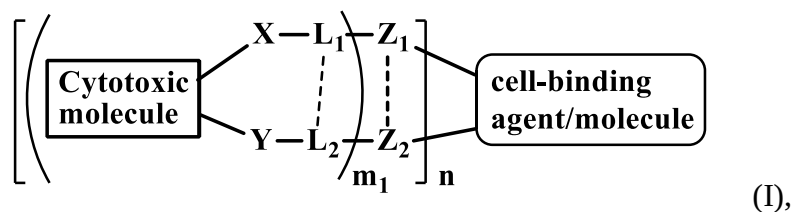


CLAIMS

1. A bis-linkaged conjugate compound of Formula (I):



wherein:

“—” represents a single bond; “-----” is a single bond, a double bond, or absent;

n and m₁ are 1 to 20 independently;

a cell-binding agent/molecule is an agent/molecule that binds to, complexes with, or reacts with a moiety of a cell population sought to be therapeutically or otherwise biologically modified; wherein the cell-binding agent/molecule is selected from an immunotherapeutic protein; an antibody; a single chain antibody; an antibody fragment that binds to a target cell; a monoclonal antibody; a single chain monoclonal antibody; a monoclonal antibody fragment that binds a target cell; a chimeric antibody; a chimeric antibody fragment that binds to a target cell; a domain antibody; a domain antibody fragment that binds to a target cell; an adnectin that mimics an antibody; a DARPin; a lymphokine; a hormone; a vitamin; a growth factor; a colony stimulating factor; a nutrient-transport molecule; a transferrin; a binding peptide having at least four amino acids; or an antibody, a protein, a small cell-binding molecule or a binding-ligand attached on an albumin, a polymer, a dendrimer, a liposome, a nanoparticle, a vesicle, or on a (viral) capsid;

a cytotoxic molecule is a therapeutic drug/molecule/agent; or an immunotherapeutic protein/molecule; or a cell-surface receptor binding ligand; or a functional molecule for enhancement of binding or stabilization of a cell-binding agent/molecule, or for inhibition of cell proliferation, or for monitoring, detection or study of a cell-binding molecule action; or an analog, or prodrug, or a pharmaceutically acceptable salt, hydrate, or hydrated salt, or a crystalline structure, or an optical isomer, racemate, diastereomer or enantiomer, of an immunotherapeutic compound, a chemotherapeutic compound, an antibody (probody) or an antibody (probody) fragment; or a siRNA or DNA molecule; or a cell surface binding ligand; or an analog or prodrug of a therapeutic drug selected from the group comprising tubulysins, calicheamicins, auristatins, maytansinoids, CC-1065 analogs, morpholino doxorubicins, taxanes, cryptophycins, amatoxins, epothilones, eribulin, geldanamycins, duocarmycins, daunomycins, methotrexates, vindesines, vincristines, and benzodiazepine dimers (including

dimers of pyrrolobenzodiazepine (PBD), tomaymycin, indolinobenzodiazepines, imidazobenzothiadiazepines, or oxazolidinobenzodiazepines);

X and Y represent the same or different, and, independently, a functional group that links the cytotoxic molecule via a disulfide, thioether, thioester, peptide, hydrazone, ether, ester, carbamate, carbonate, amine (secondary, tertiary, or quaternary), imine, heterocycloalkyl, heteroaromatic, alkyloxime or amide bond; wherein X and Y are independently selected from NH; NHNH; N(R₁); N(R₁)N(R₂); O; S; S-S; O-NH; O-N(R₁); CH₂-NH; CH₂-N(R₁); CH=NH; CH=N(R₁); S(O); S(O₂); P(O)(OH); S(O)NH; S(O₂)NH; P(O)(OH)NH; NHS(O)NH; NHS(O₂)NH; NHP(O)(OH)NH; N(R₁)S(O)N(R₂); N(R₁)S(O₂)N(R₂); N(R₁)P(O)(OH)N(R₂); OS(O)NH; OS(O₂)NH; OP(O)(OH)NH; C(O); C(NH); C(NR₁); C(O)NH; C(NH)NH; C(NR₁)NH; OC(O)NH; OC(NH)NH; OC(NR₁)NH; NHC(O)NH; NHC(NH)NH; NHC(NR₁)NH; C(O)NH; C(NH)NH; C(NR₁)NH; OC(O)N(R₁); OC(NH)N(R₁); OC(NR₁)N(R₁); NHC(O)N(R₁); NHC(NH)N(R₁); NHC(NR₁)N(R₁); N(R₁)C(O)N(R₁); N(R₁)C(NH)N(R₁); N(R₁)C(NR₁)N(R₁); or C₁-C₆ alkyl, C₂-C₈ alkenyl, heteroalkyl, alkylcycloalkyl, or heterocycloalkyl; or C₃-C₈ aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl;

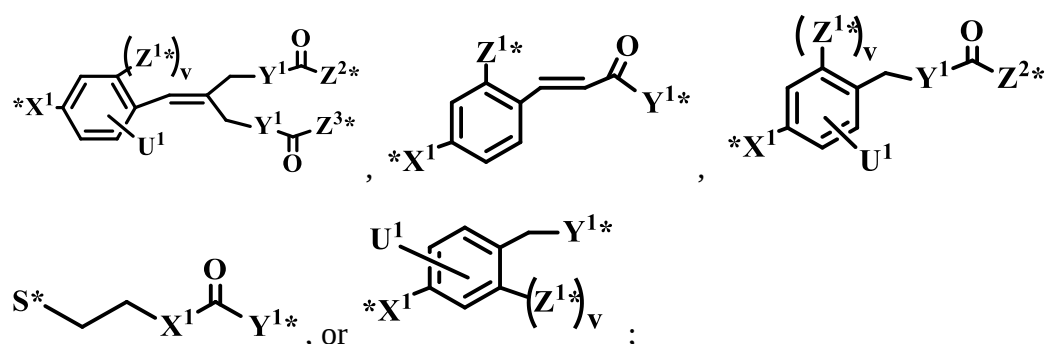
Z₁ and Z₂ are the same or different, and independently a functional group that is linked to the cell-binding agent/molecule to form a disulfide, ether, ester, thioether, thioester, peptide, hydrazone, carbamate, carbonate, amine (secondary, tertiary, or quaternary), imine, heterocycloalkyl, heteroaromatic, alkyloxime or amide bond; wherein Z₁ and Z₂ are independently selected from C(O)CH; C(O)C; C(O)CH₂; ArCH₂; C(O); NH; NHNH; N(R₁); N(R₁)N(R₂); O; S; S-S; O-NH; O-N(R₁); CH₂-NH; CH₂-N(R₁); CH=NH; CH=N(R₁); S(O); S(O₂); P(O)(OH); S(O)NH; S(O₂)NH; P(O)(OH)NH; NHS(O)NH; NHS(O₂)NH; NHP(O)(OH)NH; N(R₁)S(O)N(R₂); N(R₁)S(O₂)N(R₂); N(R₁)P(O)(OH)N(R₂); OS(O)NH; OS(O₂)NH; OP(O)(OH)NH; C(O); C(NH); C(NR₁); C(O)NH; C(NH)NH; C(NR₁)NH; OC(O)NH; OC(NH)NH; OC(NR₁)NH; NHC(O)NH; NHC(NH)NH; NHC(NR₁)NH; C(O)NH; C(NH)NH; C(NR₁)NH; OC(O)N(R₁); OC(NH)N(R₁); OC(NR₁)N(R₁); NHC(O)N(R₁); NHC(NH)N(R₁); NHC(NR₁)N(R₁); N(R₁)C(O)N(R₁); N(R₁)C(NH)N(R₁); N(R₁)C(NR₁)N(R₁); C₁-C₈ alkyl, C₂-C₈ heteroalkyl, alkylcycloalkyl, or heterocycloalkyl; or C₃-C₈ aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl;

L₁ and L₂ are the same or different, independently selected from O; NH; S; NHNH; N(R₃); N(R₃)N(R₃); C₁-C₈ alkyl, amide, amine, imine, hydrazine, or hydrazone; C₂-C₈ heteroalkyl, alkylcycloalkyl, ether, ester, hydrazone, urea, semicarbazide, carbazide, alkoxyamine, alkoxyamine, urethane, amino acid, peptide, acyloxylamine, hydroxamic acid,

or heterocycloalkyl; C₃-C₈ aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl; 1-8 amino acids; or a polyethyleneoxy unit of formula (OCH₂CH₂)_pOR₃, or (OCH₂CH(CH₃))_pOR₃, or NH(CH₂CH₂O)_pR₃, or NH(CH₂CH(CH₃)O)_pR₃, or N[(CH₂CH₂O)_pR₃]-[(CH₂CH₂O)_pR₃], or (OCH₂CH₂)_pCOOR₃, or CH₂CH₂(OCH₂CH₂)_pCOOR₃, wherein p and p' are independently an integer selected from 0 to about 5000, or a combination thereof; R₃ and R₃' are independently H; C₁-C₈ alkyl; C₂-C₈ heteroalkyl, alkylcycloalkyl, or heterocycloalkyl; C₃-C₈ aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl; or a C₂-C₈ ester, ether, or amide; or 1-8 amino acids; or a polyethyleneoxy unit having formula (OCH₂CH₂)_p or (OCH₂CH(CH₃))_p, wherein p is an integer from 0 to about 5000; or a combination thereof;

or L₁ and L₂ independently have one or more linker components of 6-maleimidocaproyl ("MC"), maleimidopropanoyl ("MP"), valine-citrulline ("val-cit" or "vc"), alanine-phenylalanine ("ala-phe" or "af"), p-aminobenzyloxycarbonyl ("PAB"), 4-thiopentanoate ("SPP"), 4-(N-maleimidomethyl)cyclohexane-1 carboxylate ("MCC"), (4-acetyl)amino-benzoate ("SIAB"), 4-thio-butyrate (SPDB), 4-thio-2-hydroxysulfonyl-butyrate (2-Sulfo-SPDB), or a natural or unnatural peptide comprising 1-8 natural or unnatural amino acid units;

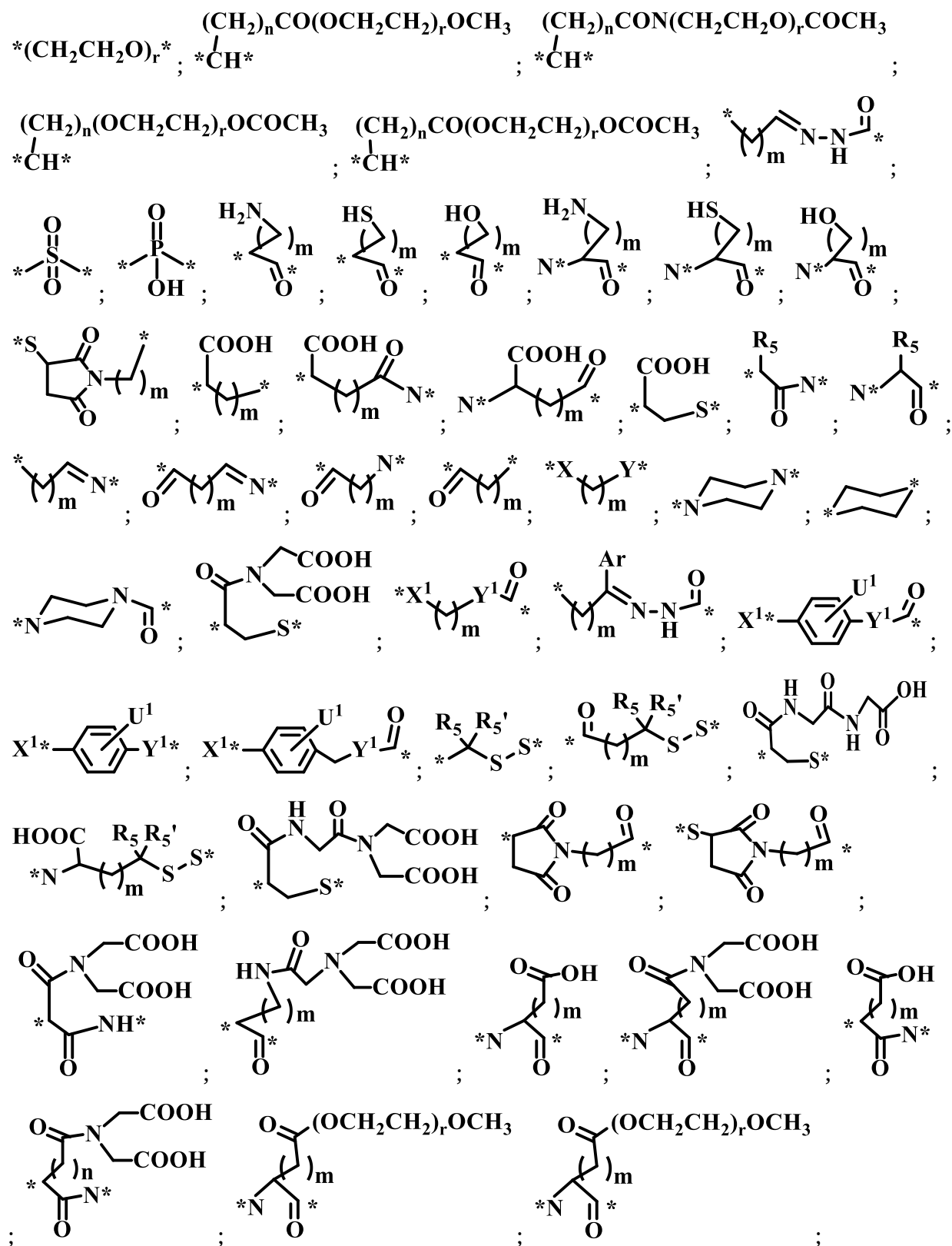
or L₁ and L₂ independently contain a self-immolative component, a peptidic unit, a hydrazone bond, a disulfide, an ester, an oxime, an amide, or a thioether bond; wherein the self-immolative component includes an aromatic compound that is electronically similar to a para-aminobenzyl-carbamoyl (PAB) group, 2-aminoimidazol-5-methanol derivative, heterocyclic PAB analog, beta-glucuronide, or an ortho- or para-aminobenzylacetal, or one of the following structures:

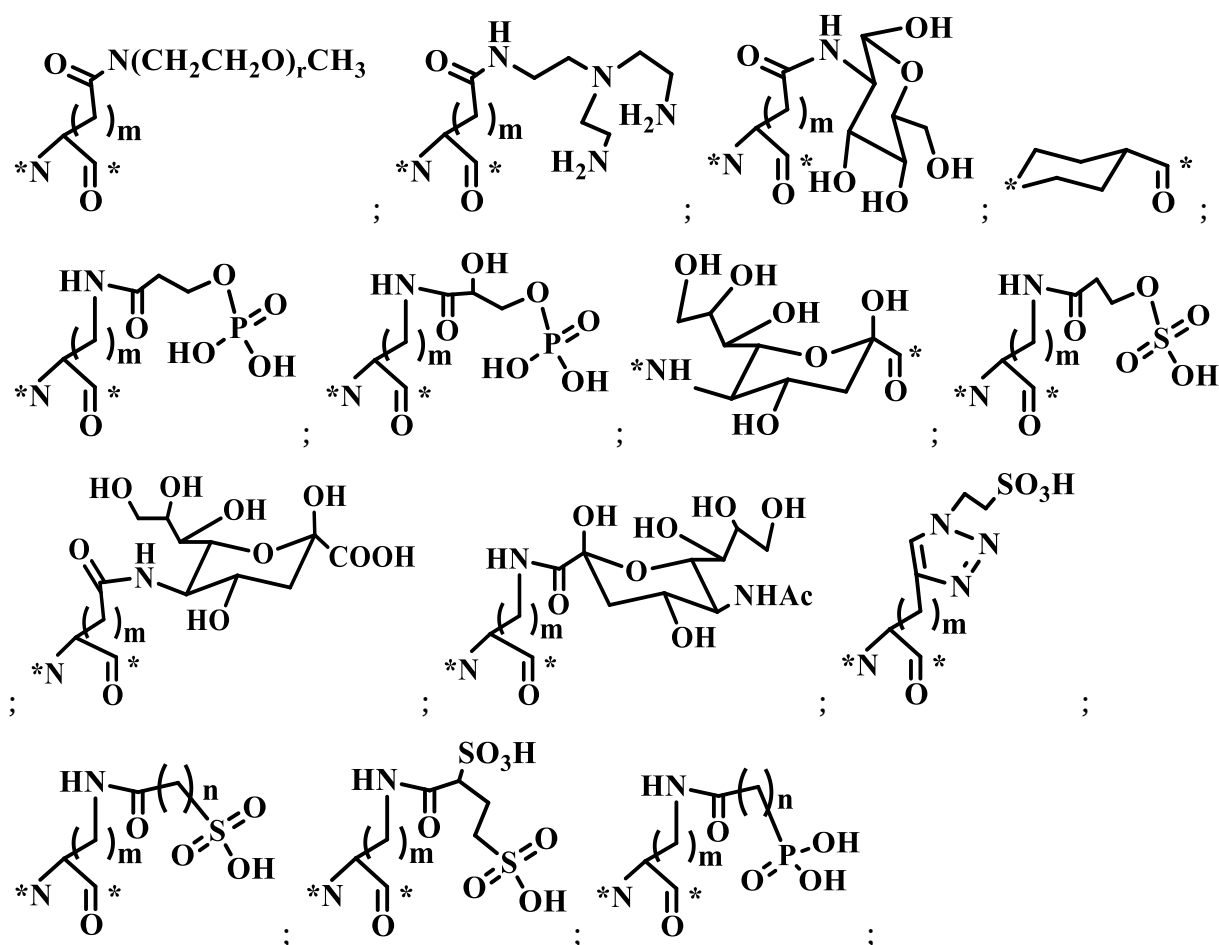


wherein the (*) atom is a point of attachment of an additional spacer or releasable linker unit, or the cytotoxic molecule, and/or the cell-binding agent/molecule; X¹, Y¹, Z² and Z³ are independently NH, O, or S; Z¹ is independently H, NHR₁, OR₁, SR₁, or COX₁R₁, wherein X₁ and R₁ are defined as above; v is 0 or 1; U¹ is independently H, OH, C₁-C₆ alkyl, (OCH₂CH₂)_n, F, Cl, Br, I, OR₅, SR₅, NR₅R₅', N=NR₅, N=R₅, NR₅R₅', NO₂, SOR₅R₅', SO₂R₅, SO₃R₅, OSO₃R₅, PR₅R₅', POR₅R₅', PO₂R₅R₅', OPO(OR₅)(OR₅'), or OCH₂PO(OR₅(OR₅')), wherein R₅

and R₅' are independently selected from H; C₁-C₈ alkyl; C₂-C₈ alkenyl, alkynyl, heteroalkyl, or amino acid; C₃-C₈ aryl, heterocyclic, carbocyclic, cycloalkyl, heterocycloalkyl, heteroaralkyl, alkylcarbonyl, or glycoside; or a pharmaceutically acceptable cation salt;

or L₁ and L₂ independently have a non-self-immolative linker component containing one of the following structures:





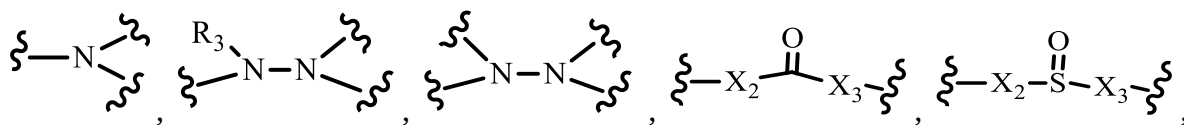
wherein the (*) atom is a point of attachment of an additional spacer or releasable linker, the cytotoxic molecule, and/or the cell-binding agent/molecule; X^1 , Y^1 , U^1 , R_5 , R_5' are defined as above; r is 0-100; m and n are 0-6 independently;

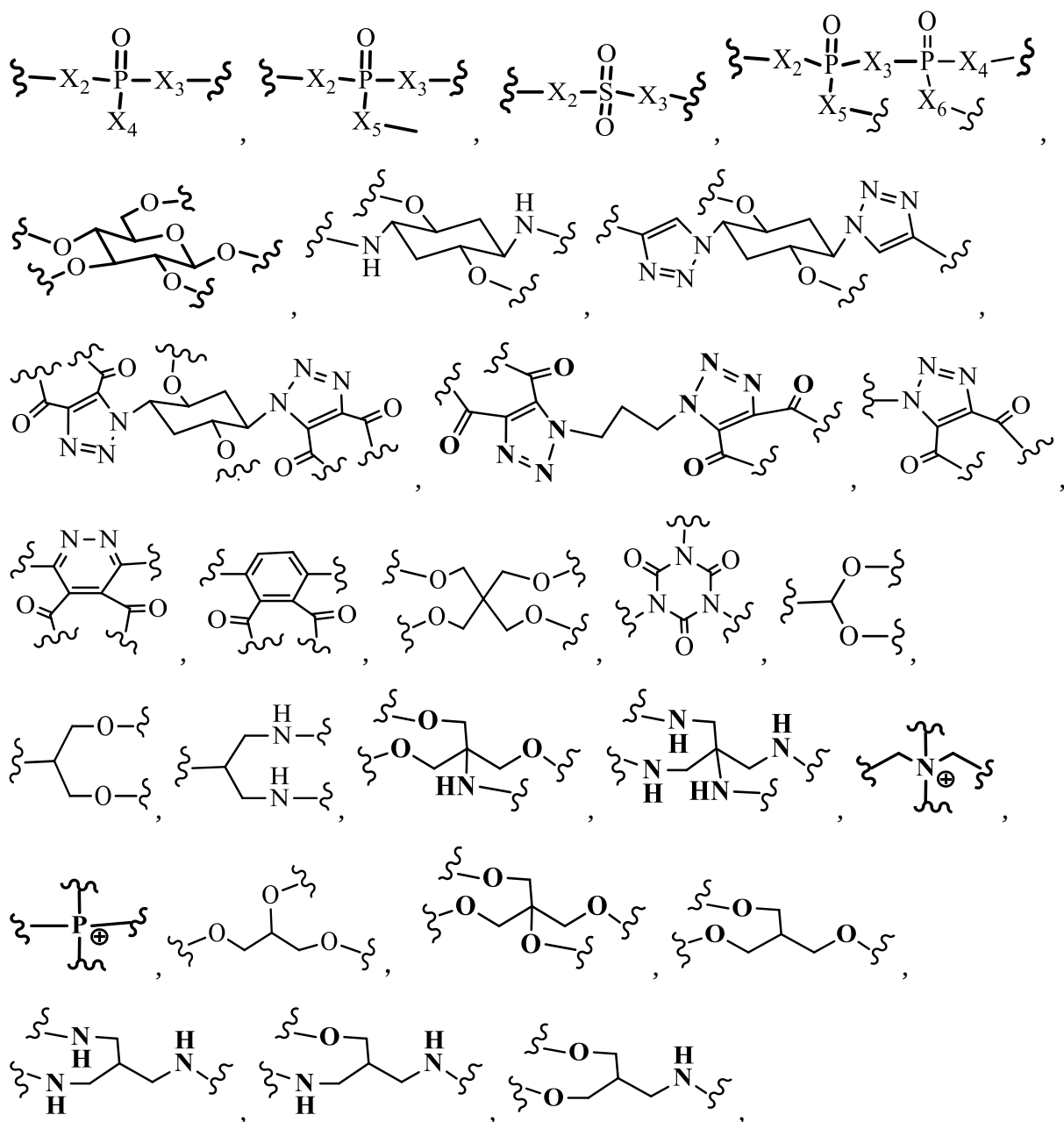
or L_1 and L_2 independently are a releasable linker comprising at least one bond that is capable of being broken under physiological conditions, wherein the bond is selected from a pH-labile, acid-labile, base-labile, oxidatively labile, metabolically labile, biochemically labile or enzyme-labile bond, having one of the following structures:

$-(CR_5R_6)_m(Aa)_r(CR_7R_8)_n(OCH_2CH_2)_t-$, $-(CR_5R_6)_m(CR_7R_8)_n(Aa)_t(OCH_2CH_2)_r-$, $-(Aa)_t-$
 $(CR_5R_6)_m(CR_7R_8)_n(OCH_2CH_2)_t-$, $-(CR_5R_6)_m(CR_7R_8)_n(OCH_2CH_2)_r(Aa)_t-$, $-(CR_5R_6)_m-$
 $(CR_7=CR_8)(CR_9R_{10})_n(Aa)_t(OCH_2CH_2)_r-$, $-(CR_5R_6)_m(NR_{11}CO)(Aa)_t(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-$
 $(CR_5R_6)_m(Aa)_t(NR_{11}CO)(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-(CR_5R_6)_m(OCO)(Aa)_t(CR_9R_{10})_n-$
 $(OCH_2CH_2)_r-$, $-(CR_5R_6)_m(OCNR_7)(Aa)_t(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-(CR_5R_6)_m(CO)(Aa)_t-$
 $(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-(CR_5R_6)_m(NR_{11}CO)(Aa)_t(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-(CR_5R_6)_m-$
 $(OCO)(Aa)_t(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-(CR_5R_6)_m(OCNR_7)(Aa)_t(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-$
 $(CR_5R_6)_m(CO)(Aa)_t(CR_9R_{10})_n(OCH_2CH_2)_r-$, $-(CR_5R_6)_m$ -phenyl-CO(Aa) $_t(CR_7R_8)_n-$, $-(CR_5R_6)_m$ -
furyl-CO(Aa) $_t(CR_7R_8)_n-$, $-(CR_5R_6)_m$ -oxazolyl-CO(Aa) $_t(CR_7R_8)_n-$, $-(CR_5R_6)_m$ -thiazolyl-

CO(Aa)_t(CCR₇R₈)_n-, -(CR₅R₆)_t-thienyl-CO(CR₇R₈)_n-, -(CR₅R₆)_t-imidazolyl-CO-(CR₇R₈)_n-, -(CR₅R₆)_t-morpholino-CO(Aa)_t-(CR₇R₈)_n-, -(CR₅R₆)_t-piperazino-CO(Aa)_t-(CR₇R₈)_n-, -(CR₅R₆)_t-N-methylpiperazin-CO(Aa)_t-(CR₇R₈)_n-, -(CR₅R₆)_m-(Aa)_t-phenyl-, -(CR₅R₆)_m-(Aa)_t-furyl-, -(CR₅R₆)_m-oxazolyl(Aa)_t-, -(CR₅R₆)_m-thiazolyl(Aa)_t-, -(CR₅R₆)_m-thienyl-(Aa)_t-, -(CR₅R₆)_m-imidazolyl(Aa)_t-, -(CR₅R₆)_m-morpholino-(Aa)_t-, -(CR₅R₆)_m-piperazino-(Aa)_t-, -(CR₅R₆)_m-N-methylpiperazino-(Aa)_t-,
 -K(CR₅R₆)_m(Aa)_r(CR₇R₈)_n(OCH₂CH₂)_t-, -K(CR₅R₆)_m(CR₇R₈)_n(Aa)_r(OCH₂CH₂)_t-, -K(Aa)_r-(CR₅R₆)_m(CR₇R₈)_n(OCH₂CH₂)_t-, -K(CR₅R₆)_m(CR₇R₈)_n(OCH₂CH₂)_r(Aa)_t-, -K(CR₅R₆)_m-(CR₇=CR₈)(CR₉R₁₀)_n(Aa)_t(OCH₂CH₂)_r-, -K(CR₅R₆)_m(NR₁₁CO)(Aa)_t(CR₉R₁₀)_n(OCH₂CH₂)_r-,
 -K(CR₅R₆)_m(Aa)_t(NR₁₁CO)(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m(OCO)(Aa)_t(CR₉R₁₀)_n-(OCH₂CH₂)_r-, -K(CR₅R₆)_m(OCNR₇)(Aa)_t(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m(CO)(Aa)_t-(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m(NR₁₁CO)(Aa)_t(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m-(OCO)(Aa)_t(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m(OCNR₇)(Aa)_t(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m(CO)(Aa)_t(CR₉R₁₀)_n(OCH₂CH₂)_r-, -K(CR₅R₆)_m-phenyl-CO(Aa)_t(CR₇R₈)_n-, -K(CR₅R₆)_m-furyl-CO(Aa)_t(CR₇R₈)_n-, -K(CR₅R₆)_m-oxazolyl-CO(Aa)_t(CR₇R₈)_n-, -K(CR₅R₆)_m-thiazolyl-CO(Aa)_t(CR₇R₈)_n-, -K(CR₅R₆)_t-thienyl-CO(CR₇R₈)_n-, -K(CR₅R₆)_t-imidazolyl-CO-(CR₇R₈)_n-, -K(CR₅R₆)_t-morpholino-CO(Aa)_t(CR₇R₈)_n-, -K(CR₅R₆)_t-piperazino-CO(Aa)_t-(CR₇R₈)_n-, -K(CR₅R₆)_t-N-methylpiperazinCO(Aa)_t(CR₇R₈)_n-, -K(CR₅R₆)_m-(Aa)_t-phenyl-, -K(CR₅R₆)_m-(Aa)_t-furyl-, -K(CR₅R₆)_m-oxazolyl(Aa)_t-, -K(CR₅R₆)_m-thiazolyl(Aa)_t-, -K(CR₅R₆)_m-thienyl-(Aa)_t-, -K(CR₅R₆)_m-imidazolyl(Aa)_t-, -K(CR₅R₆)_m-morpholino(Aa)_t-, -K(CR₅R₆)_m-piperazino-(Aa)_tG, -K(CR₅R₆)_mN-methylpiperazino(Aa)_t-, wherein Aa is 1-8 amino acids; m and n are as defined above; t and r are 0 – 100, independently; R₃, R₄, R₅, R₆, R₇, and R₈ are independently chosen from H; halide; C₁-C₈ alkyl; C₂-C₈ aryl, alkenyl, alkynyl, ether, ester, amine or amide, which optionally substituted by one or more halide, CN, NR₁R₂, CF₃, OR₁, Aryl, heterocycle, S(O)R₁, SO₂R₁, -CO₂H, -SO₃H, -OR₁, -CO₂R₁, -CONR₁, -PO₂R₁R₂, -PO₃H or P(O)R₁R₂R₃; K is NR₁, -SS-, -C(=O)-, -C(=O)NH-, -C(=O)O-, -C=NH-O-, -C=N-NH-, -C(=O)NH-NH-, O, S, Se, B, Het (heterocyclic or heteroaromatic ring having C₃-C₈), or a peptide comprising 1-20 amino acids;

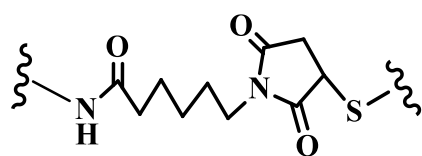
or L₁ and L₂ independently contain one of the following structures:



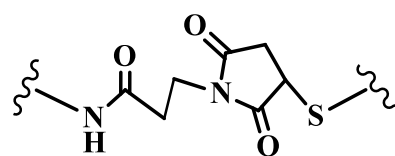


wherein S is a site of linkage; X_2 , X_3 , X_4 , X_5 , or X_6 are independently NH ; NHNH ; $\text{N}(\text{R}_3)$; $\text{N}(\text{R}_3)\text{N}(\text{R}_3')$; O ; S ; C_1 - C_6 alkyl; C_2 - C_6 heteroalkyl, alkylcycloalkyl, or heterocycloalkyl; C_3 - C_8 aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl; or 1-8 amino acids; wherein R_3 and R_3' are independently H ; C_1 - C_8 alkyl; C_2 - C_8 heteroalkyl, alkylcycloalkyl, or heterocycloalkyl; C_3 - C_8 aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl; or a C_2 - C_8 ester, ether, or amide; or a polyethyleneoxy unit having formula $(\text{OCH}_2\text{CH}_2)_p$ or $(\text{OCH}_2\text{CH}(\text{CH}_3))_p$, wherein p is an integer from 0 to about 5000; or a combination thereof;

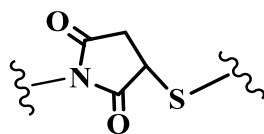
or X, Y, L₁, L₂, Z₁ or Z₂ are independently composed of one or more components selected from the following:



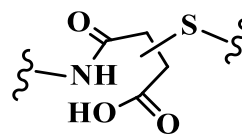
6-maleimidocaproyl (MC),



maleimidopropanoyl (MP),

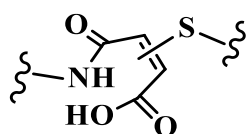


thio-maleido,

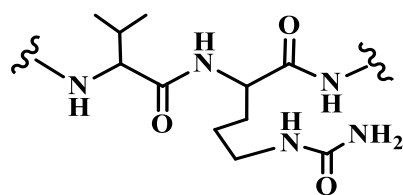


thio-amino-

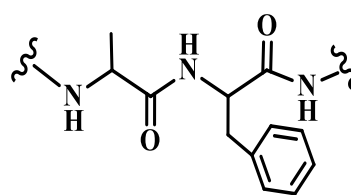
oxobutanoic acid,



thio-amino-oxobutenoic acid,

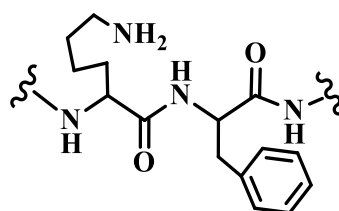


valine-citrulline (val-cit),

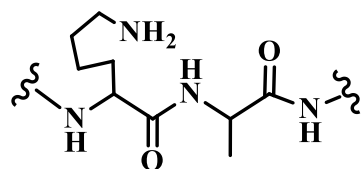


alanine-

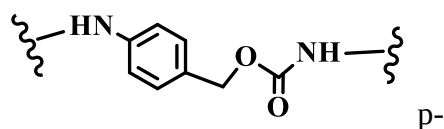
phenylalanine (ala-phe),



lysine-phenylalanine (lys-phe),

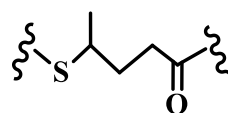


lysine-alanine (lys-ala),

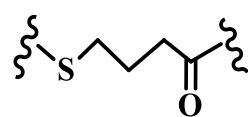


p-

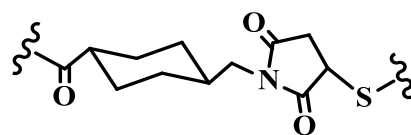
aminobenzyloxycarbonyl (PAB),



4-thio-pentanoate (SPP),

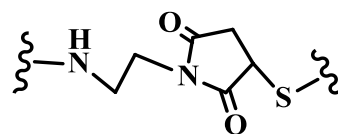


4-thio-butyrate (SPDB),

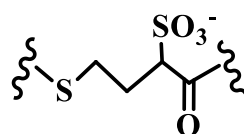


4-(N-

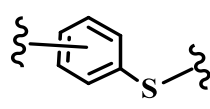
maleimidomethyl)cyclo-hexane-1-carboxylate (MCC),



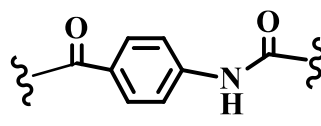
maleimidoethyl (ME),



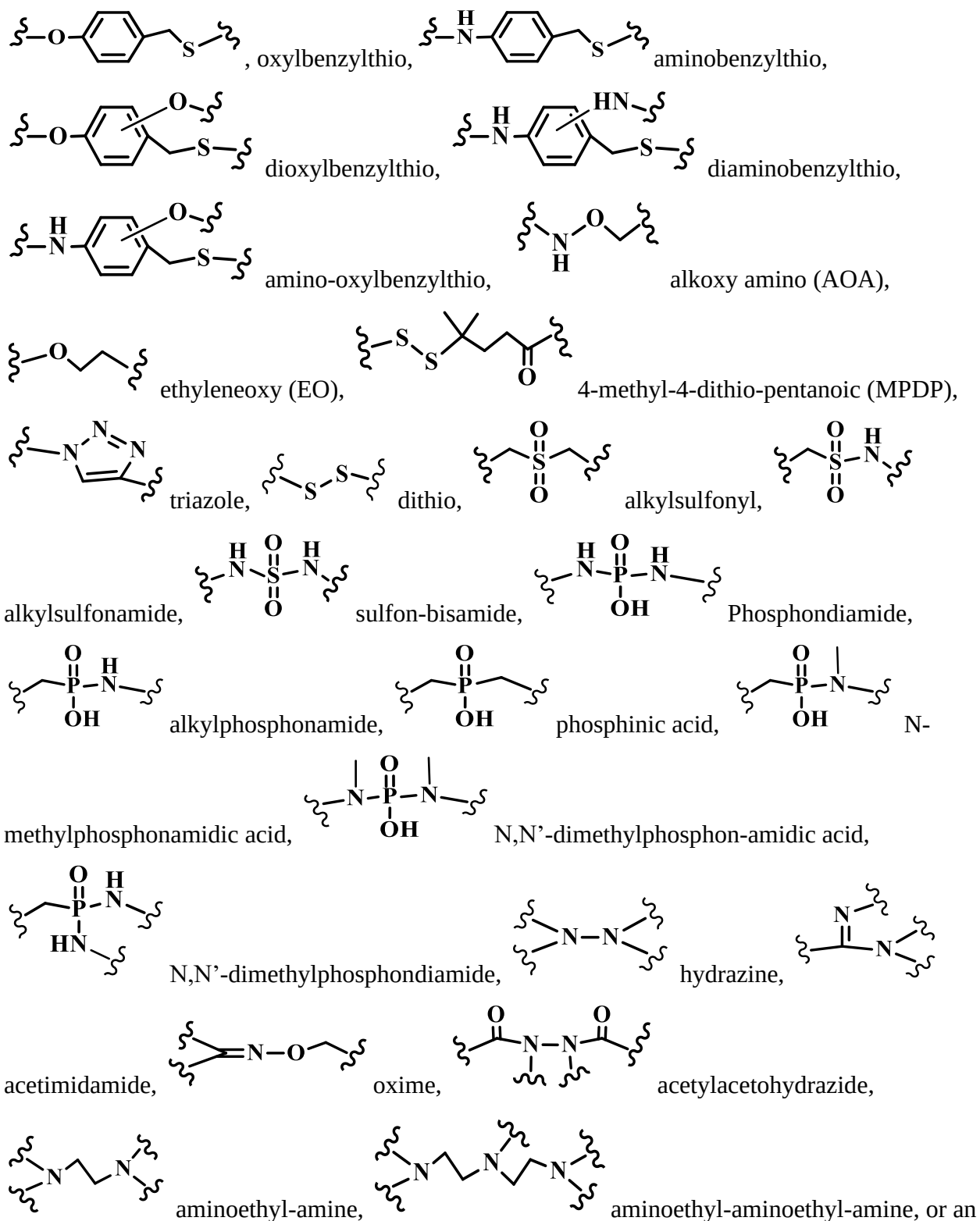
4-thio-2-hydroxysulfonyl-butyrate (2-Sulfo-SPDB),



aryl-thiol (PySS),



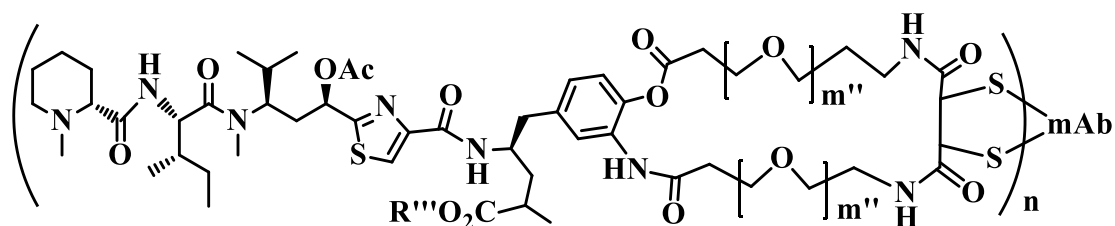
(4-acetyl)aminobenzoate (SIAB),



L- or D-, natural or unnatural peptide containing 1-20 amino acids; wherein the connecting bond in the middle of atoms means that it can connect either neighbor carbon atom bonds; and wherein the wavy line is a site that another bond can be connected to;

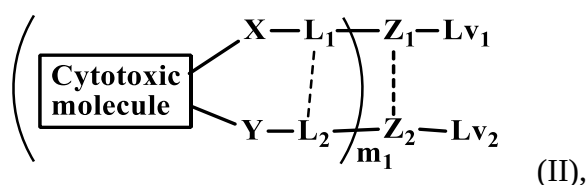
or X, Y, L₁, L₂, Z₁, or Z₂, are independently absent, provided that L₁ and Z₁, or L₂ and Z₂ are not absent at the same time;

provided that the said conjugate compound of Formula (I) specifically excludes the following structure:



wherein $n = 1-30$; $m'' = 1-3$; $R''' = H, CH_3$ or C_2H_5 .

