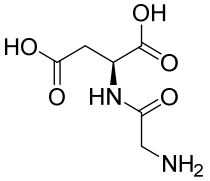
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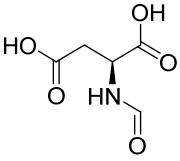
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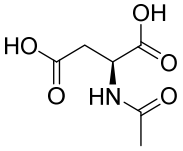
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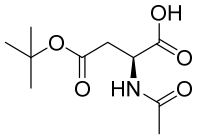
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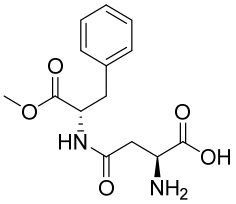
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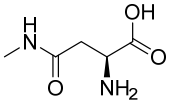
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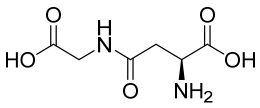
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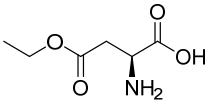
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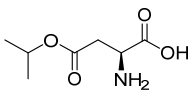
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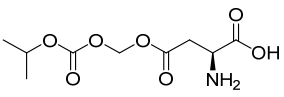
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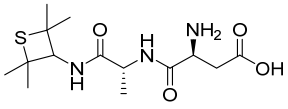
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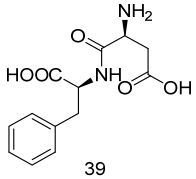
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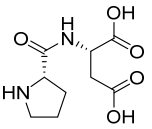
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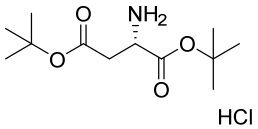
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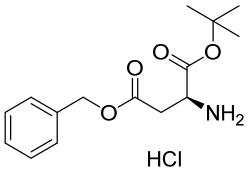


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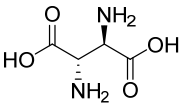
HCl

41

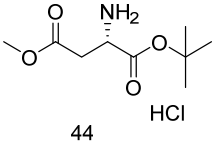


HCl

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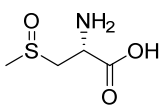


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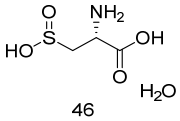


HCl

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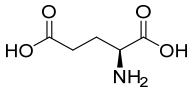


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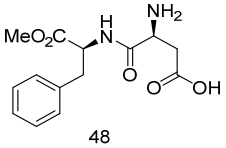


H_2O

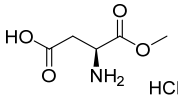
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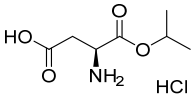


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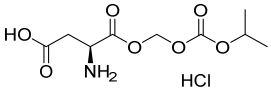
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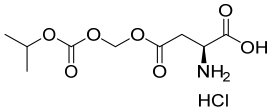
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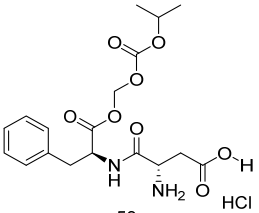
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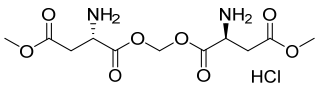
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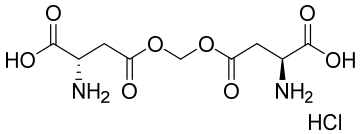
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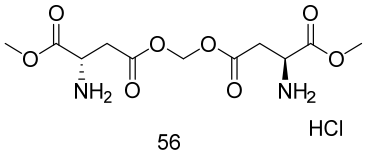
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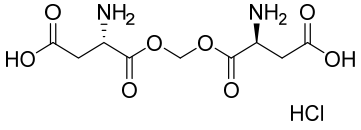
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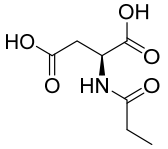
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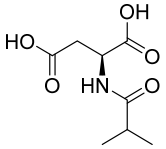