2. A bis-linker compound comprising a cytotoxic molecule of Formula (II):



wherein:

“—” represents a single bond; “-----” is a single bond, a double bond, or a triple bond, or absent;

provided that when ----- represents a triple bond, both L_{v1} and L_{v2} are absent;

Cytotoxic molecule in the frame, m_1 , X, Y, L_1 , L_2 , Z_1 , and Z_2 are defined the same as in Claim 1;

L_{v1} and L_{v2} represent the same or different leaving group that is capable of reacting with a thiol, amine, carboxylic acid, selenol, phenol or hydroxyl group on the cell-binding agent/molecule;

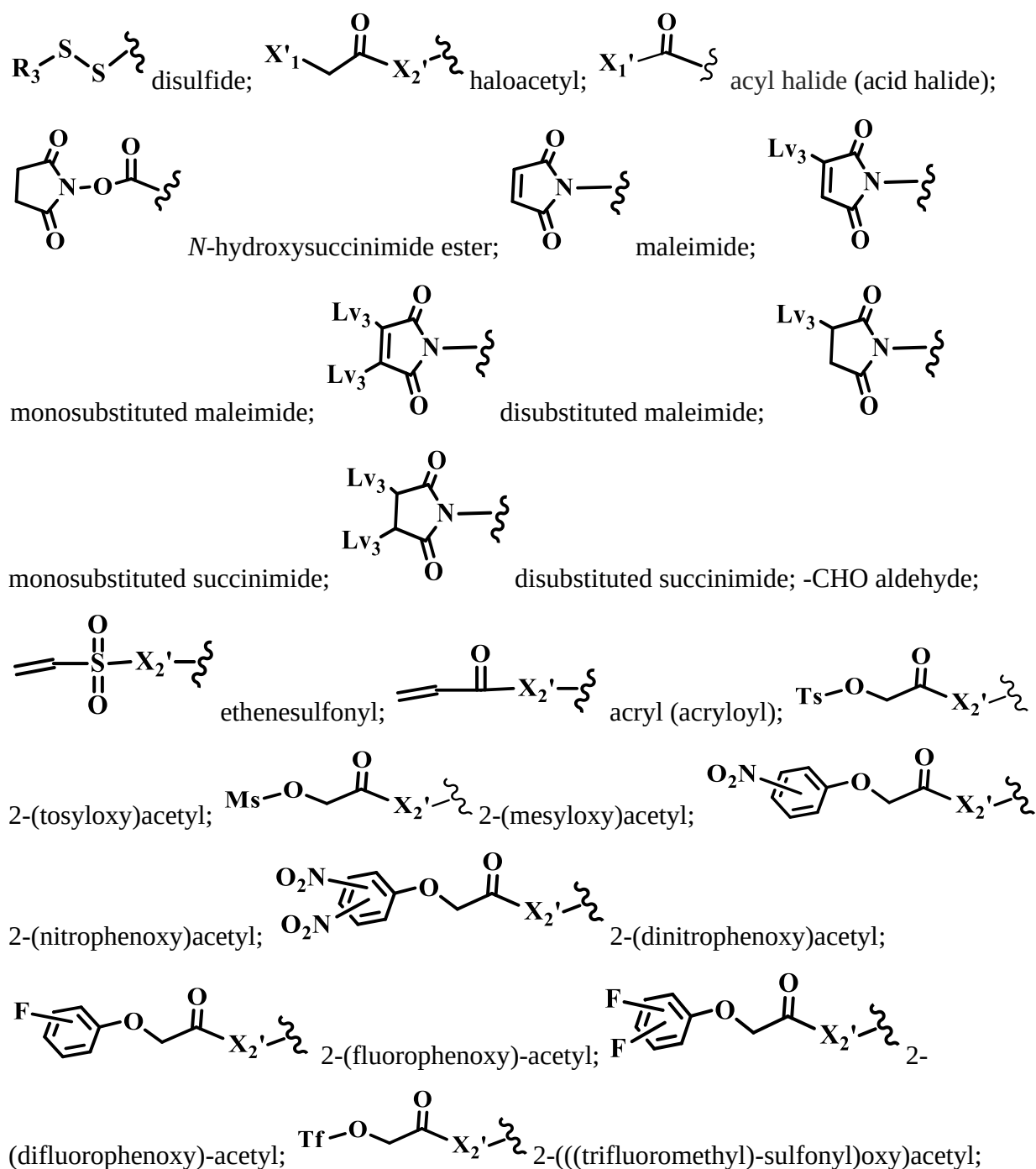
L_{v1} and L_{v2} are independently selected from OH; F; Cl; Br; I; nitrophenol; N-hydroxysuccinimide (NHS); phenol; dinitrophenol; pentafluorophenol; tetrafluorophenol; difluorophenol; mono-fluorophenol; pentachlorophenol; triflate; imidazole; dichlorophenol; tetrachlorophenol; 1-hydroxybenzotriazole; tosylate; mesylate; 2-ethyl-5-phenylisoxazolium-3'-sulfonate, anhydrides formed its self, or formed with the other anhydride: acetyl anhydride, or formyl anhydride; or an intermediate molecule generated with a condensation reagent for peptide coupling reactions, or for Mitsunobu reactions, which are selected from: EDC (N-(3-Dimethylaminopropyl)-N'-ethylcarbodiimide), DCC (Dicyclohexylcarbodiimide), N,N'-Diisopropylcarbodiimide (DIC), N-Cyclohexyl-N'-(2-morpholino-ethyl)carbodiimide metho-p-toluenesulfonate (CMC, or CME-CDI), 1,1'-Carbonyldiimidazole (CDI), TBTU (O-(Benzotriazol-1-yl)-N,N,N',N'-tetramethyluronium tetrafluoroborate), N,N,N',N'-Tetramethyl-O-(1H-benzotriazol-1-yl)-uronium hexafluorophosphate (HBTU),

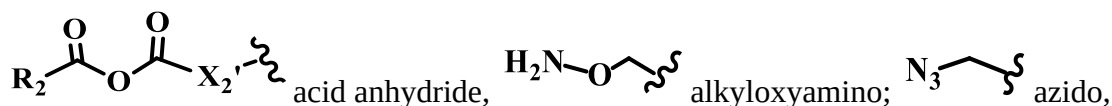
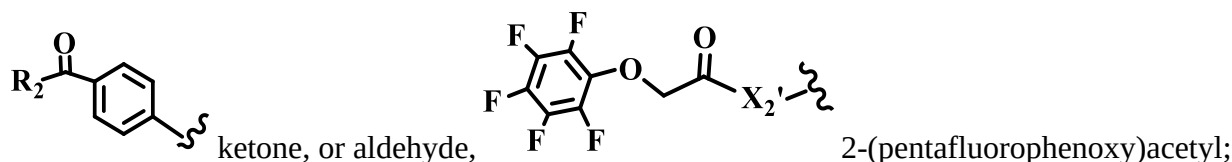
(Benzotriazol-1-yloxy)tris(dimethylamino)-phosphonium hexafluorophosphate (BOP), (Benzotriazol-1-yloxy)tripyrrolidinophosphonium hexafluorophosphate (PyBOP), Diethyl cyanophosphonate (DEPC), Chloro-N,N,N',N'-tetramethylformamidiniumhexafluorophosphate, 1-[Bis(dimethylamino)methylene]-1H-1,2,3-triazolo[4,5-b]pyridinium 3-oxid hexafluorophosphate (HATU), 1-[(Dimethylamino)(morpho-lino)methylene]-1H-[1,2,3]triazolo[4,5-b]pyridine-1-ium 3-oxide hexafluoro-phosphate (HDMA), 2-Chloro-1,3-dimethylimidazolidinium hexafluorophosphate (CIP), Chlorotripyrrolidinophosphonium hexafluorophosphate (PyCloP), Fluoro-N,N,N',N'-bis(tetramethylene)-formamidinium hexafluorophosphate (BTFFH), N,N,N',N'-Tetramethyl-S-(1-oxido-2-pyridyl)thiuronium hexafluorophosphate, O-(2-Oxo-1(2H)pyridyl)-N,N,N',N'-tetramethyl-uronium tetrafluoroborate (TPTU), S-(1-Oxido-2-pyridyl)-N,N,N',N'-tetramethylthiuronium tetrafluoroborate, O-[(Ethoxycarbonyl)-cyanomethylenamino]-N,N,N',N'-tetramethyluronium hexafluorophosphate (HOTU), (1-Cyano-2-ethoxy-2-oxoethylidenaminoxy) dimethylaminomorpholino-carbenium hexafluorophosphate (COMU), O-(Benzotriazol-1-yl)-N,N,N',N'-bis(tetramethylene)uronium hexafluorophosphate (HBPYU), N-Benzyl-N'-cyclohexylcarbodiimide (with, or without polymer-bound), Dipyrrolidino(N-succinimidyl-oxy)carbenium hexafluoro-phosphate (HSPYU), Chlorodipyrrolidinocarbenium hexafluorophosphate (PyClU), 2-Chloro-1,3-dimethylimidazolidinium tetrafluoroborate(CIB), (Benzotriazol-1-yloxy)dipiperidinocarbenium hexafluorophosphate (HBPipU), O-(6-Chlorobenzotriazol-1-yl)-N,N,N',N'-tetramethyluronium tetrafluoroborate (TCTU), Bromotris(dimethylamino)-phosphonium hexafluorophosphate (BroP), Propylphosphonic anhydride (PPACA, T3P[®]), 2-Morpholinoethyl isocyanide (MEI), N,N,N',N'-Tetramethyl-O-(N-succinimidyl)uronium hexafluorophosphate (HSTU), 2-Bromo-1-ethyl-pyridinium tetrafluoroborate (BEP), O-[(Ethoxycarbonyl)cyano-methylenamino]-N,N,N',N'-tetra-methyluronium tetrafluoroborate (TOTU), 4-(4,6-Dimethoxy-1,3,5-triazin-2-yl)-4-methylmorpholiniumchloride (MMTM, DMTMM), N,N,N',N'-Tetramethyl-O-(N-succinimidyl)uronium tetrafluoroborate (TSTU), O-(3,4-Dihydro-4-oxo-1,2,3-benzotriazin-3-yl)-N,N,N',N'-tetramethyluronium tetrafluoro-borate (TDBTU), 1,1'-(Azodicarbonyl)-dipiperidine (ADD), Di-(4-chlorobenzyl)azodicarboxylate (DCAD), Di-tert-butyl azodicarboxylate (DBAD), Diisopropyl azodicarboxylate (DIAD), Diethyl azodicarboxylate (DEAD);

or Lv_1 and Lv_2 are independently an anhydride, formed by acid themselves or formed with other C_1 - C_8 acid anhydrides;

or Lv_1 and Lv_2 are independently selected from a halide (fluoride, chloride, bromide, or iodide), methanesulfonyl (mesyl), toluenesulfonyl (tosyl), trifluoromethyl-sulfonyl (triflate),

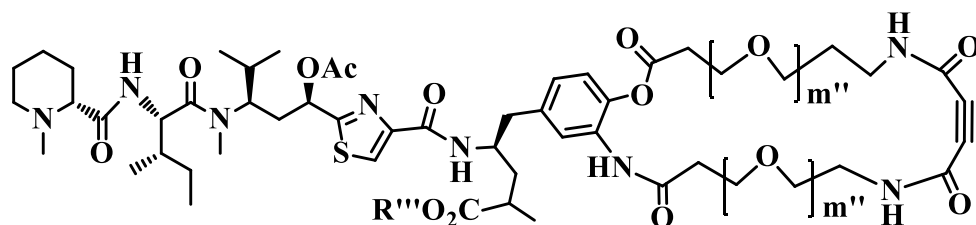
trifluoromethylsulfonate, nitrophenoxyl, N-succinimidyloxyl (NHS), phenoxyl; dinitrophenoxyl; pentafluorophenoxyl, tetrafluorophenoxyl, trifluorophenoxyl, difluorophenoxyl, monofluorophenoxyl, pentachlorophenoxyl, 1H-imidazole-1-yl, chlorophenoxyl, dichlorophenoxyl, trichlorophenoxyl, tetrachlorophenoxyl, N-(benzotriazol-yl)oxyl, 2-ethyl-5-phenylisoxazolium-3'-sulfonyl, phenyloxadiazole-sulfonyl (-sulfone-ODA), 2-ethyl-5-phenylisoxazolium-yl, phenyloxadiazol-yl (ODA), oxadiazol-yl, unsaturated carbon (a double or a triple bond between carbon-carbon, carbon-nitrogen, carbon-sulfur, carbon-phosphorus, sulfur-nitrogen, phosphorus-nitrogen, oxygen-nitrogen, or carbon-oxygen), or one of the following structure:





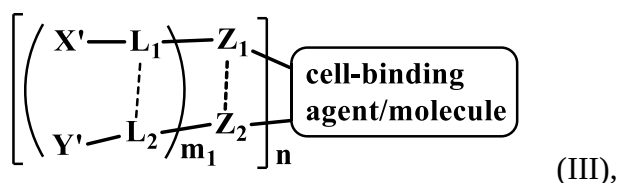
R_3 alkynyl, or $\text{H}_2\text{NHN}-\text{C}(=\text{O})-$ hydrazide, wherein X_1' is F, Cl, Br, I or Lv_3 ; X_2' is O, NH, $\text{N}(\text{R}_1)$, or CH_2 ; R_3 is independently H, aromatic, heteroaromatic, or aromatic group wherein one or several H atoms are replaced independently by $-\text{R}_1$, -halogen, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{NR}_1\text{R}_2$, $-\text{NO}_2$, $-\text{S}(\text{O})\text{R}_1$, $-\text{S}(\text{O})_2\text{R}_1$, or $-\text{COOR}_1$; Lv_3 is a leaving group selected from F, Cl, Br, I, nitrophenol; N-hydroxysuccinimide (NHS); phenol; dinitrophenol; pentafluorophenol; tetrafluorophenol; difluorophenol; monofluorophenol; pentachlorophenol; triflate; imidazole; dichlorophenol; tetrachlorophenol; 1-hydroxybenzotriazole; tosylate; mesylate; 2-ethyl-5-phenylisoxazolium-3'-sulfonate; R_1 and R_2 are independently selected from H, C_1 - C_8 alkyl, C_2 - C_8 alkenyl, heteroalkyl, alkylcycloalkyl, or heterocycloalkyl; C_3 - C_8 aryl, Ar-alkyl, heterocyclic, carbocyclic, cycloalkyl, heteroalkylcycloalkyl, alkylcarbonyl, or heteroaryl, or C_2 - C_8 ester, ether, or amide; or a peptide containing 1-8 amino acids; or polyethyleneoxy unit having formula $(\text{OCH}_2\text{CH}_2)_p$ or $(\text{OCH}_2\text{CH}(\text{CH}_3))_p$, wherein p is an integer from 0 to about 5000, or a combination thereof;

provided that the said conjugate compound of Formula (II) specifically excludes the following structure:



wherein $m'' = 1-3$; $\text{R}''' = \text{H}$, CH_3 or C_2H_5 .

3. A bis-linker compound comprising a cell-binding molecule of Formula (III):



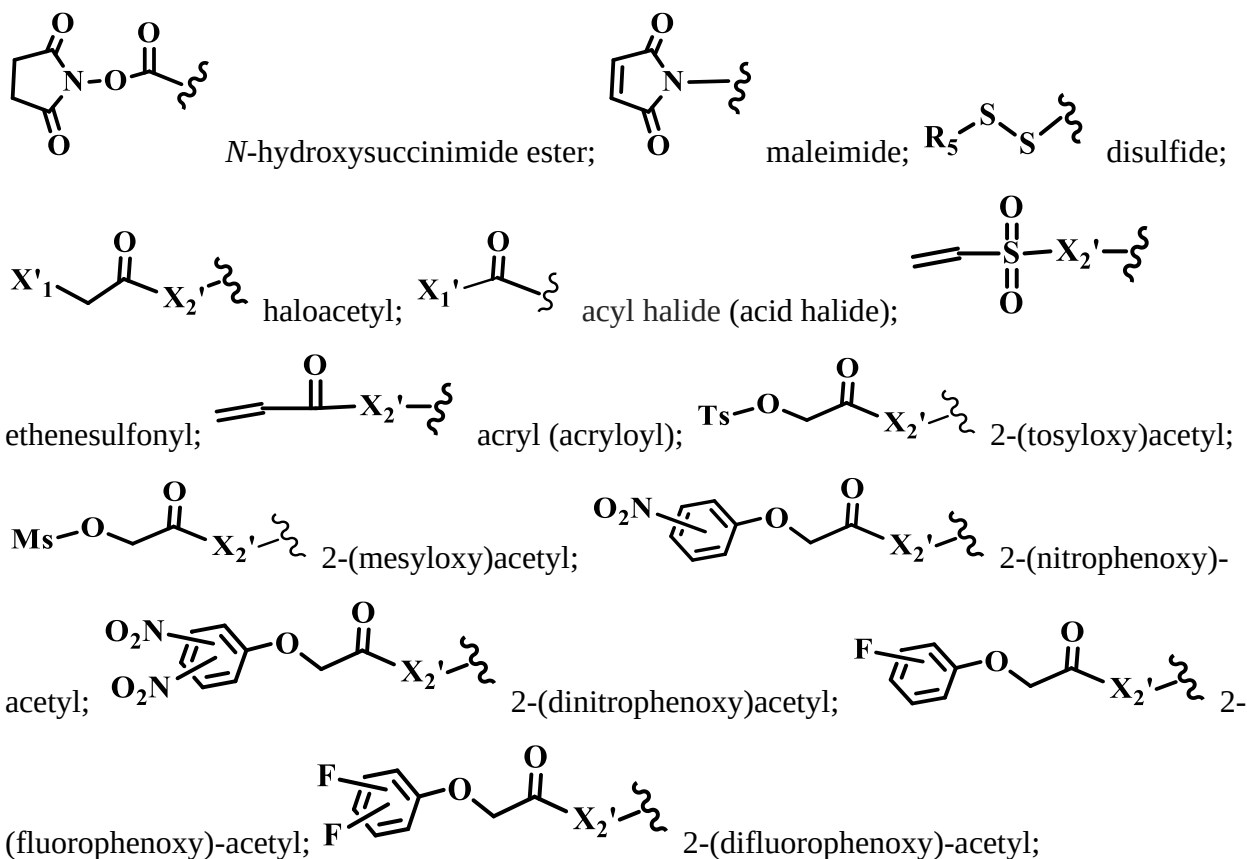
wherein:

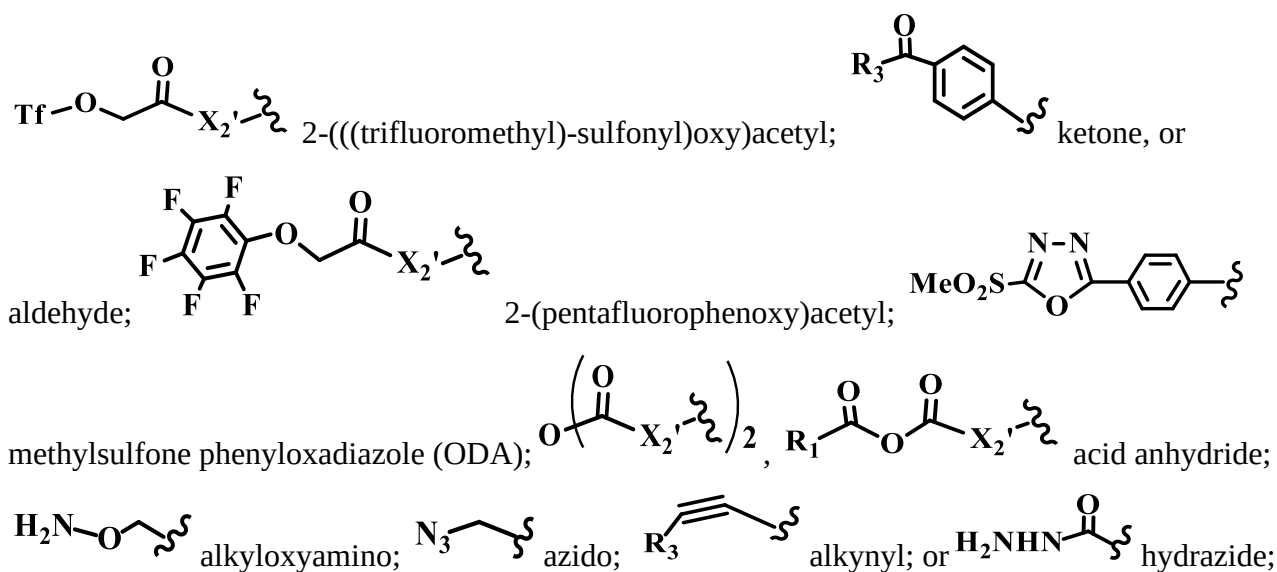
“—” represents a single bond;

m_1 , n , “-----”, cell-binding agent/molecule, L_1 , L_2 , Z_1 , and Z_2 are defined the same as in Claim 1;

X' and Y' are a functional group that is capable of independently reacting with a residue group of a cytotoxic molecule simultaneously or sequentially;

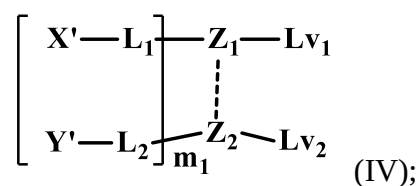
X' and Y' are independently selected from a disulfide substituent, maleimido, haloacetyl, alkoxyamine, azido, ketone, aldehyde, hydrazine, amino, hydroxyl, carboxylate, imidazole, thiol, or alkyne; or a *N*-hydroxysuccinimide ester, *p*-nitrophenyl ester, dinitrophenyl ester, pentafluorophenyl ester, pentachlorophenyl ester; tetrafluorophenyl ester; difluorophenyl ester; monofluorophenyl ester; or pentachlorophenyl ester, dichlorophenyl ester, tetrachlorophenyl ester, or 1-hydroxybenzotriazole ester; a triflate, mesylate, or tosylate; 2-ethyl-5-phenylisoxazolium-3'-sulfonate; a pyridyldisulfide, or nitropyridyldisulfide; a maleimide, haloacetate, acetylenedicarboxylic group, or carboxylic acid halogenate (fluoride, chloride, bromide, or iodide); or one of the following structures:





wherein X_1' is F, Cl, Br, I or Lv_3 ; X_2' is O, NH, $\text{N}(\text{R}_1)$, or CH_2 ; R_3 and R_5 are H, R_1 , aromatic, heteroaromatic, or aromatic group wherein one or several H atoms are replaced independently by - R_1 , -halogen, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{NR}_1\text{R}_2$, $-\text{NO}_2$, $-\text{S}(\text{O})\text{R}_1$, $-\text{S}(\text{O})_2\text{R}_1$, or $-\text{COOR}_1$; Lv_3 is a leaving group selected from methanesulfonyl (mesyl), toluenesulfonyl (tosyl), trifluoromethyl-sulfonyl (triflate), trifluoromethylsulfonate, nitrophenoxyl, N-succinimidyloxy (NHS), phenoxy; dinitrophenoxyl; pentafluorophenoxy, tetrafluoro-phenoxy, trifluorophenoxy, difluorophenoxy, monofluoro-phenoxy, pentachlorophenoxy, 1H-imidazole-1-yl, chlorophenoxy, dichlorophenoxy, trichlorophenoxy, tetrachlorophenoxy, N-(benzotriazol-yl)oxy, 2-ethyl-5-phenylisoxazolium-yl, phenyloxadiazol-yl (ODA), oxadiazol-yl, or an intermediate molecule generated with a condensation reagent for Mitsunobu reactions, wherein R_1 and R_2 are defined as above.

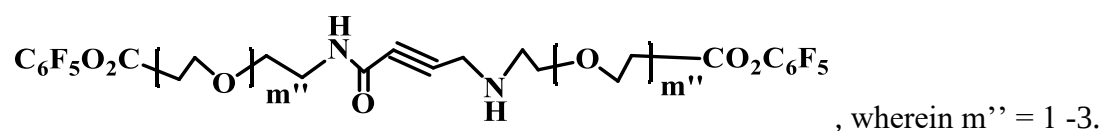
4. A bis-linker molecule of Formula (IV):



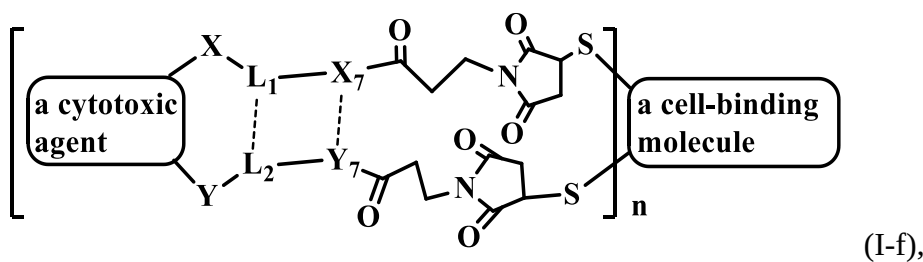
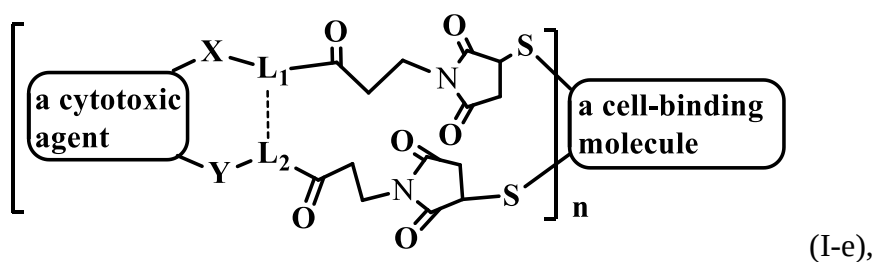
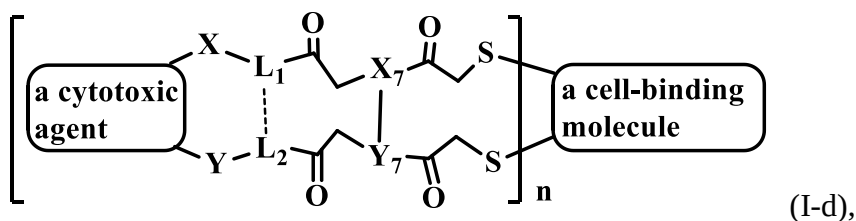
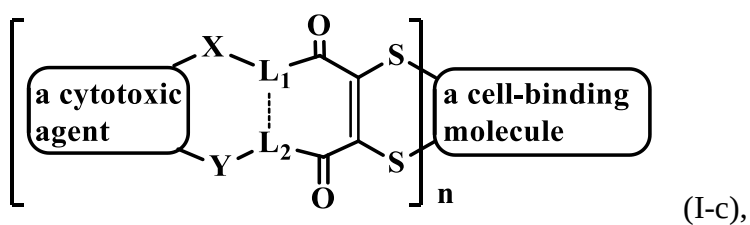
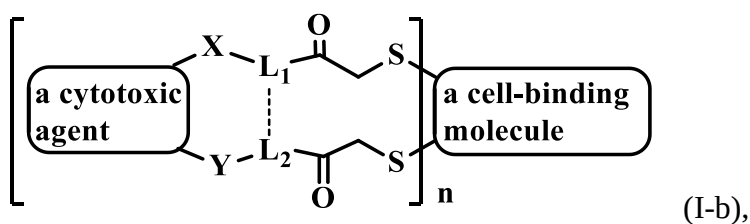
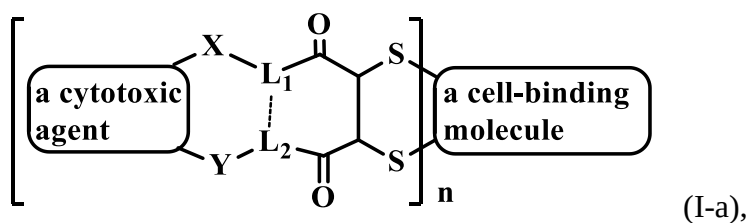
wherein:

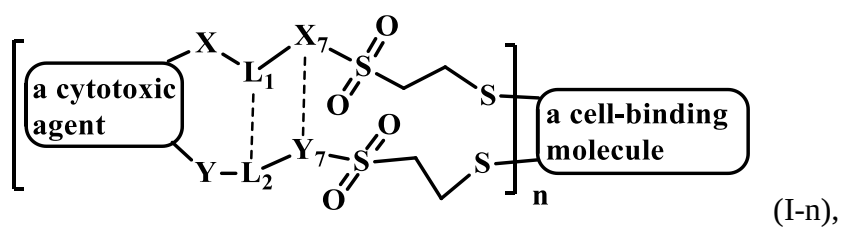
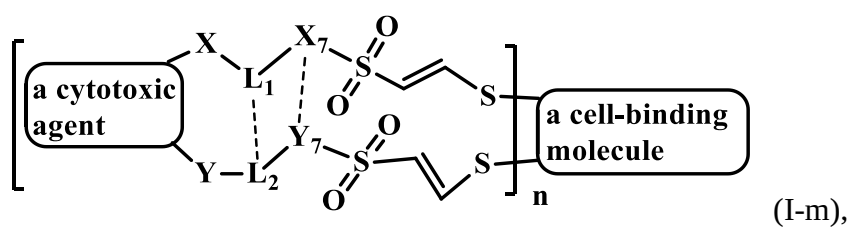
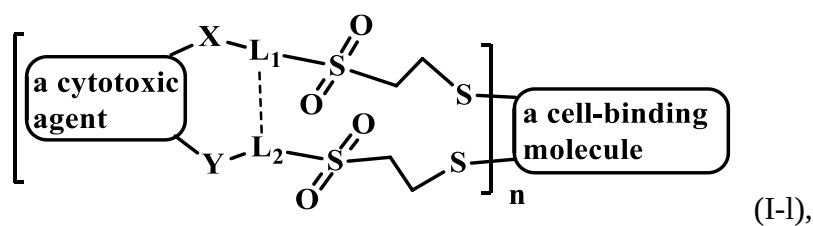
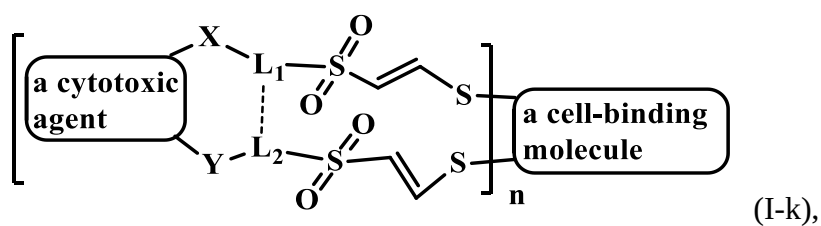
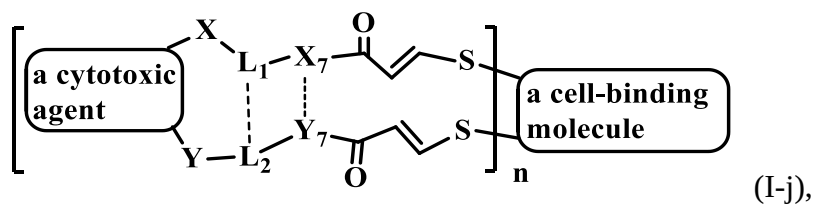
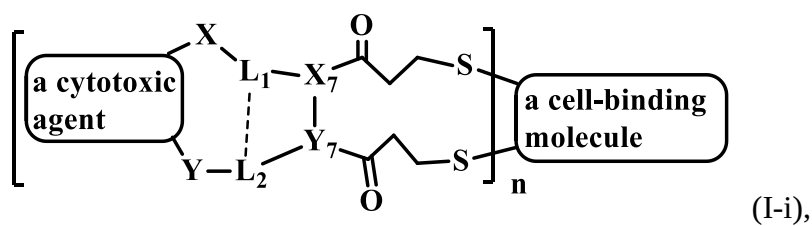
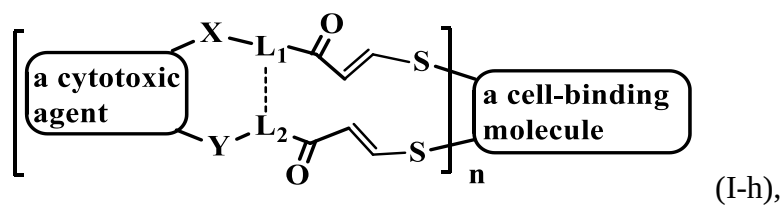
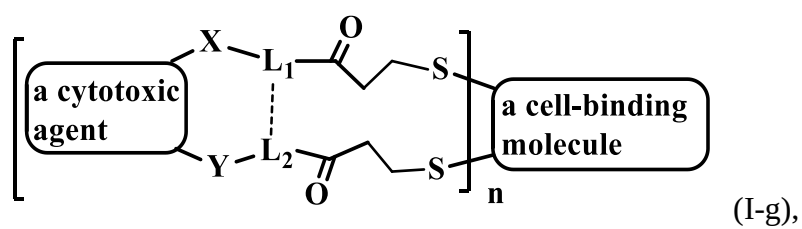
“-----”, m_1 , L_1 , L_2 , Z_1 , and Z_2 are defined the same as in Claim 1; Lv_1 and Lv_2 are defined in Claim 2, and X' and Y' are defined in Claim 3

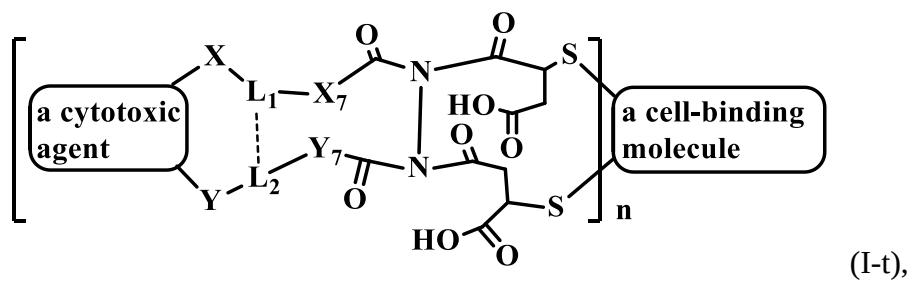
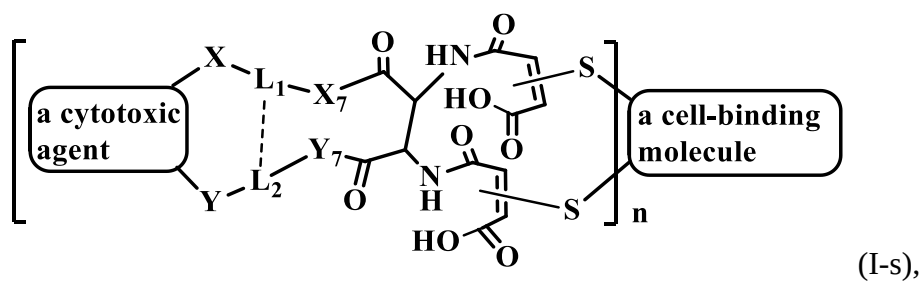
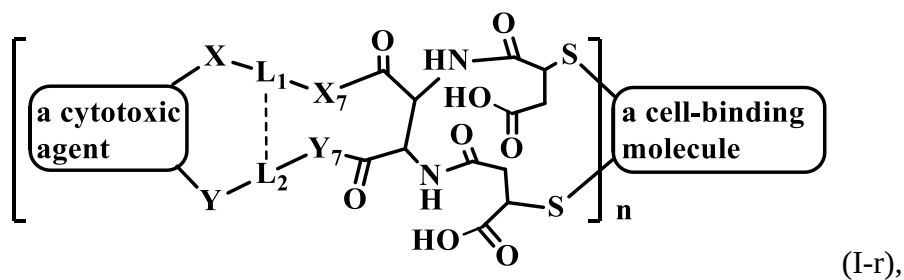
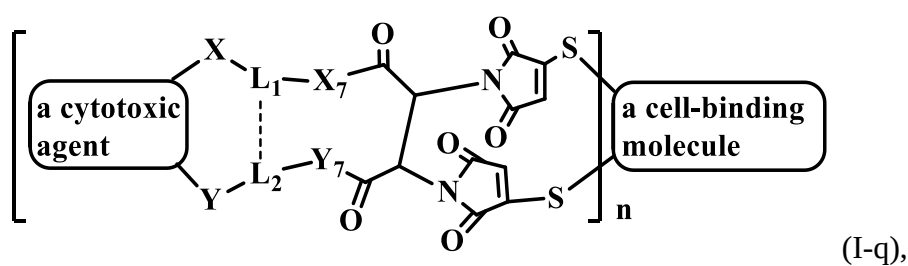
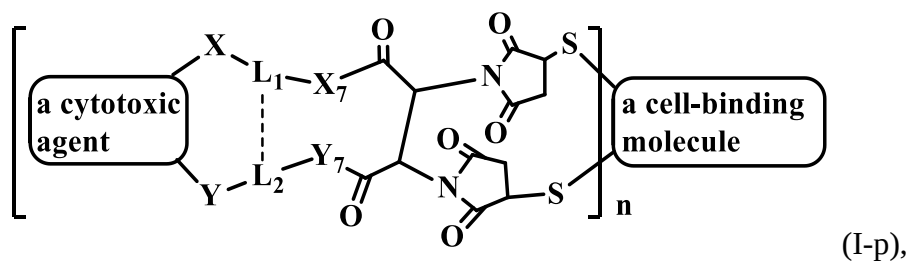
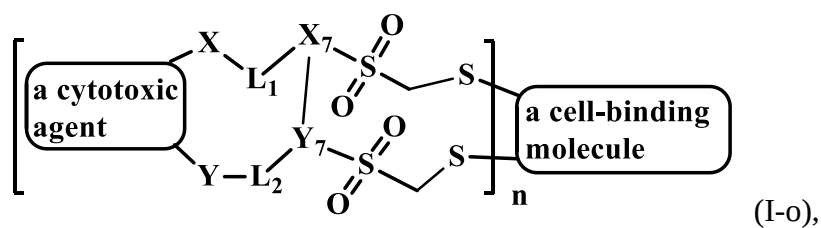
wherein the said bis-linker molecule of Formula (IV) specifically excludes the following structure:

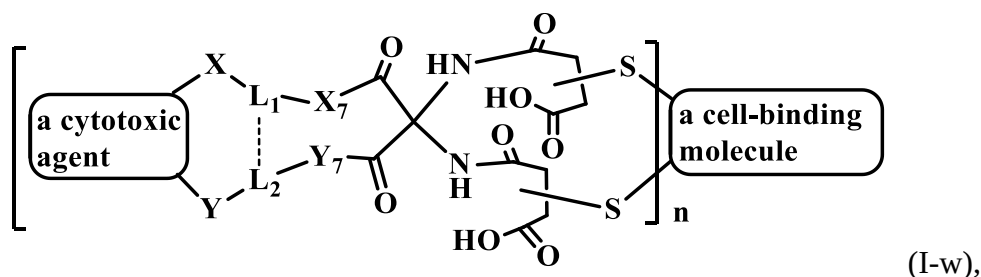
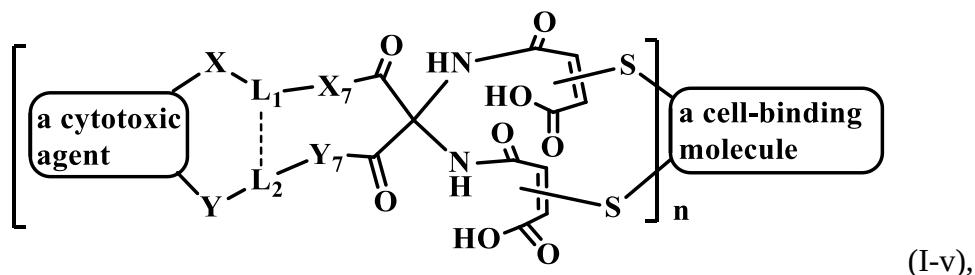
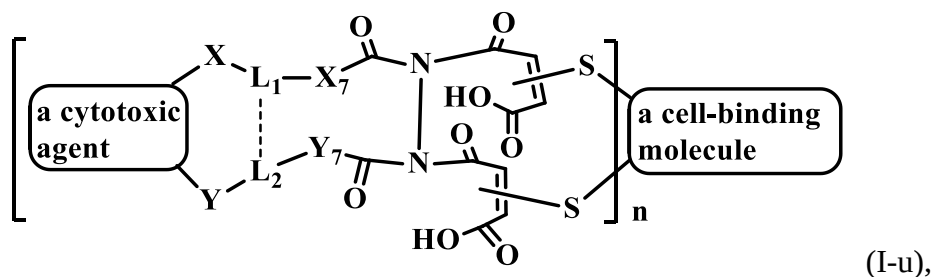


5. The compound according to Claim 1 having a structure represented by Formula (I-a), (I-b), (I-c), (I-d), (I-e), (I-f), (I-g), (I-h), (I-i), (I-j), (I-k), (I-m), (I-n), (I-o), (I-p), (I-q), (I-r), (I-s), (I-t), (I-u), (I-v), or (I-w) below:



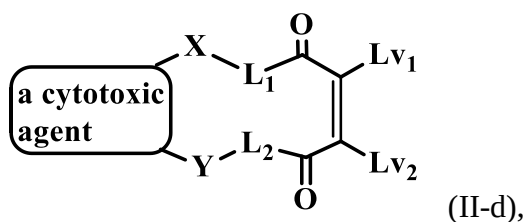
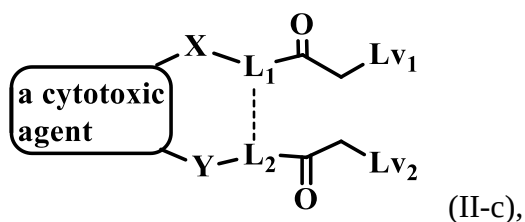
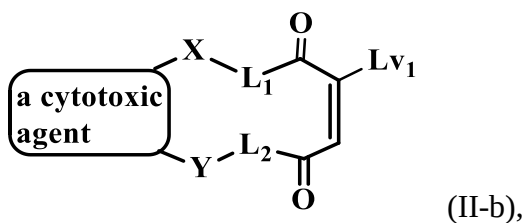
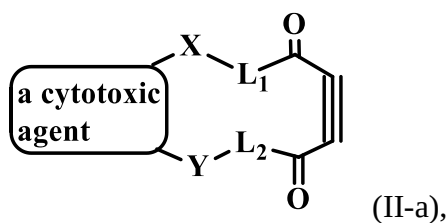