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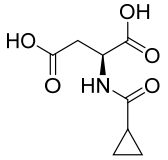
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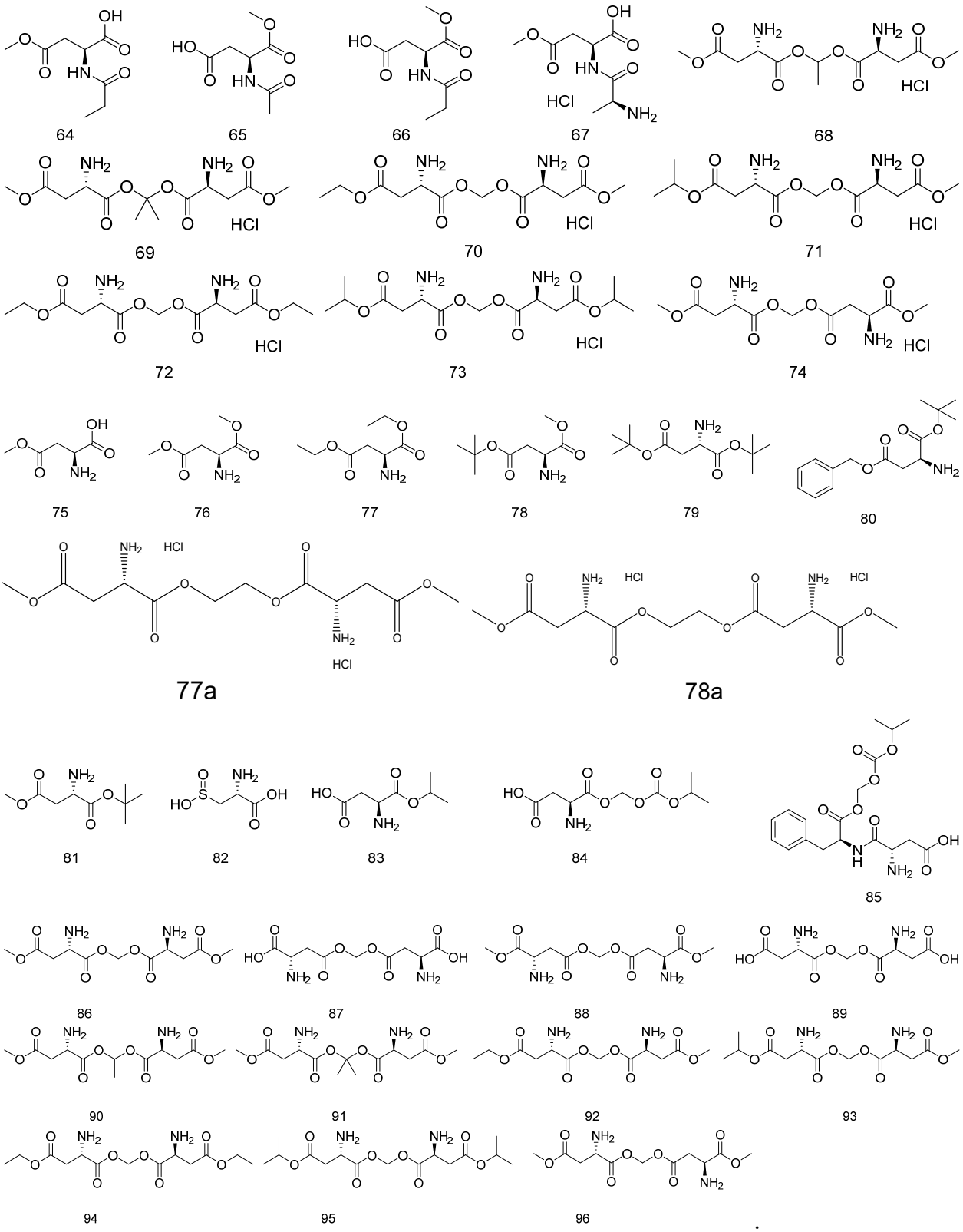


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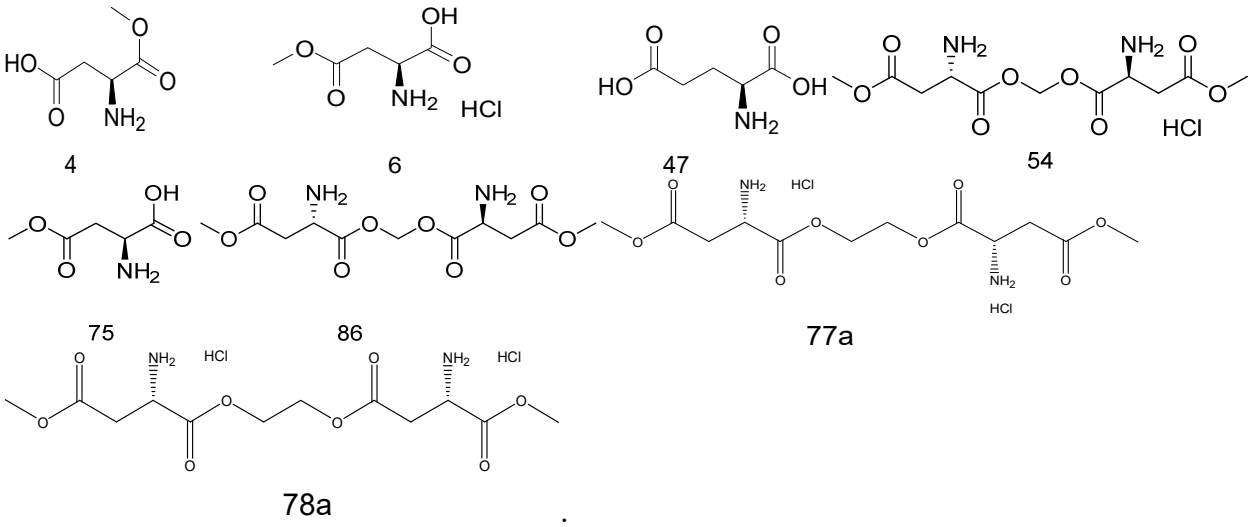
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6. The use according to any one of claims 1 to 5, wherein the compound represented by Formula I or I-1, I-2, I-3, I-4 is selected from the group consisting of the following:



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7. Use of a peptide containing 2 to 10 or 2 to 3 amino acids, or pharmaceutically acceptable salt, ester, prodrug, stereoisomer, hydrate, solvate, isotopic compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, in the manufacture of a medicament or agent,

wherein the drug or agent is used for at least one of the following:

1) treating, improving, or preventing a liver disease (e.g., NAFLD, NASH, liver fibrosis);

2) alleviating a mammalian liver fibrosis, liver steatosis, or inflammation;

3) inhibiting the activation of hepatica stellate cells;

4) regulating the expression of NS3TP1;

in the peptide, at least one amino acid is aspartic acid, and when aspartic acid has a free carboxyl group, the free carboxyl group is optionally esterified with C1-C6 alkyl-OH;

optionally, the amino acid is aspartic acid, phenylalanine, glycine, alanine, glutamic acid, cystine, glutamine, histidine, tyrosine, serine, methionine, arginine acid or leucine;

or, the free amino acid located on one side of the peptide is aspartic acid, and optionally, the free carboxyl group of the free aspartic acid is optionally esterified with C1-C6 alkyl-OH;

optionally, the remaining amino acids are aspartic acid, phenylalanine, glycine, alanine, glutamic acid, cystine, glutamine, histidine, tyrosine, serine, methionine, arginine or leucine.

8. The use according to any one of claims 1 to 7, wherein the liver fibrosis includes, but is not limited to: liver fibrosis caused by chronic viral liver diseases, liver fibrosis caused by alcoholism or long-term drinking, liver fibrosis caused by non-alcoholic factor such as obesity, portal liver fibrosis caused by repeated schistosomiasis infection, biliary liver fibrosis caused by chronic cholestasis, metabolic liver fibrosis caused by hepatolenticular degeneration and hemoglobin deposition, toxic liver fibrosis caused by various toxic substances, malnutrition-induced liver fibrosis caused by a preference for low-protein diets and fatty fried foods, and cardiogenic liver fibrosis caused by chronic congestive heart failure.

9. Use of a pharmaceutical composition in the manufacture of a medicament, the pharmaceutical composition comprising the compound or pharmaceutically acceptable salt, ester, prodrug, stereoisomer, hydrate, solvate, isotope compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, as defined in any one of claims 1 to 6, or the peptide or pharmaceutically acceptable salt, ester, prodrug, stereoisomer, hydrate, solvate, isotopic compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, as defined in claim 7, wherein the medicament is used for at least one of the following:

1) treating, improving, or preventing a liver disease (e.g., NAFLD, NASH, liver fibrosis);

2) alleviating a mammalian liver fibrosis, liver steatosis or inflammation;

3) inhibiting the activation of hepatica stellate cells;

4) regulating the expression of NS3TP1.

10. The use according to claim 9, wherein the liver fibrosis includes, but is not limited to: liver fibrosis caused by chronic viral liver diseases, liver fibrosis caused by alcoholism or long-term drinking, liver fibrosis caused by non-alcoholic factor such as obesity, portal liver fibrosis caused by repeated schistosomiasis infection, biliary liver fibrosis caused by chronic cholestasis, metabolic liver fibrosis caused by hepatolenticular degeneration and hemoglobin deposition, toxic liver fibrosis caused by various toxic substances, malnutrition-induced liver fibrosis caused by a preference for low-protein diets and fatty fried foods, and cardiogenic liver fibrosis caused by chronic congestive heart failure.