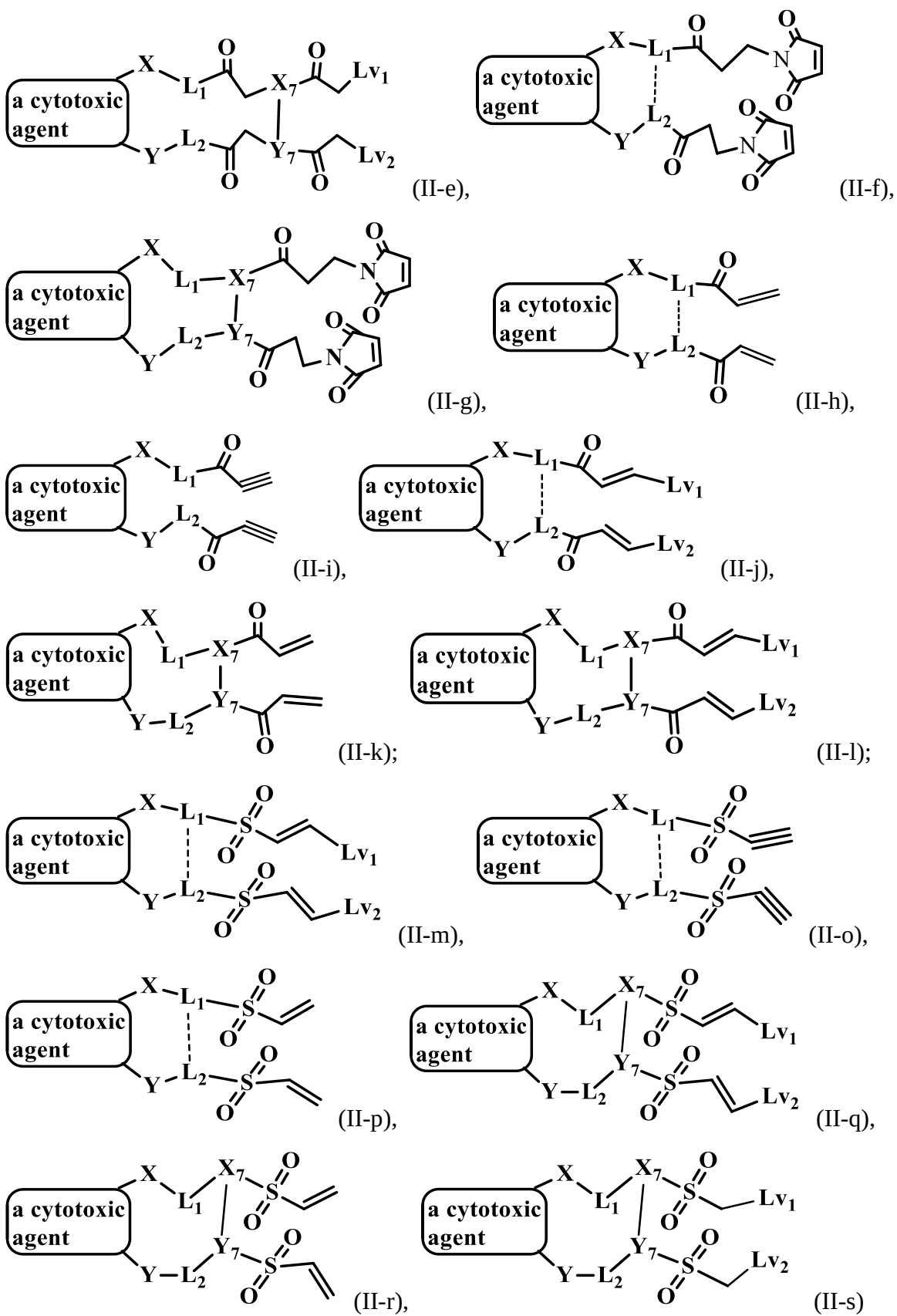


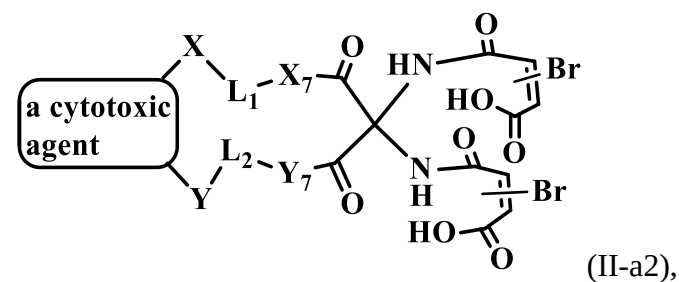
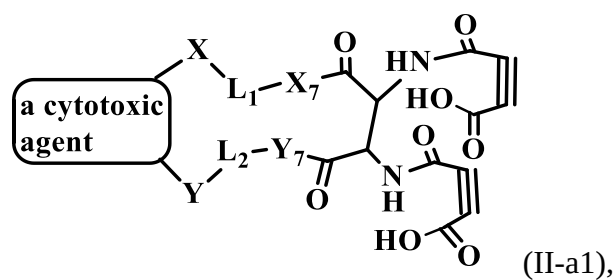
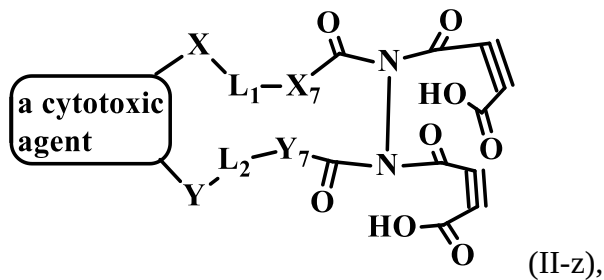
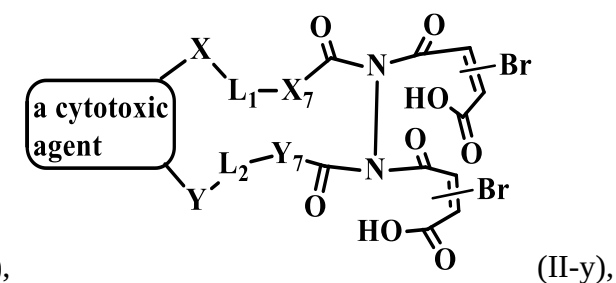
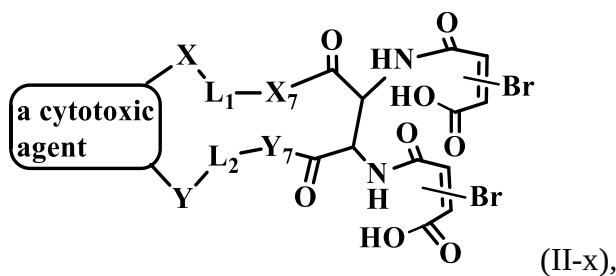
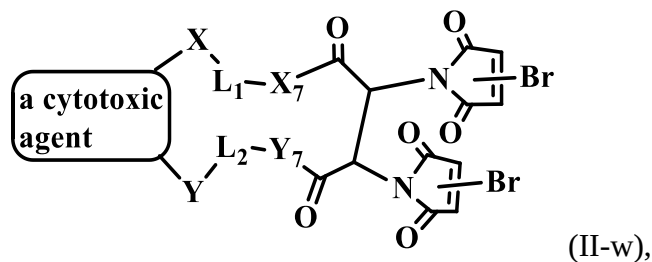
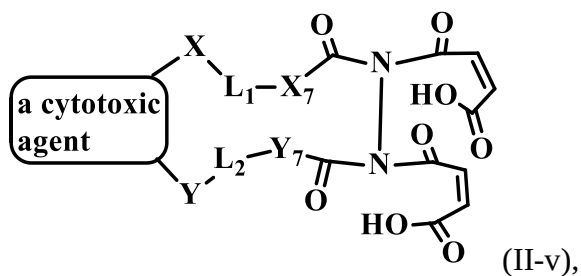
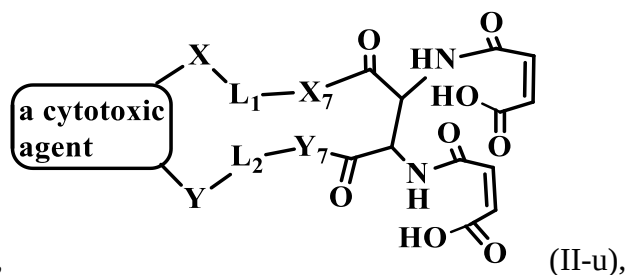
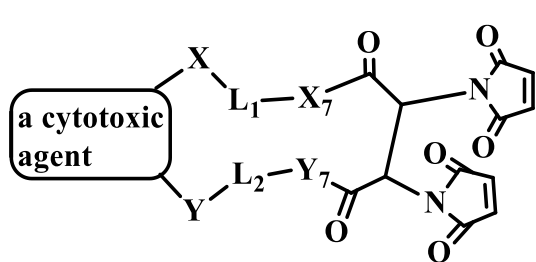


wherein X_7 and Y_7 are independently CH, CH_2 , NH, O, S, NHNH, $N(R_1)$, or N; the chemical bond in the middle of two atoms means it can link either of the adjoining two atoms; “-----”, X, Y, R_1 , n, L_1 and L_2 are the same as described in Claim 1; the cytotoxic agent is the same as the cytotoxic molecule described in Claim 1; and the cell-binding molecule is the same as the cell-binding agent/molecule defined in Claim 1.

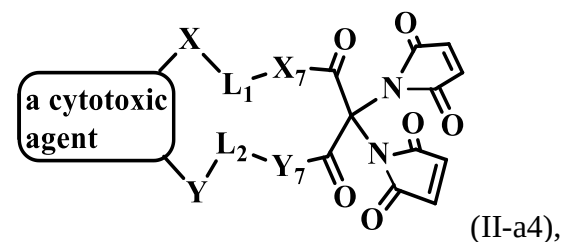
6. The compound according to Claim 2 having a structure represented by Formula (II-a), (II-b), (II-c), (II-d), (II-e), (II-f), (II-g), (II-h), (II-i), (II-j), (II-k), (II-m), (II-n), (II-o), (II-q), (II-r), (II-s), (II-t), (II-u), (II-v), (II-w), (II-x), (II-y), (II-z), (II-a1), (II-a2), (II-a3), or (II-a4):







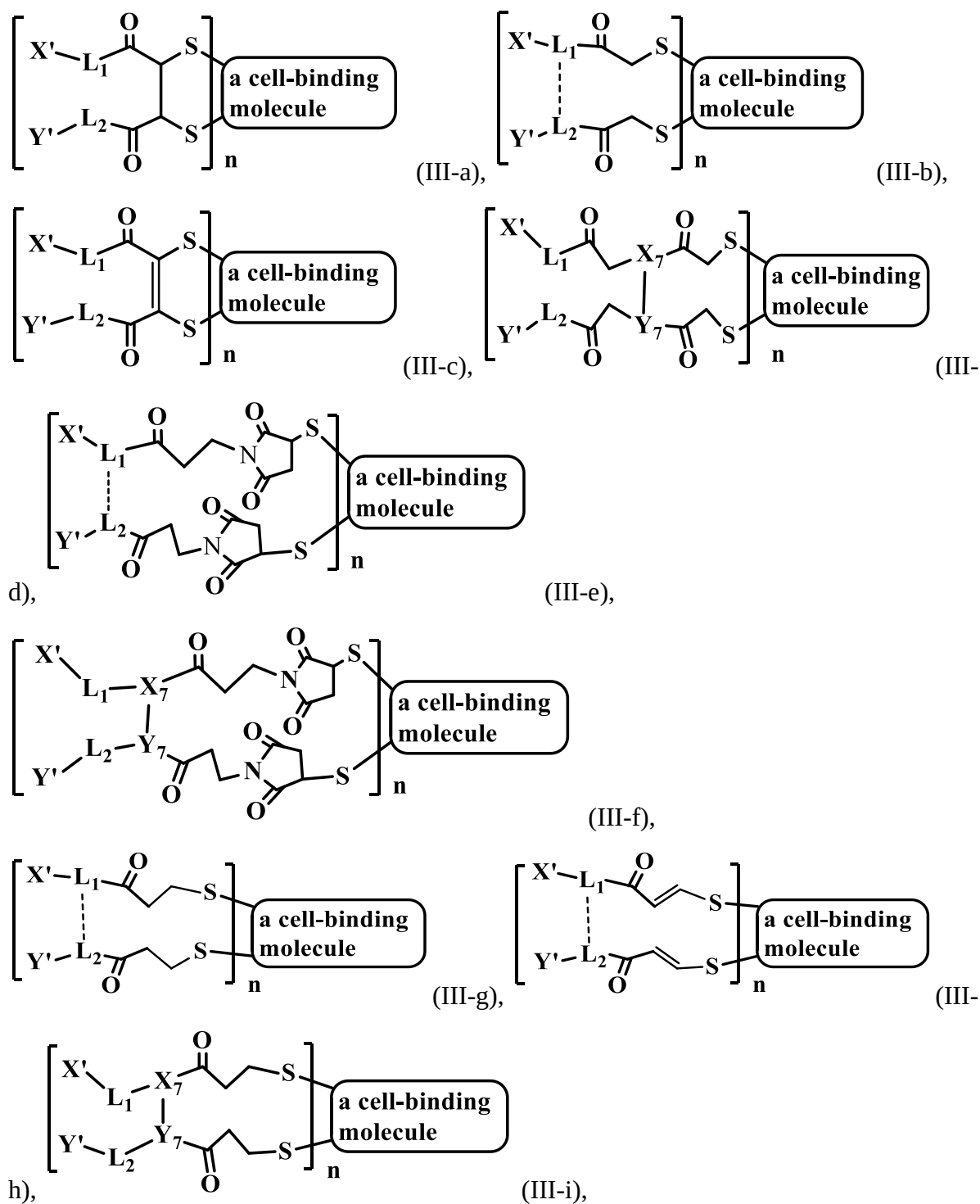
(II-a3),

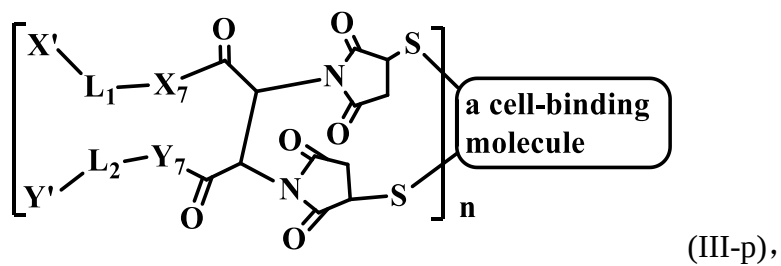
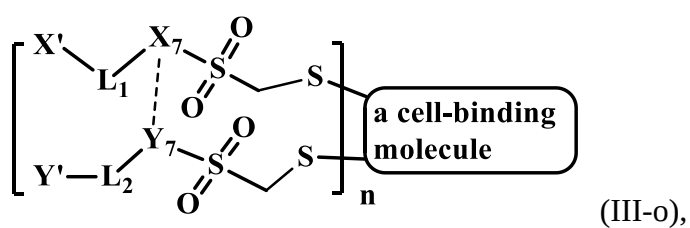
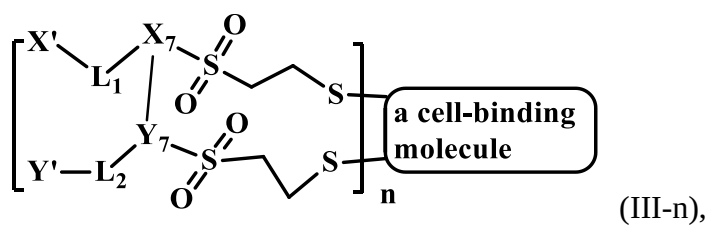
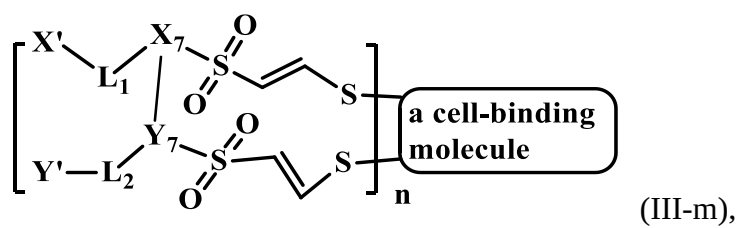
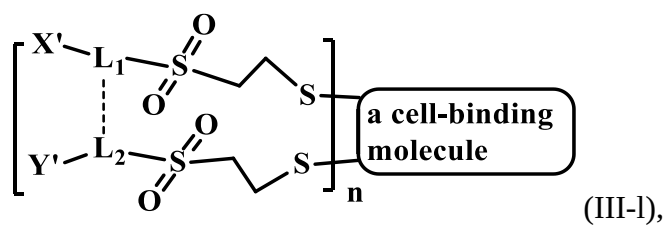
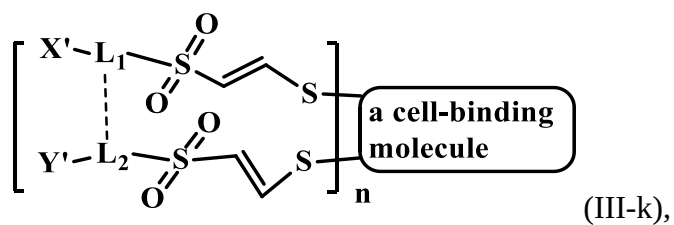
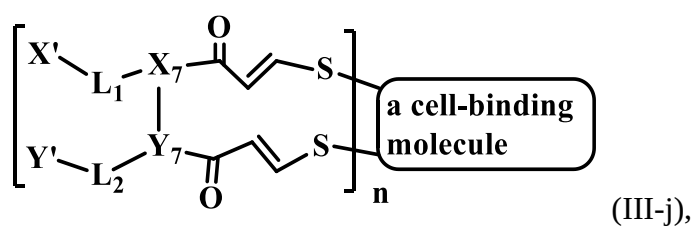


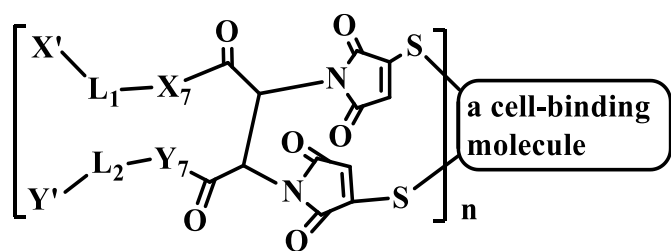
wherein X_7 and Y_7 are independently CH, CH_2 , NH, O, S, NHNH, $N(R_1)$, or N; the chemical bond in the middle of two atoms means it can link either of the adjoining two atoms;

“-----”, R_1 , X , Y , n , L_1 , L_2 , L_{V1} and L_{V2} are described the same as in Claim 1 and Claim 2; the cytotoxic agent is the same as the cytotoxic molecule described in Claim 1.

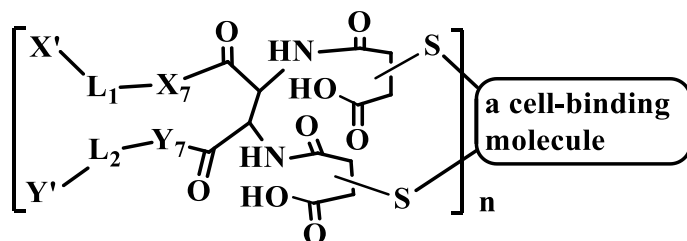
7. The compound according to Claim 3 having a structure represented by Formula (III-a), (III-b), (III-c), (III-d), (III-e), (III-f), (III-g), (III-h), (III-i), (III-j), (III-k), (III-l), (III-m), (III-n), (III-o), (III-p), (III-r), (III-s), (III-t), (III-u), (III-v), or (III-w) below:



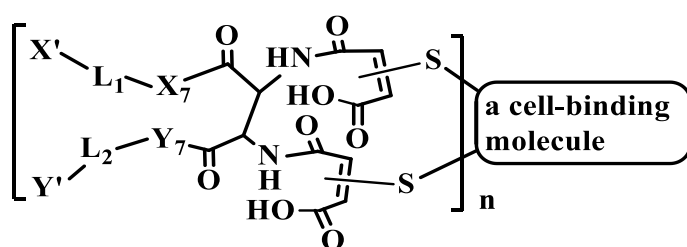




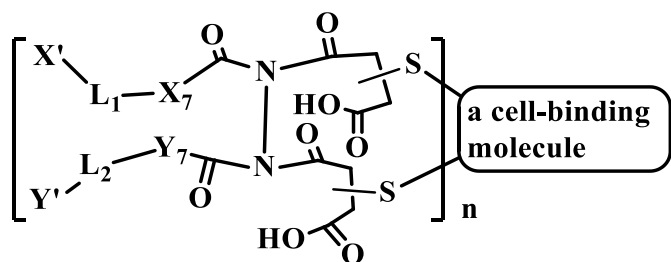
(III-q),



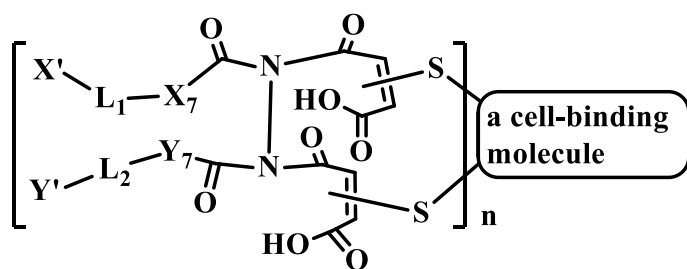
(III-r),



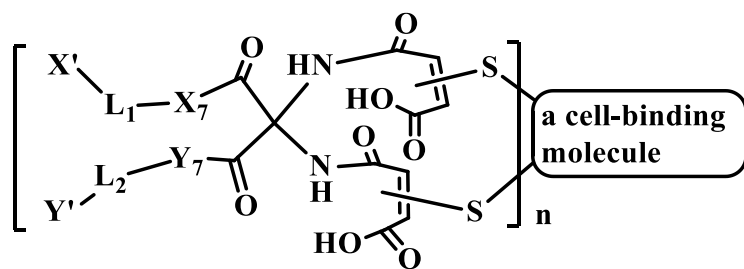
(III-s),



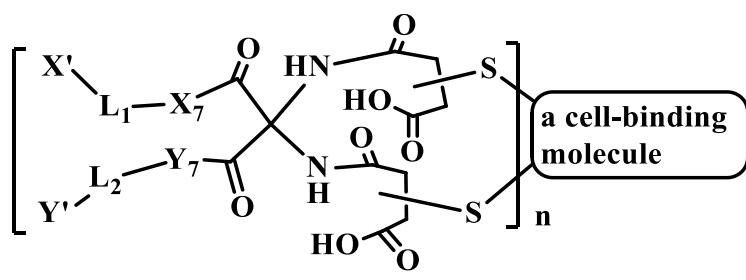
(III-t),



(III-u),

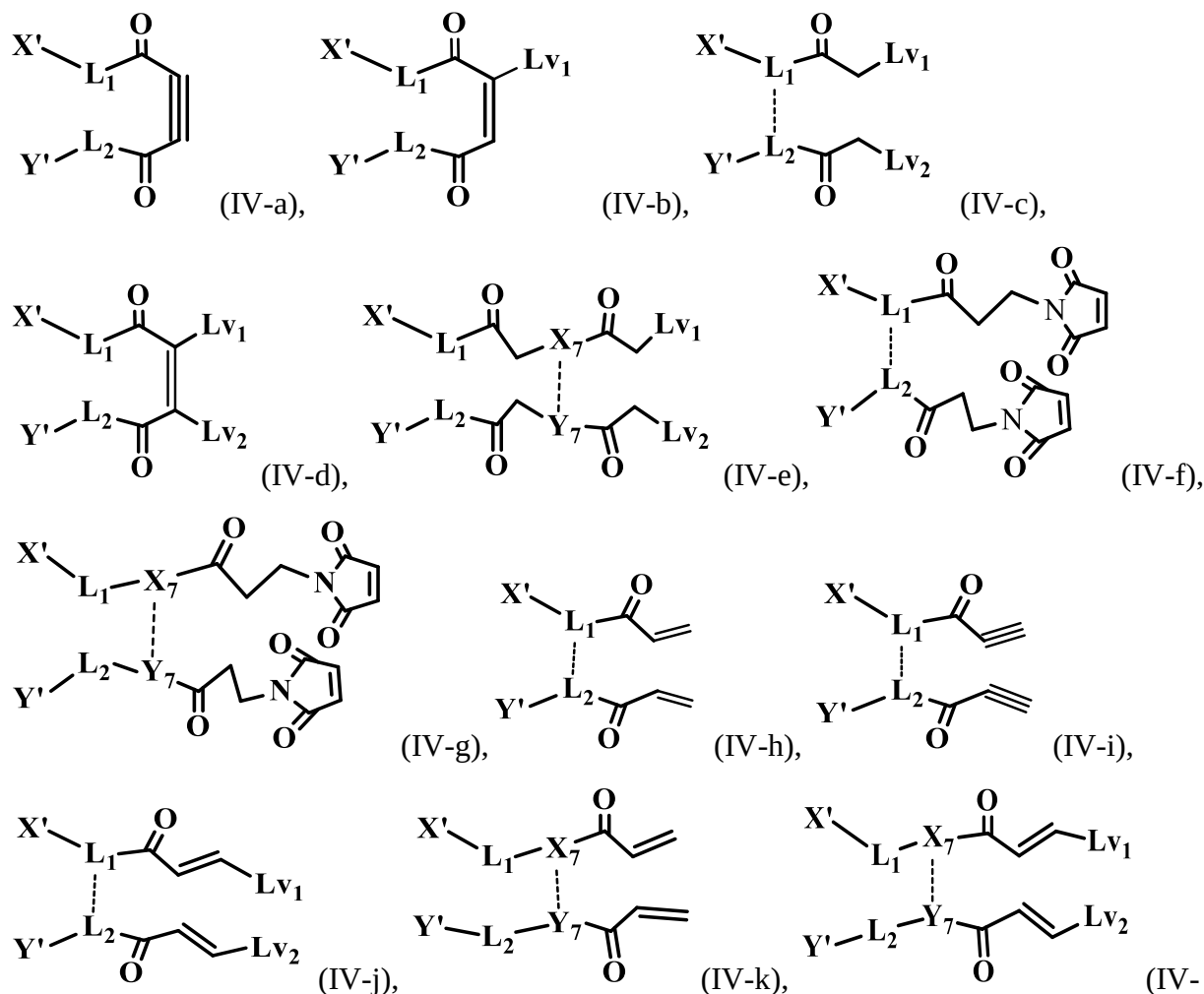


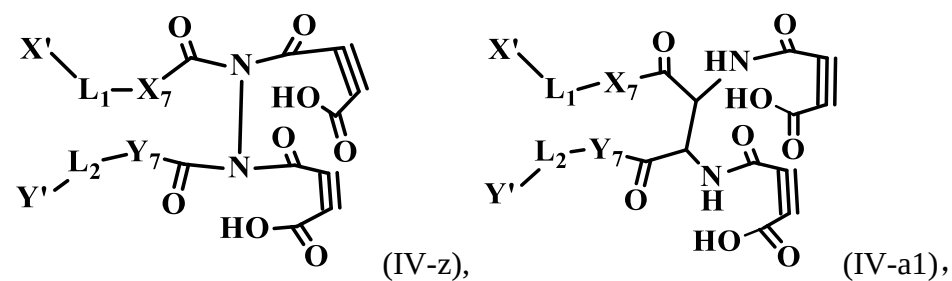
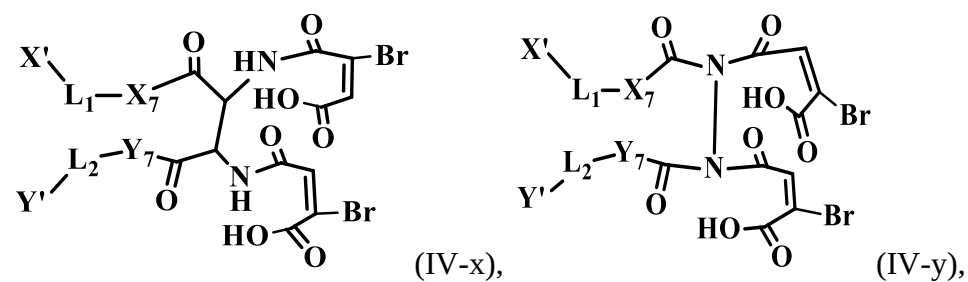
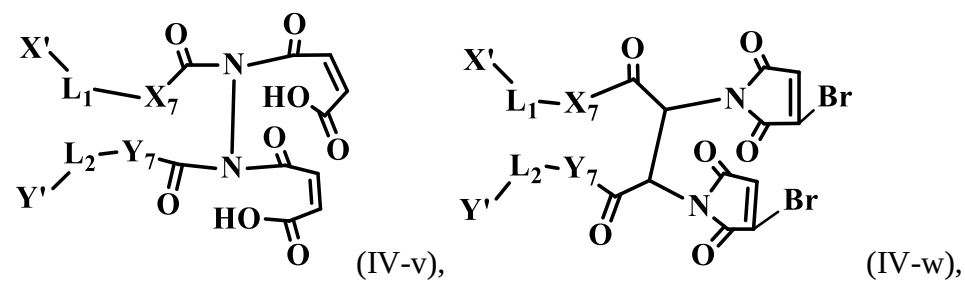
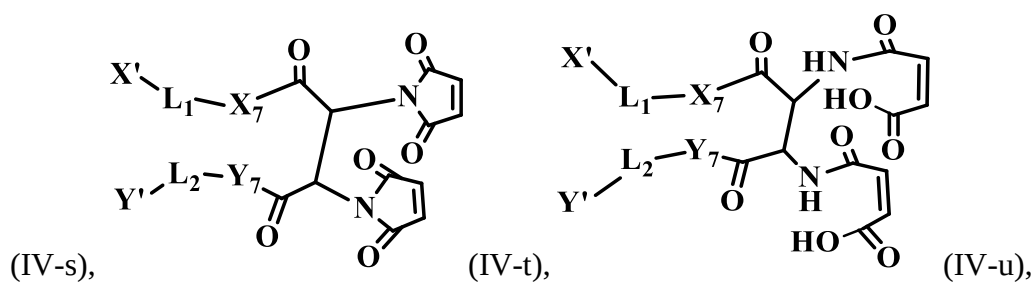
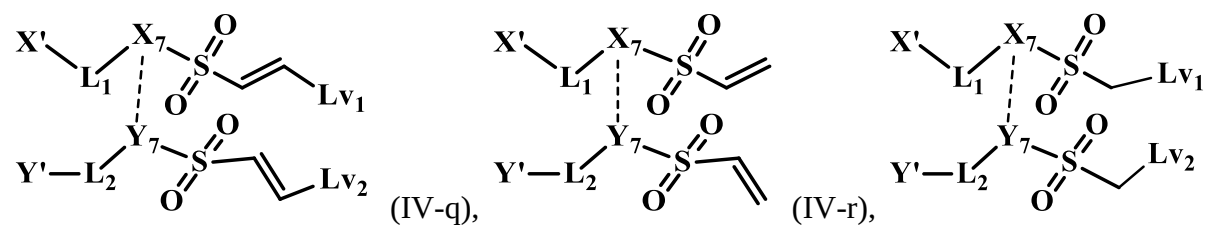
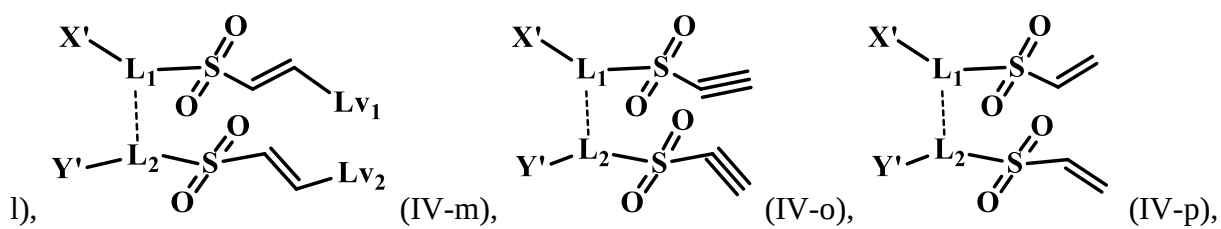
(III-v),

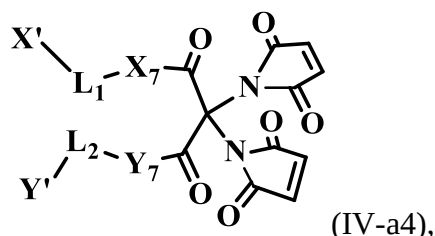
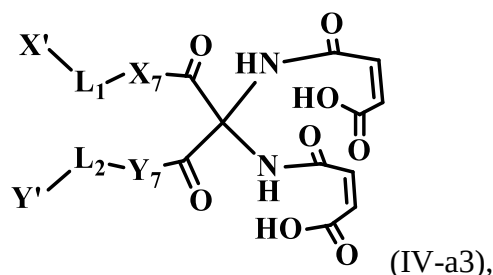
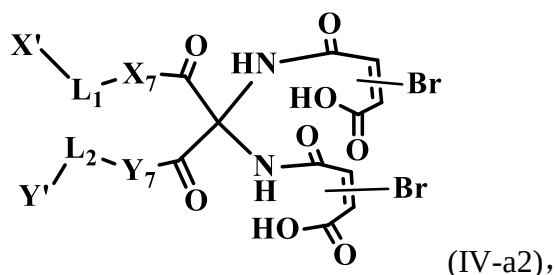


wherein X_7 and Y_7 are independently CH, CH_2 , NH, O, S, NHHN, $N(R_1)$, or N; the chemical bond in the middle of two atoms means it can link either of the adjoining two atoms; R_1 , X' , Y' , n , L_1 and L_2 are the same as described in Claims 1 and 3-; the cell-binding molecule is the same as the cell-binding agent/molecule defined in Claim 1.

8. The molecule according to Claim 4 having a structure represented by Formula (IV-a), (IV-b), (IV-c), (IV-d), (IV-e), (IV-f), (IV-g), (IV-h), (IV-i), (IV-j), (IV-k), (IV-m), (IV-n), (IV-o), (IV-p), (IV-q), (IV-r), (IV-s), (IV-t), (IV-u), (IV-v), (IV-w), (IV-x), (IV-y), (IV-z), (IV-a1), (IV-a2), (IV-a3), or (IV-a4) below:







wherein X_7 and Y_7 are independently CH, CH_2 , NH, O, S, NHNH, $N(R_1)$, or N; the chemical bond in the middle of two atoms means it can link either of the adjoining two atoms; “-----”, R_1 , X' , Y' , n , L_1 and L_2 are the same as described in Claims 1-4.

9. The compound according to Claim 1, wherein a pair of thiols from inter-chain disulfide atoms of the cell-binding agent/molecule are reduced by a reducing agent selected from dithiothreitol (DTT), dithioerythritol (DTE), dithiolbutylamine (DTBA), L-glutathione (GSH), tris (2-carboxyethyl) phosphine (TCEP), 2-mercaptoethylamine (β -MEA), or/and beta-mercaptoethanol (β -ME, 2-ME).

10. The compound according to Claim 1, wherein the cytotoxic molecule is selected from:

(1) a chemotherapeutic agent selected from the group consisting of:

a) an alkylating agent: selected from the group consisting of nitrogen mustards: chlorambucil, chlornaphazine, cyclophosphamide, dacarbazine, estramustine, ifosfamide, mechlorethamine, mechlorethamine oxide hydrochloride, mannomustine, mitobronitol, melphalan, mitolactol, pipobroman, novembichin, phenesterine, prednimustine, thiotepa, trofosfamide, uracil mustard; CC-1065 and adozelesin, carzelesin, bizelesin or their synthetic analogues; duocarmycin and its synthetic analogues, KW-2189, CBI-TMI, or CBI dimers; benzodiazepine dimers or pyrrolobenzodiazepine (PBD) dimers, tomaymycin dimers, indolinobenzodiazepine dimers, imidazobenzothiadiazepine dimers, or oxazolidinobenzodiazepine dimers; Nitrosoureas: comprising carmustine, lomustine, chlorozotocin, fotemustine, nimustine, ranimustine; Alkylsulphonates: comprising busulfan, treosulfan, improsulfan and piposulfan); Triazines or dacarbazine; Platinum containing compounds: comprising carboplatin, cisplatin, and oxaliplatin; aziridines, benzodopa,

carboquone, meturedopa, or uredopa; ethylenimines and methylamelamines including altretamine, triethylenemelamine, triethylenephosphoramidate, triethylenethiophosphoramidate and trimethylolomelamine;

b) a plant alkaloid selected from the group consisting of Vinca alkaloids: comprising vincristine, vinblastine, vindesine, vinorelbine, and navelbin; Taxoids: comprising paclitaxel, docetaxol and their analogs, Maytansinoids comprising DM1, DM2, DM3, DM4, DM5, DM6, DM7, maytansine, ansamitocins and their analogs, cryptophycins (including the group consisting of cryptophycin 1 and cryptophycin 8); epothilones, eleutherobin, discodermolide, bryostatins, dolostatins, auristatins, tubulysins, cephalostatins; pancratistatin; a sarcodictyin; spongistatin;

c) a DNA Topoisomerase Inhibitor selected from the groups of Epipodophyllins: comprising 9-aminocamptothecin, camptothecin, crisnatol, daunomycin, etoposide, etoposide phosphate, irinotecan, mitoxantrone, novantrone, retinoic acids (or retinols), teniposide, topotecan, 9-nitrocamptothecin or RFS 2000; and mitomycins and their analogs;

d) an antimetabolite selected from the group consisting of {[Anti-folate: (DHFR inhibitors: comprising methotrexate, trimetrexate, denopterin, pteropterin, aminopterin (4-aminopteroic acid) or folic acid analogues); IMP dehydrogenase Inhibitors: (comprising mycophenolic acid, tiazofurin, ribavirin, EICAR); Ribonucleotide reductase Inhibitors: (comprising hydroxyurea, deferoxamine)]; [Pyrimidine analogs, comprising Uracil analogs: (comprising ancitabine, azacitidine, 6-azauridine, capecitabine (Xeloda), carmofur, cytarabine, dideoxyuridine, doxifluridine, enocitabine, 5-Fluorouracil, floxuridine, ratitrexed (Tomudex)); Cytosine analogs: (comprising cytarabine, cytosine arabinoside, fludarabine); Purine analogs: (comprising azathioprine, fludarabine, mercaptopurine, thiamiprine, thioguanine)]; folic acid replenisher, frolinic acid];

e) a hormonal therapy: selected from the group consisting of {Receptor antagonists: [Anti-estrogen: (comprising megestrol, raloxifene, tamoxifen); LHRH agonists: (comprising goserelin, leuprolide acetate); Anti-androgens: (comprising bicalutamide, flutamide, calusterone, dromostanolone propionate, epitioestanol, goserelin, leuprolide, mepitiostane, nilutamide, testolactone, trilostane and other androgens inhibitors)]; Retinoids/Deltoids: [Vitamin D3 analogs: (comprising CB 1093, EB 1089 KH 1060, cholecalciferol, ergocalciferol)]; Photodynamic therapies: (comprising verteporfin, phthalocyanine, photosensitizer Pc4, demethoxyhypocrellin A); Cytokines: (comprising Interferon-alpha, Interferon-gamma, tumor necrosis factor (TNFs), human proteins containing a TNF domain)]};

f) a kinase inhibitor, selected from the group consisting of BIBW 2992 (anti-EGFR/Erb2), imatinib, gefitinib, pegaptanib, sorafenib, dasatinib, sunitinib, erlotinib, nilotinib, lapatinib, axitinib, pazopanib, vandetanib, E7080 (anti-VEGFR2), mubritinib, ponatinib (AP24534), bafetinib (INNO-406), bosutinib (SKI-606), cabozantinib, vismodegib, iniparib, ruxolitinib, CYT387, axitinib, tivozanib, sorafenib, bevacizumab, cetuximab, Trastuzumab, Ranibizumab, Panitumumab, and ispinesib;

g) a poly (ADP-ribose) polymerase (PARP) inhibitor, selected from the group consisting of olaparib, niraparib, iniparib, talazoparib, veliparib, CEP 9722 (Cephalon's), E7016 (Eisai's), BGB-290 (BeiGene's), and 3-aminobenzamide;

h) an antibiotic, selected from the group consisting of an enediyne antibiotic (selected from the group consisting of calicheamicin, calicheamicin $\gamma 1$, $\delta 1$, $\alpha 1$ or $\beta 1$; dynemicin, including dynemicin A and deoxydynemicin; esperamicin, kedarcidin, C-1027, maduropeptin, or neocarzinostatin chromophore and related chromoprotein enediyne antibiotic chromomorphores), aclacinomycins, actinomycin, authramycin, azaserine, bleomycins, cactinomycin, carabycin, carminomycin, carzinophilin; chromomycins, dactinomycin, daunorubicin, detorubicin, 6-diazo-5-oxo-L-norleucine, doxorubicin, morpholino-doxorubicin, cyanomorpholino-doxorubicin, 2-pyrrolino-doxorubicin and deoxydoxorubicin, epirubicin, eribulin, esorubicin, idarubicin, marcellomycin, nitomycins, mycophenolic acid, nogalamycin, olivomycins, peplomycin, potfiromycin, puromycin, quelamycin, rodorubicin, streptonigrin, streptozocin, tubercidin, ubenimex, zinostatin, zorubicin;

i) a polyketide (acetogenin), bullatacin and bullatacinone; gemcitabine, epoxomicins and carfilzomib, bortezomib, thalidomide, lenalidomide, pomalidomide, tosedostat, zybrestat, PLX4032, STA-9090, Stimuvax, allovectin-7, Xegeva, Provenge, Yervoy, Isoprenylation inhibitors and Lovastatin, Dopaminergic neurotoxins and 1-methyl-4-phenylpyridinium ion, Cell cycle inhibitors (selected from staurosporine), Actinomycins (comprising Actinomycin D, dactinomycin), amanitins, Bleomycins (comprising bleomycin A2, bleomycin B2, peplomycin), Anthracyclines (comprising daunorubicin, doxorubicin (adriamycin), idarubicin, epirubicin, pirarubicin, zorubicin, mtoxantrone, MDR inhibitors or verapamil, Ca^{2+} ATPase inhibitors or thapsigargin, Histone deacetylase inhibitors ((comprising Vorinostat, Romidepsin, Panobinostat, Valproic acid, Mocetinostat (MGCD0103), Belinostat, PCI-24781, Entinostat, SB939, Resminostat, Givinostat, AR-42, CUDC-101, sulforaphane, Trichostatin A) ; Thapsigargin, Celecoxib, glitazones, epigallocatechin gallate, Disulfiram, Salinosporamide A.; Anti-adrenals, selected from the group consisting of aminoglutethimide, mitotane, trilostane; aceglatone; aldophosphamide glycoside; aminolevulinic acid; amsacrine; arabinoside,

bestrabucil; bisantrene; edatraxate; defofamine; demecolcine; diaziquone; eflornithine (DFMO),
elfomithine; elliptinium acetate, etoglucid; gallium nitrate; gacytosine, hydroxyurea;
ibandronate, lentinan; lonidamine; mitoguazone; mitoxantrone; mopidamol; nitracrine;
pentostatin; phenamet; pirarubicin; podophyllinic acid; 2-ethylhydrazide; procarbazine; PSK®;
razoxane; rhizoxin; sizofiran; spirogermanium; tenuazonic acid; triaziquone; 2,
2',2''-trichlorotriethylamine; trichothecenes (including the group consisting of T-2 toxin,
verrucarin A, roridin A and anguidine); urethane, siRNA, antisense drugs;

(2) an anti-autoimmune disease agent, selected from cyclosporine, cyclosporine A, aminocaproic acid, azathioprine, bromocriptine, chlorambucil, chloroquine, cyclophosphamide, corticosteroids (including the group consisting of amcinonide, betamethasone, budesonide, hydrocortisone, flunisolide, fluticasone propionate, fluocortolone danazol, dexamethasone, Triamcinolone acetate, beclomethasone dipropionate), DHEA, enanthercept, hydroxychloroquine, infliximab, meloxicam, methotrexate, mofetil, mycophenolate, prednisone, sirolimus, tacrolimus;

(3) an anti-infectious disease agent, selected from the group comprising:

a) aminoglycosides: amikacin, astromicin, gentamicin (netilmicin, sisomicin, isepamicin), hygromycin B, kanamycin (amikacin, arbekacin, bekanamycin, dibekacin, tobramycin), neomycin (framycetin, paromomycin, ribostamycin), netilmicin, spectinomycin, streptomycin, tobramycin, verdamicin;

b) amphenicols: azidamfenicol, chloramphenicol, florfenicol, thiamphenicol;

c) ansamycins: geldanamycin, herbimycin;

d) carbapenems: biapenem, doripenem, ertapenem, imipenem/cilastatin, meropenem, panipenem;

e) cepheids: carbacephem (loracarbef), cefacetrile, cefaclor, cefradine, cefadroxil, cefalonium, cefaloridine, cefalotin or cefalothin, cefalexin, cefaloglycin, cefamandole, cefapirin, cefatrizine, cefazaflur, cefazedone, cefazolin, cefbuperazone, cefcapene, cefdaloxime, cefepime, cefminox, cefoxitin, cefprozil, cefroxadine, ceftazole, cefuroxime, cefixime, cefdinir, cefditoren, cefepime, cefetamet, cefmenoxime, cefodizime, cefonicid, cefoperazone, ceforanide, cefotaxime, cefotiam, cefozopran, cephalixin, cefpimizole, cefpiramide, cefpirome, cefpodoxime, cefprozil, cefquinome, cefsulodin, ceftazidime, cefteram, ceftibuten, ceftiolene, ceftizoxime, ceftobiprole, ceftriaxone, cefuroxime, cefuzonam, cephamycin (cefoxitin, cefotetan, cefmetazole), oxacephem (flomoxef, latamoxef);

f) glycopeptides: bleomycin, vancomycin (oritavancin, telavancin), teicoplanin (dalbavancin), ramoplanin;