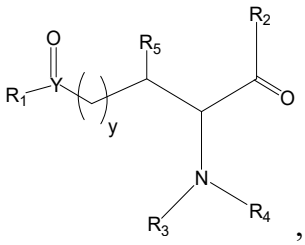
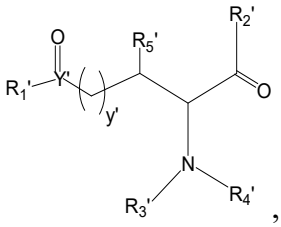
11. The use according to claim 9, wherein the pharmaceutical composition further comprises an additional active ingredient: other amino acids for improving liver function (including but not limited to alanine, glutamic acid, cystine, glutamine, glycine, histidine, tyrosine, serine, methionine, arginine, leucine), cholesterol absorption inhibitors (e.g., Ezetimibe), HSC activation and proliferation inhibitors (e.g., Pirfenidone, Fluorofenidone, Pegbelfermin), PCSK9 inhibitors, PPAR agonists (e.g., Gemfibrozil, Fenofibrate, Clofibrate, Bezafibrate, Pemafibrate, Elafibranor), ACE inhibitors, CCR2/5 inhibitors, TLR4 inhibition agents, LOXL2 inhibitors, TIMP-1 inhibitors, FXR agonists, AT1R blockers, NOX inhibitors, calcium channel blockers, ARBs, diuretics, renin, GLP-1 or synthetic variants thereof, insulin or synthetic variants thereof, metformin, sulfonylurea compounds, thiazolidinediones (TZD), SGLT2 inhibitors, DPP-IV inhibitors, inhibitors of HMGCoA reductase, inhibitors of proprotein convertase subtilisin/kexin type 9 (PCSK9), Gemcabene (CI-1027), ACC inhibitors, ApoC-III inhibitors, ACL-inhibitors (e.g., bepedic acid), prescription fish oil, CETP inhibitors, ursodeoxycholic acid, obeticholic acid, polyene phosphatidylcholine, glucocorticoids, silymarin, glycyrrhizic acid preparations (e.g., magnesium isoglycyrrhizinate injection and diammonium glycyrrhizinate enteric-coated capsules), and combinations thereof;

and further comprises a pharmaceutically acceptable carrier or excipient;

or, the pharmaceutical composition is a solid preparation, an injection, a topical preparation, a spray, a liquid preparation or a compound preparation.

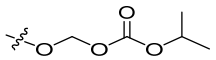
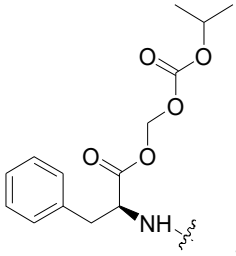
12. A compound represented by Formula II, or pharmaceutically acceptable salt or ester, prodrug, stereoisomer, hydrate, solvate, crystalline form, and metabolism form thereof,

A_1-$(L_1)_x$-A_1' Formula II

wherein, A_1 is , A_1' is , A_1 and A_1' are the same or different;

x is selected from the group consisting of 0, 1 and 2;

1) when x is 0, A' is absent; for A_1, wherein:

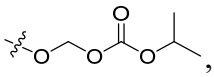
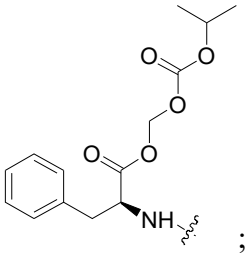
R_1 and R_2 are independently selected from the group consisting of: , , and -O-R^a,

R^a is each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)$_n$-(CO)-R^{b1}, -(C1-C6 alkyl)$_n$-(CO)-O-R^{b2}, -(C1-C6 alkyl)$_n$-O-(CO)-R^{b3}, -(C1-C6 alkyl)$_n$-NR^{b4}-(CO)-R^{b5}, and -(C1-C6 alkyl)$_n$-NR^{b6}-(CO)-O-R^{b7}, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, and heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

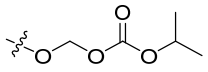
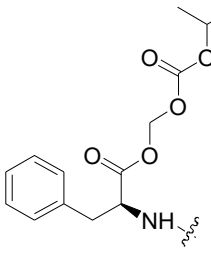
R^{b1}, R^{b2}, R^{b3}, R^{b4}, R^{b5}, R^{b6}, R^{b7} are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, amino, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl;

R_3 and R_4 are independently selected from the group consisting of: -$COCH(CH_3)(NH_2)$, hydrogen, -$COCH_2CH_3$, deuterium, and C1-C6 alkyl, the alkyl is optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl, and heterocyclyl;

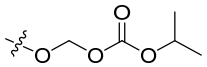
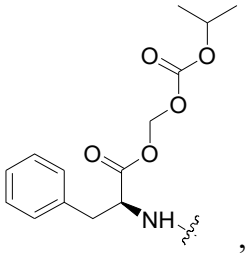
and for "x is 0, A' is absent", A_1 meets one of the following conditions, (1), (2), (3) or (4):

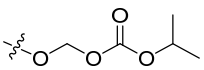
(1) at least one of R_1 and R_2 is , or ;

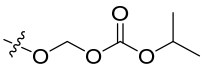
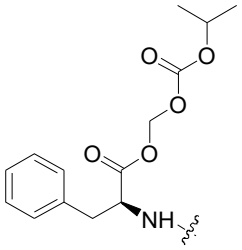
(2) at least one of R_3 and R_4 is -$COCH(CH_3)(NH_2)$ or -$COCH_2CH_3$;