- g) glycyclcyclines: tigecycline;
- h) β -lactamase inhibitors: penam (sulbactam, tazobactam), clavam (clavulanic acid);
- i) lincosamides: clindamycin, lincomycin;
- j) lipopeptides: daptomycin, A54145, calcium-dependent antibiotics (CDA);
- k) macrolides: azithromycin, cethromycin, clarithromycin, dirithromycin, erythromycin, flurithromycin, josamycin, ketolide (telithromycin, cethromycin), midecamycin, miocamycin, oleandomycin, rifamycins (rifampicin, rifampin, rifabutin, rifapentine), rokitamycin, roxithromycin, spectinomycin, spiramycin, tacrolimus (FK506), troleandomycin, telithromycin;
- l) monobactams: aztreonam, tigemonam;
- m) oxazolidinones: linezolid;
- n) penicillins: amoxicillin, ampicillin, pivampicillin, hetacillin, bacampicillin, metampicillin, talampicillin, azidocillin, azlocillin, benzylpenicillin, benzathine benzylpenicillin, benzathine phenoxymethylpenicillin, clometocillin, procaine benzylpenicillin, carbenicillin (carindacillin), cloxacillin, dicloxacillin, epicillin, flucloxacillin, mecillinam (pivmecillinam), mezlocillin, meticillin, nafcillin, oxacillin, penamecillin, penicillin, pheneticillin, phenoxymethylpenicillin, piperacillin, propicillin, sulbenicillin, temocillin, ticarcillin;
- o) polypeptides: bacitracin, colistin, polymyxin B;
- p) quinolones: alatrofloxacin, balofloxacin, ciprofloxacin, clinafloxacin, danofloxacin, difloxacin, enoxacin, enrofloxacin, floxin, garenoxacin, gatifloxacin, gemifloxacin, grepafloxacin, kano trovafloxacin, levofloxacin, lomefloxacin, marbofloxacin, moxifloxacin, nadifloxacin, norfloxacin, orbifloxacin, ofloxacin, pefloxacin, trovafloxacin, grepafloxacin, sitafloxacin, sparfloxacin, temafloxacin, tosufloxacin, trovafloxacin;
- q) streptogramins: pristinamycin, quinupristin/dalfopristin;
- r) sulfonamides: mafenide, prontosil, sulfacetamide, sulfamethizole, sulfanilimide, sulfasalazine, sulfisoxazole, trimethoprim, trimethoprim-sulfamethoxazole (co-trimoxazole);
- s) steroid antibacterials: selected from fusidic acid;
- t) tetracyclines: doxycycline, chlortetracycline, clomocycline, demeclocycline, lymecycline, meclocycline, metacycline, minocycline, oxytetracycline, penimepicycline, rolitetracycline, tetracycline, glycyclcyclines (including tigecycline);
- u) other antibiotics: selected from the group consisting of annonacin, arspenamine, bactoprenol inhibitors (Bacitracin), DADAL/AR inhibitors (cycloserine), dictyostatin, discodermolide, eleutherobin, epothilone, ethambutol, etoposide, faropenem, fusidic acid, furazolidone, isoniazid, laulimalide, metronidazole, mupirocin, mycolactone, NAM synthesis

inhibitors (fosfomycin), nitrofurantoin, paclitaxel, platensimycin, pyrazinamide, quinupristin/dalfopristin, rifampicin (rifampin), tazobactam tinidazole, uvaricin;

(4) an anti-viral drug, selected from the group comprising:

- a) entry/fusion inhibitors: aplaviroc, maraviroc, vicriviroc, *gp41* (enfuvirtide), PRO 140, CD4 (ibalizumab);
- b) integrase inhibitors: raltegravir, elvitegravir, globoidnan A;
- c) maturation inhibitors: bevirimat, vivecon;
- d) neuraminidase inhibitors: oseltamivir, zanamivir, peramivir;
- e) nucleosides & nucleotides: abacavir, aciclovir, adefovir, amdoxovir, apricitabine, brivudine, cidofovir, clevidine, dexelvucitabine, didanosine (ddI), elvucitabine, emtricitabine (FTC), entecavir, famciclovir, fluorouracil (5-FU), 3'-fluoro-substituted 2', 3'-dideoxynucleoside analogues (including the group consisting of 3'-fluoro-2',3'-dideoxythymidine (FLT) and 3'-fluoro-2',3'-dideoxyguanosine (FLG), fomivirsen, ganciclovir, idoxuridine, lamivudine (3TC), l-nucleosides (including the group consisting of β -l-thymidine and β -l-2'-deoxycytidine), penciclovir, racivir, ribavirin, stampidine, stavudine (d4T), taribavirin (viramidine), telbivudine, tenofovir, trifluridine valaciclovir, valganciclovir, zalcitabine (ddC), zidovudine (AZT);
- f) non-nucleosides: amantadine, ateviridine, capravirine, diarylpyrimidines (etravirine, rilpivirine), delavirdine, docosanol, emivirine, efavirenz, foscarnet (phosphonoformic acid), imiquimod, interferon alfa, loviride, lodenosine, methisazone, nevirapine, NOV-205, peginterferon alfa, podophyllotoxin, rifampicin, rimantadine, resiquimod (R-848), tromantadine;
- g) protease inhibitors: amprenavir, atazanavir, boceprevir, darunavir, fosamprenavir, indinavir, lopinavir, nelfinavir, pleconaril, ritonavir, saquinavir, telaprevir (VX-950), tipranavir;
- h) other types of anti-virus drugs: abzyme, arbidol, calanolide a, ceragenin, cyanovirin-n, diarylpyrimidines, epigallocatechin gallate (EGCG), foscarnet, griffithsin, taribavirin (viramidine), hydroxyurea, KP-1461, miltefosine, pleconaril, portmanteau inhibitors, ribavirin, seliciclib;

(5) a radioisotope that can be selected from the group consisting of (radionuclides) ^3H , ^{11}C , ^{14}C , ^{18}F , ^{32}P , ^{35}S , ^{64}Cu , ^{68}Ga , ^{86}Y , ^{99}Tc , ^{111}In , ^{123}I , ^{124}I , ^{125}I , ^{131}I , ^{133}Xe , ^{177}Lu , ^{211}At , or ^{213}Bi ;

(6) a chromophore molecule, which is capable of absorbing UV light, florescent light, IR light, near IR light, visual light; selected from the group comprising a class or subclass of xanthophores, erythrophores, iridophores, leucophores, melanophores, cyanophores, fluorophore molecules which are fluorescent chemical compounds reemitting light upon light,

visual phototransduction molecules, photophore molecules, luminescence molecules, luciferin compounds; Non-protein organic fluorophores, selected from: Xanthene derivatives (comprising fluorescein, rhodamine, Oregon green, eosin, and Texas red); Cyanine derivatives (comprising cyanine, indocarbocyanine, oxacarbocyanine, thiocarbocyanine, and merocyanine); Squaraine derivatives and ring-substituted squaraines, including Seta, SeTau, and Square dyes; Naphthalene derivatives (comprising dansyl and prodan derivatives); Coumarin derivatives; Oxadiazole derivatives (comprising pyridyloxazole, nitrobenzoxadiazole and benzoxadiazole); Anthracene derivatives (comprising anthraquinones, including DRAQ5, DRAQ7 and CyTRAK Orange); Pyrene derivatives (cascade blue); Oxazine derivatives (comprising Nile red, Nile blue, cresyl violet, oxazine 170); Acridine derivatives (comprising proflavin, acridine orange, acridine yellow); Arylmethine derivatives (comprising auramine, crystal violet, malachite green); Tetrapyrrole derivatives (comprising porphin, phthalocyanine, bilirubin); Any analogs and derivatives of the following fluorophore compounds comprising CF dye, DRAQ and CyTRAK probes, BODIPY, Alexa Fluor, DyLight Fluor, Atto and Tracy, FluoProbes, Abberior Dyes, DY and MegaStokes Dyes, Sulfo Cy dyes, HiLyte Fluor, Seta, SeTau and Square Dyes, Quasar and Cal Fluor dyes, SureLight Dyes (APC, RPEPerCP, Phycobilisomes), APC, APCXL, RPE, BPE, Allophycocyanin (APC), Aminocoumarin, APC-Cy7 conjugates, BODIPY-FL, Cascade Blue, Cy2, Cy3, Cy3.5, Cy3B, Cy5, Cy5.5, Cy7, Fluorescein, FluorX, Hydroxycoumarin, Lissamine Rhodamine B, Lucifer yellow, Methoxycoumarin, NBD, Pacific Blue, Pacific Orange, PE-Cy5 conjugates, PE-Cy7 conjugates, PerCP, R-Phycoerythrin(PE), Red 613, Seta-555-Azide, Seta-555-DBCO, Seta-555-NHS, Seta-580-NHS, Seta-680-NHS, Seta-780-NHS, Seta-APC-780, Seta-PerCP-680, Seta-R-PE-670, SeTau-380-NHS, SeTau-405-Maleimide, SeTau-405-NHS, SeTau-425-NHS, SeTau-647-NHS, Texas Red, TRITC, TruRed, X-Rhodamine, 7-AAD (7-aminoactinomycin D, CG-selective), Acridine Orange, Chromomycin A3, CyTRAK Orange (red excitation dark), DAPI, DRAQ5, DRAQ7, Ethidium Bromide, Hoechst33258, Hoechst33342, LDS 751, Mithramycin, PropidiumIodide (PI), SYTOX Blue, SYTOX Green, SYTOX Orange, Thiazole Orange, TO-PRO: Cyanine Monomer, TOTO-1, TO-PRO-1, TOTO-3, TO-PRO-3, YOSeta-1, YOYO-1; A fluorophore compound: comprising DCFH (2',7'-Dichlorodihydro-fluorescein, oxidized form), DHR (Dihydrorhodamine 123, oxidized form, light catalyzes oxidation), Fluo-3 (AM ester, pH > 6), Fluo-4 (AM ester, pH 7.2), Indo-1 (AM ester, low/high calcium (Ca²⁺)), SNARF(pH 6/9), Allophycocyanin(APC), AmCyan1 (tetramer, Clontech), AsRed2 (tetramer, Clontech), Azami Green (monomer), Azurite, B-phycoerythrin (BPE), Cerulean, CyPet, DsRed monomer (Clontech), DsRed2 ("RFP"), EBFP, EBFP2, ECFP, EGFP (weak dimer), Emerald (weak dimer), EYFP (weak

dimer), GFP (S65A mutation), GFP (S65C mutation), GFP (S65L mutation), GFP (S65T mutation), GFP (Y66F mutation), GFP (Y66H mutation), GFP (Y66W mutation), GFPuv, HcRed1, J-Red, Katusha, Kusabira Orange (monomer, MBL), mCFP, mCherry, mCitrine, Midoriishi Cyan (dimer, MBL), mKate (TagFP635, monomer), mKeima-Red (monomer), mKO, mOrange, mPlum, mRaspberry, mRFP1 (monomer), mStrawberry, mTFP1, mTurquoise2, P3 (phycobilisome complex), Peridinin Chlorophyll (PerCP), R-phycoerythrin (RPE), T-Sapphire, TagCFP (dimer), TagGFP (dimer), TagRFP (dimer), TagYFP (dimer), tdTomato (tandem dimer), Topaz, TurboFP602 (dimer), TurboFP635 (dimer), TurboGFP (dimer), TurboRFP (dimer), TurboYFP (dimer), Venus, Wild Type GFP, YPet, ZsGreen1 (tetramer), ZsYellow1 (tetramer) and their derivatives;

(7) a cell-binding ligand or receptor agonist, which can be selected from: Folate derivatives; Glutamic acid urea derivatives; Somatostatin and its analogs (selected from the group consisting of octreotide (Sandostatin) and lanreotide (Somatuline)); Aromatic sulfonamides; Pituitary adenylate cyclase activating peptides (PACAP) (PAC1); Vasoactive intestinal peptides (VIP/PACAP) (VPAC1, VPAC2); Melanocyte-stimulating hormones (α -MSH); Cholecystokinins (CCK) /gastrin receptor agonists; Bombesins (selected from the group consisting of Pyr-Gln-Arg-Leu-Gly-Asn-Gln-Trp-Ala-Val-Gly-His-Leu-Met-NH₂)/gastrin-releasing peptide (GRP); Neurotensin receptor ligands (NTR1, NTR2, NTR3); Substance P (NK1 receptor) ligands; Neuropeptide Y (Y1–Y6); Homing Peptides include RGD (Arg-Gly-Asp), NGR (Asn-Gly-Arg), the dimeric and multimeric cyclic RGD peptides (selected from cRGDfV), TAASGVRSMH and LTLRWVGLMS (Chondroitin sulfate proteoglycan NG2 receptor ligands) and F3 peptides; Cell Penetrating Peptides (CPPs); Peptide Hormones, selected from the group consisting of luteinizing hormone-releasing hormone (LHRH) agonists and antagonists, and gonadotropin-releasing hormone (GnRH) agonist, acts by targeting follicle stimulating hormone (FSH) and luteinising hormone (LH), as well as testosterone production, selected from the group consisting of buserelin (Pyr-His-Trp-Ser-Tyr-D-Ser(OtBu)-Leu-Arg-Pro-NHEt), Gonadorelin (Pyr-His-Trp-Ser-Tyr-Gly-Leu-Arg-Pro-Gly-NH₂), Goserelin (Pyr-His-Trp-Ser-Tyr-D-Ser(OtBu)-Leu-Arg-Pro-AzGly-NH₂), Histrelin (Pyr-His-Trp-Ser-Tyr-D-His(N-benzyl)-Leu-Arg-Pro-NHEt), leuprolide (Pyr-His-Trp-Ser-Tyr-D-Leu-Leu-Arg-Pro-NHEt), Nafarelin (Pyr-His-Trp-Ser-Tyr-2Nal-Leu-Arg-Pro-Gly-NH₂), Triptorelin (Pyr-His-Trp-Ser-Tyr-D-Trp-Leu-Arg-Pro-Gly-NH₂), Nafarelin, Deslorelin, Abarelix (Ac-D-2Nal-D-4-chloroPhe-D-3-(3-pyridyl)Ala-Ser-(N-Me)Tyr-D-Asn-Leu-isopropylLys-Pro-DAla-NH₂), Cetorelix (Ac-D-2Nal-D-4-chloroPhe-D-3-(3-pyridyl)Ala-Ser-Tyr-D-Cit-Leu-Arg-Pro-D-Ala-NH₂), Degarelix (Ac-D-2Nal-D-4-chloroPhe-D-3-(3-pyridyl)Ala-Ser-4-aminoPhe(L-

hydroorotyl)-D-4-aminoPhe(carba-moyl)-Leu-isopropylLys-Pro-D-Ala-NH₂), and Ganirelix (Ac-D-2Nal-D-4-chloroPhe-D-3-(3-pyridyl)Ala-Ser-Tyr-D-(N9, N10-diethyl)-homoArg-Leu-(N9, N10-diethyl)-homoArg-Pro-D-Ala-NH₂); Pattern Recognition Receptor (PRRs), selected from the group consisting of Toll-like receptors' (TLRs) ligands, C-type lectins and Nodlike Receptors' (NLRs) ligands; Calcitonin receptor agonists; integrin receptors' and their receptor subtypes' (selected from the group consisting of $\alpha_v\beta_1$, $\alpha_v\beta_3$, $\alpha_v\beta_5$, $\alpha_v\beta_6$, $\alpha_6\beta_4$, $\alpha_7\beta_1$, $\alpha_L\beta_2$, $\alpha_{IIb}\beta_3$) agonists (selected from the group consisting of GRGDSPK, cyclo(RGDfV) (L1) and its derivatives [cyclo(-N(Me)R-GDfV), cyclo(R-Sar-DfV), cyclo(RG-N(Me)D-fV), cyclo(RGD-N(Me)f-V), cyclo(RGDf-N(Me)V-)(Cilengitide)]; Nanobody (a derivative of VHH (camelid Ig)); Domain antibodies (dAb, a derivative of VH or VL domain); Bispecific T cell Engager (BiTE, a bispecific diabody); Dual Affinity ReTargeting (DART, a bispecific diabody); Tetravalent tandem antibodies (TandAb, a dimerized bispecific diabody); Anticalin (a derivative of Lipocalins); Adnectins (10th FN3 (Fibronectin)); Designed Ankyrin Repeat Proteins (DARPs); Avimers; EGF receptors and VEGF receptors' agonists;

(8) a pharmaceutically acceptable salt, acid, derivative, hydrate or hydrated salt; or a crystalline structure; or an optical isomer, racemate, diastereomer or enantiomer of any of the above drugs.

11. Use of the compound according to claim 1 for detecting, monitoring, or studying an interaction and/or function of the cell-binding agent/molecule, and/or an interaction of the compound with a targeted cell; wherein the cytotoxic molecule is a chromophore molecule.

12. Use of the compound according to claim 1 for extending the half-life of the cell-binding agent/molecule when the compound is administered to a mammal; wherein the cytotoxic molecule is a polyalkylene glycol comprising poly(ethylene glycol) (PEGs), poly(propylene glycol), a copolymer of ethylene oxide or propylene oxide, or an analog thereof.

13. Use of the compound according to claim 1 for a targeted delivery of the compound to a malignant cell, or for modulating or co-stimulating a desired immune response, or for altering signaling pathways; wherein the cytotoxic molecule is a cell-binding ligand, a cell receptor agonist, or a cell receptor binding molecule.

14. The compound according to claim 1 or claim 2, wherein the cytotoxic molecule is selected from the group consisting of tubulysins, calicheamicins, auristatins, maytansinoids, CC-1065

analog, daunorubicin and doxorubicin compounds, taxanoids (taxanes), cryptophycins, epothilones, benzodiazepine dimers (comprising pyrrolobenzodiazepine dimers (PBD), tomaymycin dimers, anthramycin dimers, indolinobenzodiazepine dimers, imidazobenzothiadiazepine dimers, or oxazolidinobenzodiazepine dimers and their derivatives), calicheamicins and the enediyne antibiotics, actinomycins, amatoxins, amanitins, azaserines, bleomycins, epirubicins, tamoxifen, idarubicin, dolastatins/auristatins (comprising monomethyl auristatin E, MMAE, MMAF, auristatin PYE, auristatin TP, Auristatins 2-AQ, 6-AQ, EB (AEB), EFP (AEFP) and their analogs), duocarmycins, geldanamycins, methotrexates, thiotepa, vindesines, vincristines, hemiasterlins, nazumamides, microginins, radiosumins, alterobactins, microsclerodermins, theonellamides, esperamicins, siRNA, miRNA, piRNA, nucleolytic enzymes, and/or pharmaceutically acceptable salts, acids, or/and their analogues, derivatives, hydrate or hydrated salt; or a crystalline structure; or an optical isomer, racemate, diastereomer or enantiomer of any of the above drugs.

15. The compound according to claim **1** or claim **3**, wherein the cell-binding agent/molecule is selected from the group consisting of an antibody, a protein, a probody, a nanobody, a vitamin (including folate), a peptide, a polymeric micelle, a liposome, a lipoprotein-based drug carrier, a nano-particle drug carrier, a dendrimer, and a molecule or a particle said above coating with cell-binding ligands, or a combination thereof.

16. The compound according to any one of claims **1**, **3**, or **15**, wherein the cell-binding agent/molecule is selected from an antibody, an antibody-like protein, a full-length antibody (polyclonal antibody, monoclonal antibody, antibody dimer, antibody multimer), or multispecific antibody (selected from, bispecific antibody, trispecific antibody, or tetraspecific antibody); a single chain antibody, an antibody fragment that binds to the target cell, a monoclonal antibody, a single chain monoclonal antibody, or a monoclonal antibody fragment that binds the target cell, a chimeric antibody, a chimeric antibody fragment that binds to the target cell, a domain antibody, a domain antibody fragment that binds to the target cell, a resurfaced antibody, a resurfaced single chain antibody, or a resurfaced antibody fragment that binds to the target cell, a humanized antibody or a resurfaced antibody, a humanized single chain antibody, or a humanized antibody fragment that binds to the target cell, anti-idiotypic (anti-Id) antibodies, CDR's, diabody, triabody, tetrabody, miniantibody, a probody, a probody fragment, small immune proteins (SIP), a lymphokine, a hormone, a vitamin, a growth factor, a

colony stimulating factor, a nutrient-transport molecule, large molecular weight proteins, nanoparticles or polymers modified with antibodies or large molecular weight proteins.