(3) when the situation is: R_1 and R_2 are independently selected from the group consisting of: , , hydroxyl, methoxy, and at the same time, R_3 and R_4 are independently selected from the group consisting of: hydrogen, -$COCH_2CH_3$ and -$COCH(CH_3)(NH_2)$,

A_1 meets the following conditions:

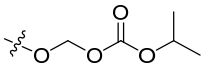
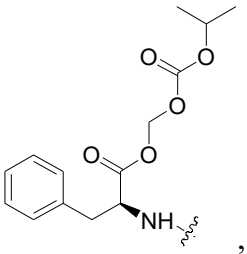
when one of R_1 and R_2 is hydroxyl or methoxy, the other of R_1 and R_2 is  or , or one of R_3 and R_4 is $-COCH(CH_3)(NH_2)$;

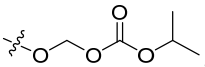
(4) when the situation is: R_1 is selected from the group consisting of: , hydroxyl, methoxy,

R_2 is selected from the group consisting of: , hydroxyl, , methoxy,

and at the same time, R_3 and R_4 are independently selected from the group consisting of: hydrogen, $-COCH_2CH_3$ and $-COCH(CH_3)(NH_2)$,

A_1 meets the following conditions:

when R_1 is hydroxyl or methoxy, R_2 is  or , or one of R_3 and R_4 is $-COCH(CH_3)(NH_2)$, or

when R_2 is hydroxyl or methoxy, R_1 is , or one of R_3 and R_4 is $-COCH(CH_3)(NH_2)$;

2) when x is 1, A_1 and A_1' are the same or different, wherein

any one of R_1, R_2, R_3, and R_4 of a unit A_1 is connected to any one of R_1', R_2', R_3' and R_4' of an adjacent unit A_1' through L_1;

each L_1 is independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkyl-O- (or -O-C1-C6 alkyl-O-), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), and heteroalkyl (or 3- to 7-membered heteroalkyl), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), and heterocyclyl;

or, L_1 is selected from the group consisting of: absence and -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, and $-C-(CH_3)_2$;

for A_1, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, $-O-R^{a1}$, and $-NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b1}$, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, and $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and $-OCH(CH_3)_2$;

or, R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and $-(C1\text{-}C6\ alkyl)_n-O-(CO)-R^{b1}$, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and $-O-R^{a1}$: R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and methoxy,

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5 is selected from the group consisting of hydrogen and amino;

or, R_5 is selected from the group consisting of hydrogen;

Y is C;

y is selected from the group consisting of 0, 1, 2, and 3; or y is 0 or 1; or y is 0;

for A_1', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, $-O-R^{a1}$, and $-NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl) and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and -OCH(CH_3)$_2$;

or, R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and methoxy;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen;

Y' is C;

y' is selected from the group consisting of 0, 1, 2, and 3; or y' is 0 or 1; or y' is 0;

3) when x is 2, A_1 and A_1' are the same or different, wherein

any one of R_1, R_2, R_3 and R_4 of a unit A_1 is connected to any one of R_1', R_2', R_3' and R_4' of an adjacent unit A_1' through L_1;

each L_1 is independently a unit-linking group selected from the group consisting of: absence, O, S, carbonyl, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), -O-alkyl-O- (or -O-C1-C6 alkyl-O-), -O-alkenyl-O- (or -O-C2-C6 alkenyl-O-), -O-alkynyl-O- (or -O-C2-C6 alkynyl-O-), cycloalkyl (or C3-C7 cycloalkyl), and heteroalkyl (or 3- to 7-membered

heteroalkyl), wherein the alkyl, cycloalkyl, heteroalkyl are optionally substituted with one or more groups independently selected from the group consisting of Z;

Z is independently selected from the group consisting of: halogen, amino, alkyl (or C1-C6 alkyl), alkenyl (or C2-C6 alkenyl), alkynyl (or C2-C6 alkynyl), haloalkyl (or halogenated C1-C6 alkyl), cycloalkyl (or C3-C7 cycloalkyl), aryl (or C6-C12 aryl), and heterocyclyl;

or, L_1 is selected from the group consisting of: absence and -CR'R", wherein R' and R" are each independently H, C1-C6 alkyl (or C1-C3 alkyl);

or, L_1 is selected from the group consisting of: absence, $-CH_2-$, $-CH(CH_3)-$, and $-C-(CH_3)_2$;

or, L_1 is selected from the group consisting of: $-CH_2-$;

for A_1, wherein:

R_1 and R_2 are each independently selected from the group consisting of: C1-C6 alkyl, -O-, $-O-R^{a1}$, and $-NR^{a2}R^{a3}$;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl), and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and $-(C1-C6\ alkyl)_n-O-(CO)-R^{b1}$, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1 is selected from the group consisting of: -O-, hydroxyl, and $-O-R^{a1}$; R^{a1} is C1-C6 alkyl;

or, R_1 is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and $-OCH(CH_3)_2$;

or, R_1 is selected from the group consisting of: methoxy;

or, R_2 is selected from the group consisting of: -O-, C1-C6 alkyl, and $-O-R^{a1}$, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and $-(C1-C6\ alkyl)_n-O-(CO)-R^{b1}$, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and $-O-R^{a1}$; R^{a1} is C1-C6 alkyl;

or, R_2 is selected from the group consisting of: hydroxyl, -O-, and methoxy,

or, R_2 is selected from the group consisting of: -O-;

R_3 and R_4 are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3 and R_4 are each independently hydrogen;

R_5 is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

or, R_5 is selected from the group consisting of hydrogen and amino;

or, R_5 is selected from the group consisting of hydrogen;

Y is C;

y is selected from the group consisting of 0, 1, 2, and 3; or y is 0 or 1; or y is 0;

for A_1', wherein:

R_1' and R_2' are each independently selected from the group consisting of: C1-C6 alkyl, -O-, -O-R^{a1}, and -$NR^{a2}R^{a3}$;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, deuterium, hydroxyl, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, C1-C6 alkyl, halogenated C1-C6 alkyl, aryl (or C6-C12 aryl) and heterocyclyl;

R^{a1}, R^{a2}, and R^{a3} are each independently selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C3-C7 cycloalkyl, C6-C10 aryl, and 3- to 15-membered heterocyclyl, the alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_1' is selected from the group consisting of: -O-, hydroxyl, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_1' is selected from the group consisting of: -O-, hydroxyl, methoxy, ethoxy, and -$OCH(CH_3)_2$;

or, R_1' is selected from the group consisting of: methoxy;

or, R_2' is selected from the group consisting of: -O-, C1-C6 alkyl, and -O-R^{a1}, wherein R^{a1} is selected from the group consisting of: hydrogen, C1-C6 alkyl, C2-C6 alkenyl, C3-C7 cycloalkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, and -(C1-C6 alkyl)$_n$-O-(CO)-R^{b1}, the alkyl, alkenyl, cycloalkyl, aryl, heterocyclyl are optionally substituted with one or more groups independently selected from the group consisting of halogen, amino, hydroxyl, C1-C6 alkyl, C6-C10 aryl, 3- to 15-membered heterocyclyl, -(C1-C6 alkyl)-(C6-C10 aryl), and -(C1-C6 alkyl)-(3- to 15-membered heterocyclyl);

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and -O-R^{a1}: R^{a1} is C1-C6 alkyl;

or, R_2' is selected from the group consisting of: hydroxyl, -O-, and methoxy;

or, R_2' is selected from the group consisting of: -O-;

R_3' and R_4' are each independently selected from the group consisting of: hydrogen, hydroxyl, and C1-C6 alkyl;

or, R_3' and R_4' are each independently hydrogen;

R_5' is selected from the group consisting of: hydrogen, deuterium, C1-C6 alkyl, halogen, and amino;

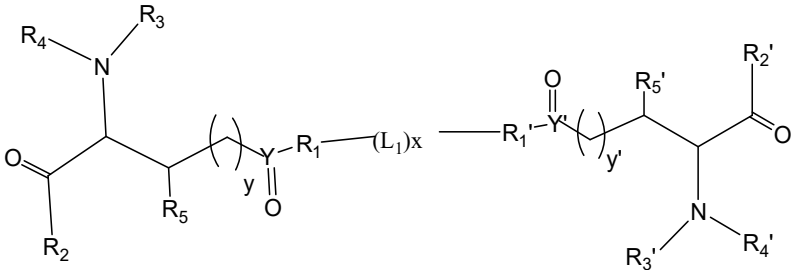
or, R_5' is selected from the group consisting of hydrogen and amino;

or, R_5' is selected from the group consisting of hydrogen;

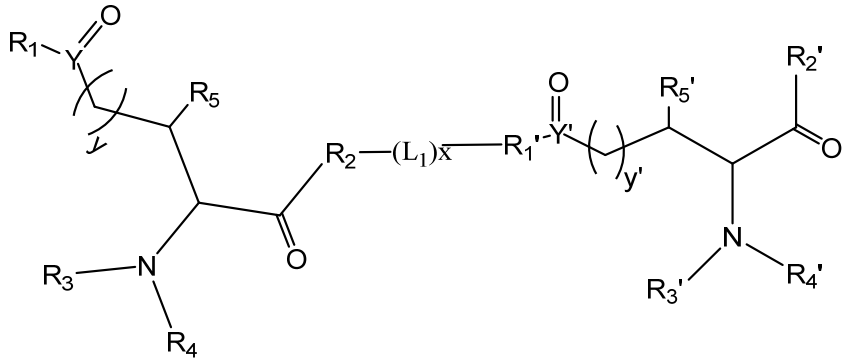
Y' is C;

y' is selected from the group consisting of 0, 1, 2, and 3; or y' is 0 or 1; or y' is 0;

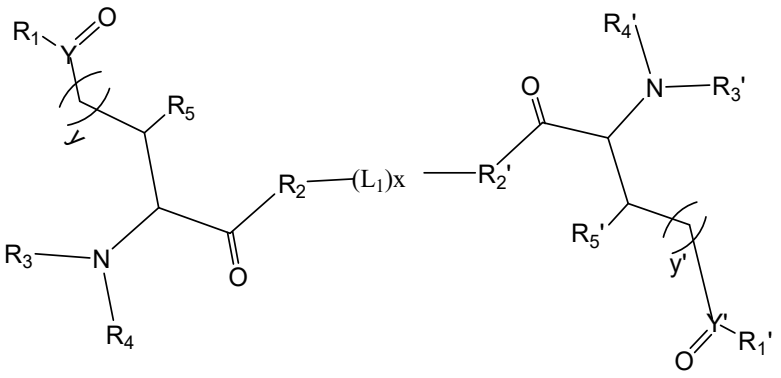
or, Formula II is:



(Formula II-1)

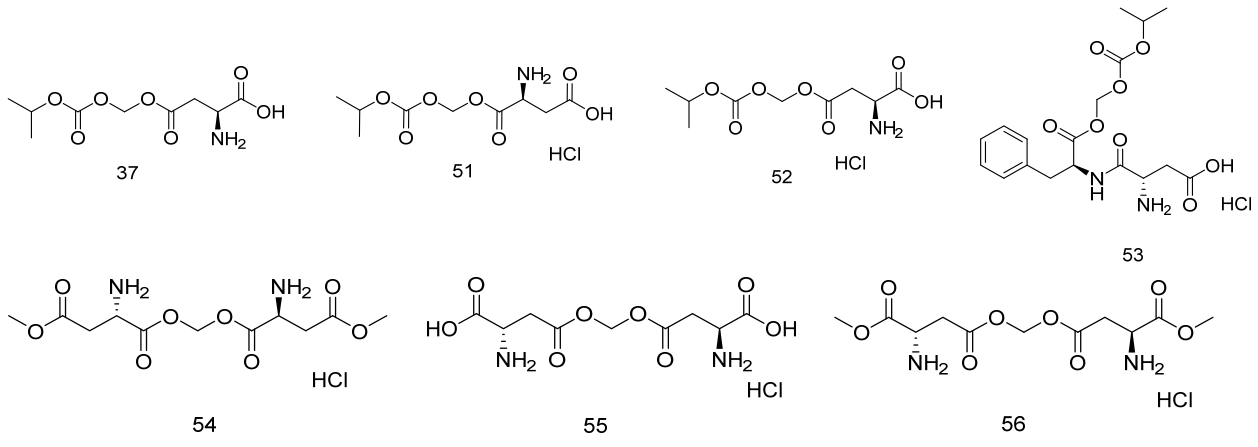


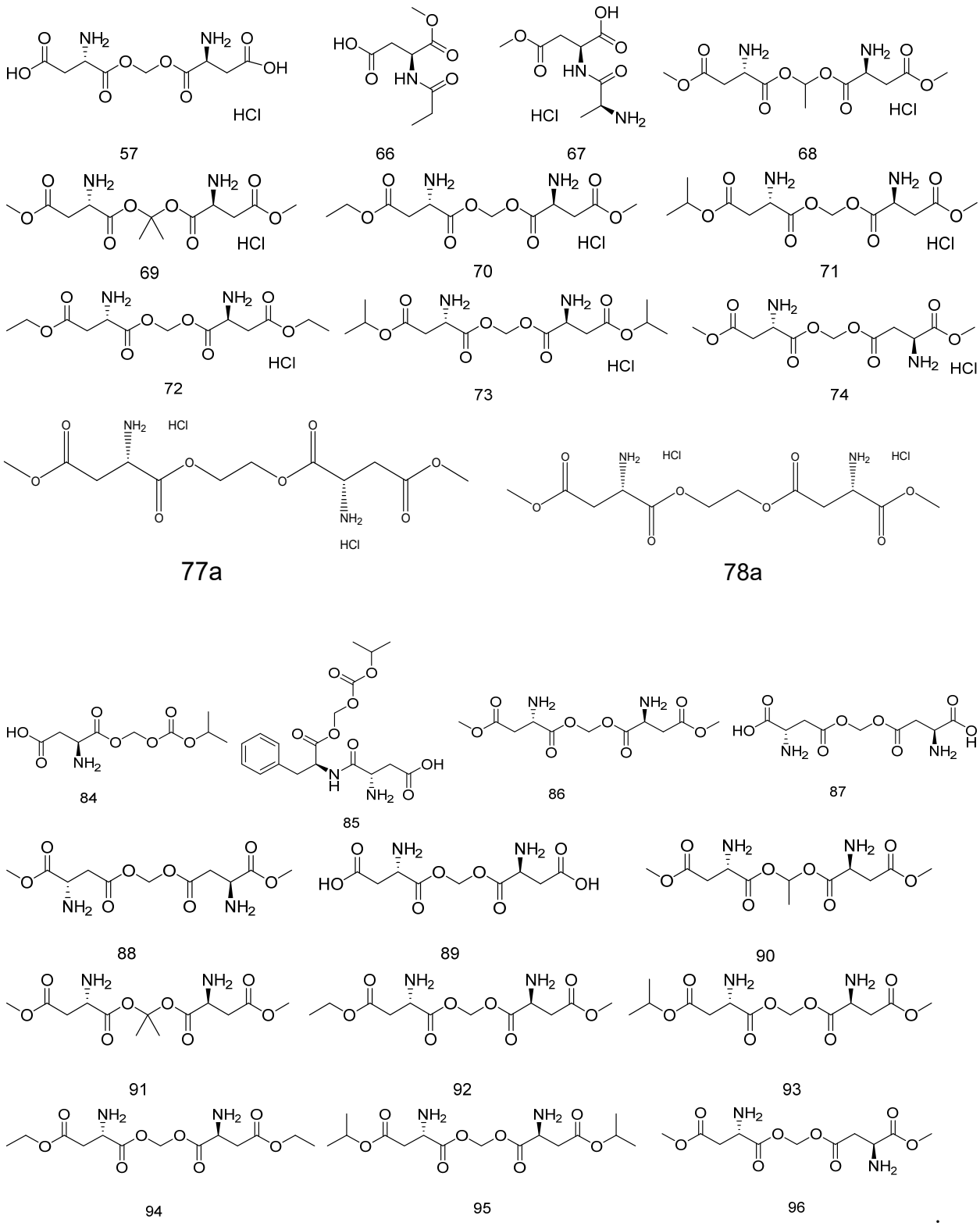
(Formula II-2)



(Formula II-3).

13. The compound of claim 12, wherein the compound represented by Formula II or II-1, II-2, II-3 is selected from the group consisting of the following:





14. A pharmaceutical composition, which comprises the compound represented by Formula II, or pharmaceutically acceptable salt or ester, prodrug, stereoisomer, hydrate, solvate, isotopic compound, crystalline form, metabolite form thereof, or any combination or mixture thereof, according to any one of claims 12 to 13,

optionally, the pharmaceutical composition further comprises a pharmaceutically acceptable carrier or excipient;

optionally, the pharmaceutical composition further comprises an additional active ingredient: other amino acids for improving liver function (including but not limited to alanine, glutamic acid,

cystine, glutamine, glycine, histidine, tyrosine, serine, methionine, arginine, leucine), cholesterol absorption inhibitors (e.g., Ezetimibe), HSC activation and proliferation inhibitors (e.g., Pirfenidone, Fluorofenidone, Pegbelfermin), PCSK9 inhibitors, PPAR agonists (e.g., Gemfibrozil, Fenofibrate, Clofibrate, Bezafibrate, Pemafibrate, Elafibranor), ACE inhibitors, CCR2/5 inhibitors, TLR4 inhibition agents, LOXL2 inhibitors, TIMP-1 inhibitors, FXR agonists, AT1R blockers, NOX inhibitors, calcium channel blockers, ARBs, diuretics, renin, GLP-1 or synthetic variants thereof, insulin or synthetic variants thereof, metformin, sulfonylurea compounds, thiazolidinediones (TZD), SGLT2 inhibitors, DPP-IV inhibitors, inhibitors of HMGCoA reductase, inhibitors of proprotein convertase subtilisin/kexin type 9 (PCSK9), Gemcabene (CI-1027), ACC inhibitors, ApoC-III inhibitors, ACL-inhibitors (e.g., bepedic acid), prescription fish oil, CETP inhibitors, ursodeoxycholic acid, obeticholic acid, polyene phosphatidylcholine, glucocorticoids, silymarin, glycyrrhizic acid preparations (e.g., magnesium isoglycyrrhizinate injection and diammonium glycyrrhizinate enteric-coated capsules), and combinations thereof;

or, the pharmaceutical composition is a solid preparation, an injection, a topical preparation, a spray, a liquid preparation or a compound preparation.