17. The compound according to any one of claims **1, 3, 5, 7, 10, 11, 12, 13, 14, 15, or 16** wherein the cell-binding agent/molecule is capable of targeting a tumor cell, a virus infected cell, a microorganism infected cell, a parasite infected cell, an autoimmune disease cell, an activated tumor cells, a myeloid cell, an activated T-cell, an affecting B cell, or a melanocyte, or any cells expressing any one of the following antigens or receptors: CD2, CD2R, CD3, CD3gd, CD3e, CD4, CD5, CD6, CD7, CD8, CD8a, CD8b, CD9, CD10, CD11a, CD11b, CD11c, CD12, CD12w, CD13, CD14, CD15, CD15s, CD15u, CD16, CD16a, CD16b, CD17, CDw17, CD18, CD19, CD20, CD21, CD22, CD23, CD24, CD25, CD26, CD27, CD28, CD29, CD30, CD31, CD32, CD33, CD34, CD35, CD36, CD37, CD38, CD39, CD40, CD41, CD42, CD42a, CD42b, CD42c, CD42d, CD43, CD44, CD44R, CD45, CD45RA, CD45RB, CD45RO, CD46, CD47, CD47R, CD48, CD49a, CD49b, CD49c, CD49e, CD49f, CD50, CD51, CD52, CD53, CD54, CD55, CD56, CD57, CD58, CD59, CD60, CD60a, CD60b, CD60c, CD61, CD62E, CD62L, CD62P, CD63, CD64, CD65, CD65s, CD66, CD66a, CD66b, CD66c, CD66d, CD66e, CD66f, CD67, CD68, CD69, CD70, CD71, CD72, CD73, CD74, CD74, CD75, CD75s, CD76, CD77, CD78, CD79, CD79a, CD79b, CD80, CD81, CD82, CD83, CD84, CDw84, CD85, CD86, CD87, CD88, CD89, CD90, CD91, CD92, CDw92, CD93, CD94, CD95, CD96, CD97, CD98, CD99, CD99R, CD100, CD101, CD102, CD103, CD104, CD105, CD106, CD107, CD107a, CD107b, CD108, CD109, CD110, CD111, CD112, CD113, CDw113, CD114, CD115, CD116, CD117, CD118, CD119, CDw119, CD120a, CD120b, CD121a, CD121b, CDw121b, CD122, CD123, CDw123, CD124, CD125, CDw125, CD126, CD127, CD128, CDw128, CD129, CD130, CD131, CDw131, CD132, CD133, CD134, CD135, CD136, CDw136, CD137, CDw137, CD138, CD139, CD140a, CD140b, CD141, CD142, CD143, CD144, CD145, CDw145, CD146, CD147, CD148, CD149, CD150, CD151, CD152, CD153, CD154, CD155, CD156a, CD156b, CDw156c, CD157, CD158a, CD158b, CD159a, CD159b, CD159c, CD160, CD161, CD162, CD162R, CD163, CD164, CD165, CD166, CD167, CD167a, CD168, CD169, CD170, CD171, CD172a, CD172b, CD172g, CD173, CD174, CD175, CD175s, CD176, CD177, CD178, CD179, CD180, CD181, CD182, CD183, CD184, CD185, CD186, CDw186, CD187, CD188, CD189, CD190, CD191, CD192, CD193, CD194, CD195, CD196, CD197, CD198, CDw198, CD199, CDw199, CD200, CD200a, CD200b, CD201, CD202, CD202b, CD203, CD203c, CD204, CD205, CD206, CD207, CD208, CD209, CD210, CDw210, CD212, CD213a1, CD213a2, CDw217, CDw218a, CDw218b, CD220, CD221, CD222, CD223,

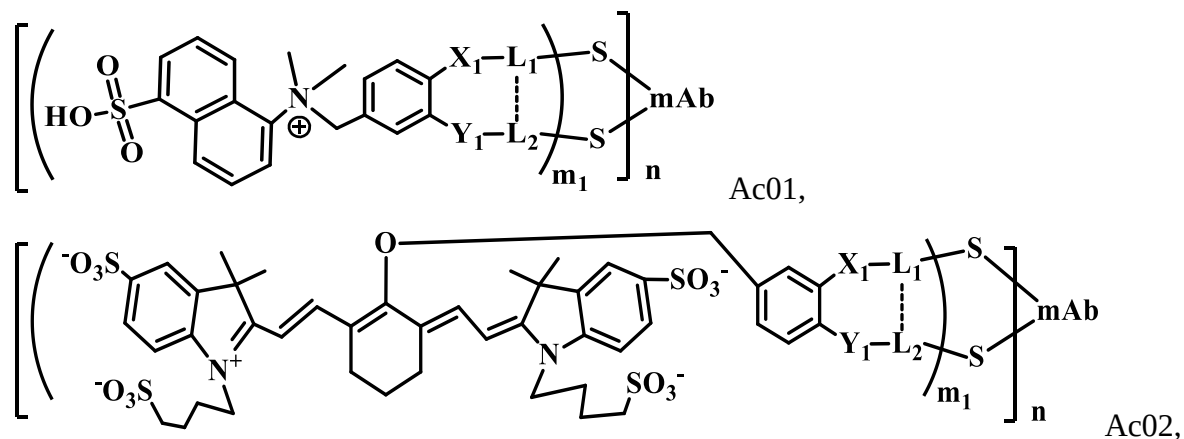
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glycolipid), GD3 idio type, GloboH, Glypican 3, N-glycolylneuraminic acid, GM3, GMCSF receptor α -chain, Growth differentiation factor 8, GP100, GPNMB (Trans-membrane glycoprotein NMB), GUCY2C (Guanylate cyclase 2C, guanylyl cyclase C(GC-C), intestinal Guanylate cyclase, Guanylate cyclase-C receptor, Heat-stable enterotoxin receptor (hSTAR)), Heat shock proteins, Hemagglutinin, Hepatitis B surface antigen, Hepatitis B virus, HER1 (human epidermal growth factor receptor 1), HER2, HER2/neu, HER3 (ERBB-3), IgG4, HGF/SF (Hepatocyte growth factor/scatter factor), HHGFR, HIV-1, Histone complex, HLA-DR (human leukocyte antigen), HLA-DR10, HLA-DRB, HMWMAA, Human chorionic gonadotropin, HNGF, Human scatter factor receptor kinase, HPV E6/E7, Hsp90, hTERT, ICAM-1 (Intercellular Adhesion Molecule 1), Idiotypic, IGF1R (IGF-1, insulin-like growth factor 1 receptor), IGHE, IFN- γ , Influenza hemagglutinin, IgE, IgE Fc region, IGHE, interleukins (comprising IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-6R, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-13, IL-15, IL-17, IL-17A, IL-18, IL-19, IL-20, IL-21, IL-22, IL-23, IL-27, or IL-28), IL31RA, ILGF2 (Insulin-like growth factor 2), Integrins (α 4, α IIb β 3, α v β 3, α 4 β 7, α 5 β 1, α 6 β 4, α 7 β 7, α II β 3, α 5 β 5, α v β 5), Interferon gamma-induced protein, ITGA2, ITGB2, KIR2D, Kappa Ig, LCK, Le, Legumain, Lewis-Y antigen, LFA-1 (Lymphocyte function-associated antigen 1, CD11a), LHRH, LINGO-1, Lipoteichoic acid, LIV1A, LMP2, LTA, MAD-CT-1, MAD-CT-2, MAGE-1, MAGE-2, MAGE-3, MAGE A1, MAGE A3, MAGE 4, MART1, MCP-1, MIF (Macrophage migration inhibitory factor, or glycosylation-inhibiting factor (GIF)), MS4A1 (membrane-spanning 4-domains subfamily A member 1), MSLN (mesothelin), MUC1(Mucin 1, cell surface associated (MUC1) or polymorphic epithelial mucin (PEM)), MUC1-KLH, MUC16 (CA125), MCP1(monocyte chemotactic protein 1), MelanA/MART1, ML-IAP, MPG, MS4A1 (membrane-spanning 4-domains subfamily A), MYCN, Myelin-associated glycoprotein, Myostatin, NA17, NARP-1, NCA-90 (granulocyte antigen), Nectin-4 (ASG-22ME), NGF, Neural apoptosis-regulated proteinase 1, NOGO-A, Notch receptor, Nucleolin, Neu oncogene product, NY-BR-1, NY-ESO-1, OX-40, OxLDL (Oxidized low-density lipoprotein), OY-TES1, P21, p53 nonmutant, P97, Page4, PAP, Paratope of anti-(N-glycolylneuraminic acid), PAX3, PAX5, PCSK9, PDCD1 (PD-1, Programmed cell death protein 1), PDGF-R α (Alpha-type platelet-derived growth factor receptor), PDGFR- β , PDL-1, PLAC1, PLAP-like testicular alkaline phosphatase, Platelet-derived growth factor receptor beta, Phosphate-sodium co-transporter, PMEL 17, Polysialic acid, Proteinase3 (PR1), Prostatic carcinoma, PS (Phosphatidylserine), Prostatic carcinoma cells, Pseudomonas aeruginosa, PSMA, PSA, PSCA, Rabies virus glycoprotein, RHD (Rh polypeptide 1 (RhPI)), Rhesus factor, RANKL, RhoC, Ras mutant, RGS5, ROBO4, Respiratory syncytial virus, RON, ROR1, Sarcoma translocation

breakpoints, SART3, Sclerostin, SLAMF7 (SLAM family member 7), Selectin P, SDC1 (Syndecan 1), sLe(a), Somatomedin C, SIP (Sphingosine-1-phosphate), Somatostatin, Sperm protein 17, SSX2, STEAP1 (six-transmembrane epithelial antigen of the prostate 1), STEAP2, STn, TAG-72 (tumor associated glycoprotein 72), Survivin, T-cell receptor, T cell transmembrane protein, TEM1 (Tumor endothelial marker 1), TENB2, Tenascin C (TN-C), TGF- α , TGF- β (Transforming growth factor beta), TGF- β 1, TGF- β 2 (Transforming growth factor-beta 2), Tie (CD202b), Tie2, TIM-1 (CDX-014), Tn, TNF, TNF- α , TNFRSF8, TNFRSF10B (tumor necrosis factor receptor superfamily member 10B), TNFRSF-13B (tumor necrosis factor receptor superfamily member 13B), TPBG (trophoblast glycoprotein), TRAIL-R1 (Tumor necrosis apoptosis Inducing ligand Receptor 1), TRAILR2 (Death receptor 5 (DR5)), tumor-associated calcium signal transducer 2, tumor specific glycosylation of MUC1, TWEAK receptor, TYRP1(glycoprotein 75), TRP-2, Tyrosinase, VCAM-1, VEGF, VEGF-A, VEGF-2, VEGFR-1, VEGFR2, or vimentin, WT1, XAGE 1, or cells expressing any insulin growth factor receptors, or any epidermal growth factor receptors.

18. The compound according to claim 17, wherein the tumor cell is selected from the group consisting of lymphoma cells, myeloma cells, renal cells, breast cancer cells, prostate cancer cells, ovarian cancer cells, colorectal cancer cells, gastric cancer cells, squamous cancer cells, small-cell lung cancer cells, none small-cell lung cancer cells, testicular cancer cells, malignant cells, or any cells that grow and divide at an unregulated, quickened pace to cause cancers.

19. The compound according to claim 1, wherein the cytotoxic molecule is a chromophore molecule, and wherein the compound is selected from the group consisting of structures of Ac01, Ac02, Ac03, Ac04, Ac05, Ac06, and Ac07:

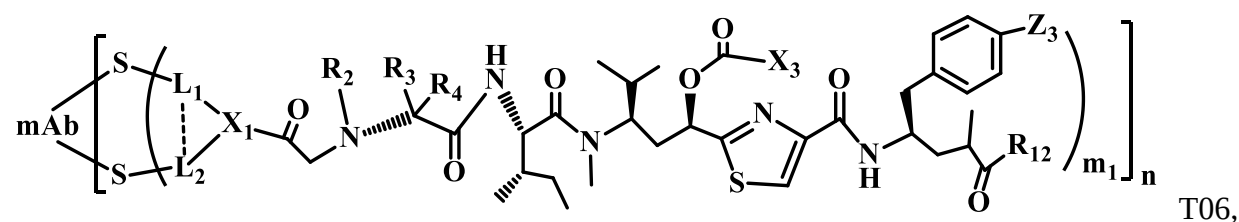
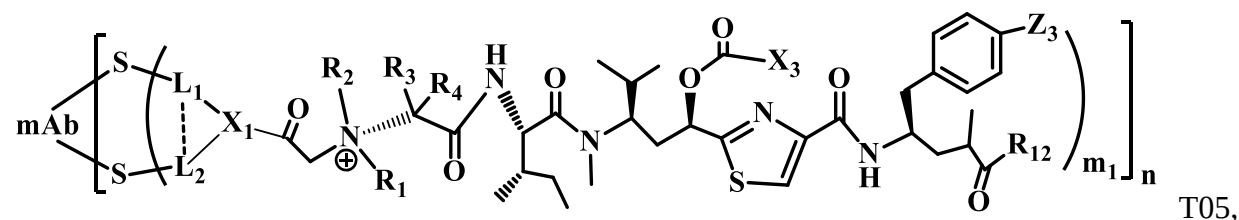
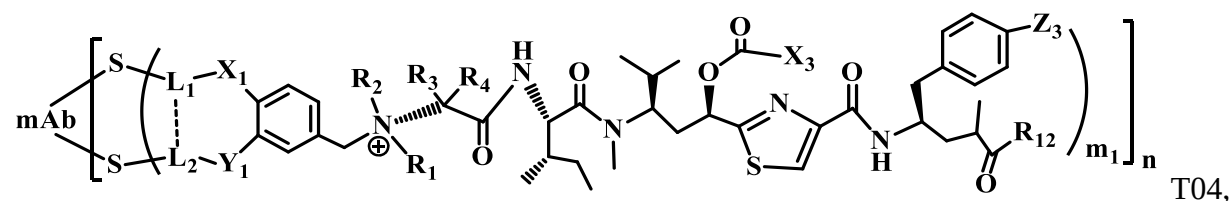
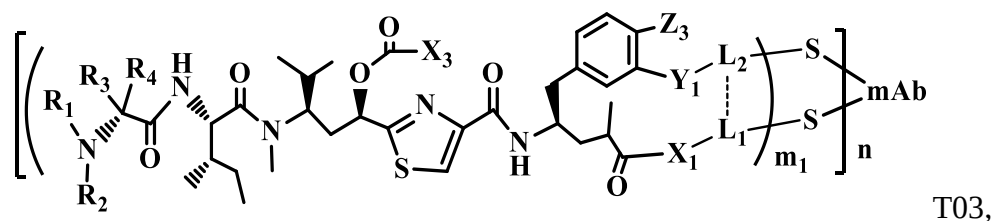
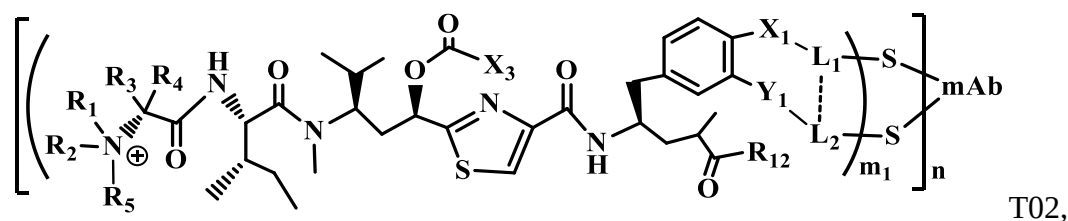
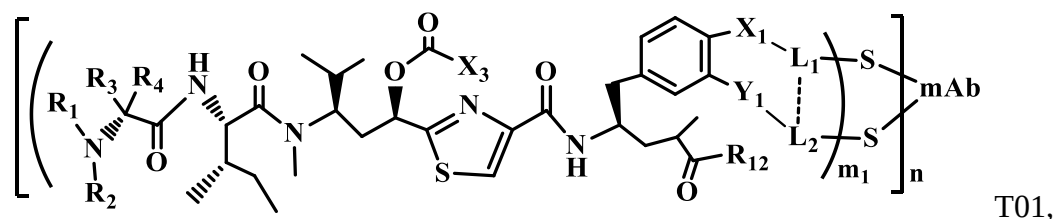




wherein “-----” is a single bond, a double bond, or absent; X₁ and Y₁ are independently O, NH, NHNH, NR₅, S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH, NHC(O)S, OC(O)N(R₁), N(R₁)C(O)N(R₁), CH, C(O)NHNHC(O) or C(O)NR₁; mAb is antibody; n and m₁ are independently 1-20; R₁₂ and R₁₂' are independently OH, NH₂, NHR₁, NHNH₂, NHNHCOOH, O-R₁-COOH, NH-R₁-COOH, NH-(Aa)_nCOOH, O(CH₂CH₂O)_pCH₂CH₂OH, O(CH₂CH₂O)_pCH₂CH₂NH₂, NH(CH₂CH₂O)_pCH₂CH₂NH₂, O(CH₂CH₂O)_pCH₂CH₂COOH, NH(CH₂CH₂O)_pCH₂CH₂COOH, O(CH₂CH₂O)_pCH₂CH₂NHSO₃H,

$\text{NH}(\text{CH}_2\text{CH}_2\text{O})_p\text{CH}_2\text{CH}_2\text{NH}\text{SO}_3\text{H}$, $\text{R}_1\text{-NH}\text{SO}_3\text{H}$, $\text{NH-R}_1\text{-NH}\text{SO}_3\text{H}$,
 $\text{O}(\text{CH}_2\text{CH}_2\text{O})_p\text{CH}_2\text{CH}_2\text{NH}\text{PO}_3\text{H}_2$, $\text{NH}(\text{CH}_2\text{CH}_2\text{O})_p\text{CH}_2\text{CH}_2\text{NH}\text{PO}_3\text{H}_2$, $\text{R}_1\text{-NH}\text{PO}_3\text{H}_2$, $\text{R}_1\text{-O}\text{PO}_3\text{H}_2$, $\text{O}(\text{CH}_2\text{CH}_2\text{O})_p\text{CH}_2\text{CH}_2\text{O}\text{PO}_3\text{H}_2$, $\text{NH}(\text{CH}_2\text{CH}_2\text{O})_p\text{CH}_2\text{CH}_2\text{NH}\text{PO}_3\text{H}_2$, $\text{OR}_1\text{-NH}\text{PO}_3\text{H}_2$,
 $\text{NH-R}_1\text{-NH}\text{PO}_3\text{H}_2$, NH-Ar-COOH , NH-Ar-NH_2 , wherein $p = 0 - 5000$, Aa is amino acids; R_1 , L_1 , and L_2 are defined the same as in Claim 1.

20. The compound according to claim 1, wherein the cytotoxic molecule is a Tubulysin analog, and wherein the compound is selected from structures of T01, T02, T03, T04, T05, T06, T07, T08, T09, T10, or T11:

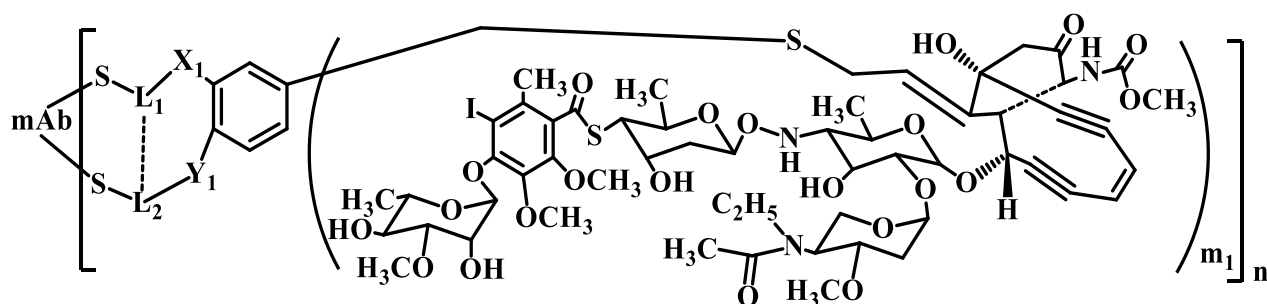




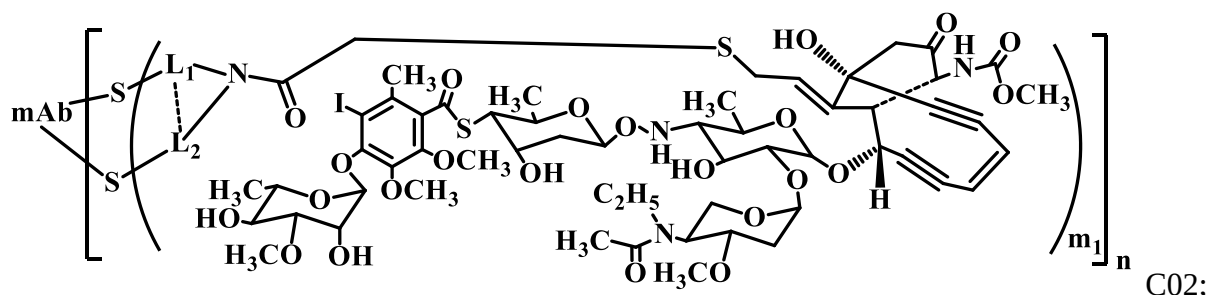
wherein “-----” is optionally either a single bond, or a double bond, or absent; X₁, and Y₁ are independently O, NH, NHNH, NR₅, S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH, NHC(O)S, OC(O)N(R₁), N(R₁)C(O)N(R₁), CH, C(O)NHNHC(O) and C(O)NR₁; mAb is antibody; R₁₂ is OH, NH₂, NHR₁, NHNH₂, NHNHCOOH, O-R₁-COOH, NH-R₁-COOH, NH-(Aa)_nCOOH, O(CH₂CH₂O)_pCH₂CH₂OH, O(CH₂CH₂O)_pCH₂CH₂NH₂, NH(CH₂CH₂O)_pCH₂CH₂NH₂, NR₁R₁’, NHOH, NHOR₁, O(CH₂CH₂O)_pCH₂CH₂COOH, NH(CH₂CH₂O)_pCH₂CH₂COOH, NH-Ar-COOH, NH-Ar-NH₂, O(CH₂CH₂O)_pCH₂CH₂NHSO₃H, NH(CH₂CH₂O)_pCH₂CH₂NHSO₃H, R₁-NHSO₃H, NH-R₁-NHSO₃H, O(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, NH(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, OR₁, R₁-NHPO₃H₂, R₁-OPO₃H₂, O(CH₂CH₂O)_pCH₂CH₂OPO₃H₂, OR₁-NHPO₃H₂, NH-R₁-NHPO₃H₂, NH(CH₂CH₂NH)_pCH₂CH₂NH₂, NH(CH₂CH₂S)_pCH₂CH₂NH₂, NH(CH₂CH₂NH)_pCH₂CH₂OH, NH(CH₂CH₂S)_pCH₂CH₂OH, NH-R₁-NH₂, or NH(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, wherein Aa is 1-8 amino acids; n and m₁ are independently

1-20; p is 1 -5000; R₁, R₁', R₂, R₃, and R₄ are independently H, C₁-C₈ lineal or branched alkyl, amide, or amines; C₂-C₈ aryl, alkenyl, alkynyl, heteroaryl, heteroalkyl, alkylcycloalkyl, ester, ether, heterocycloalkyl, or acyloxylamines; or peptides containing 1-8 amino acids, or polyethyleneoxy unit having formula (OCH₂CH₂)_p or (OCH₂CH(CH₃))_p, wherein p is an integer from 1 to about 5000; The two Rs: R₁R₂, R₂R₃, R₁R₃ or R₃R₄ can form 3~8 member cyclic ring of alkyl, aryl, heteroaryl, heteroalkyl, or alkylcycloalkyl group; X₃ is H, CH₃, CH₂CH₃, C₃H₇, or X₁'R₁', wherein X₁' is NH, N(CH₃), NHNH, O, or S; R₁' is H or C₁-C₈ lineal or branched alkyl, aryl, heteroaryl, heteroalkyl, alkylcycloalkyl, or acyloxylamines; R₃' is H or C₁-C₆ lineal or branched alkyl; Z₃ is H, COOR₁, NH₂, NHR₁, OR₁, CONHR₁, NHCOR₁, OCOR₁, OP(O)(OM₁)(OM₂), OCH₂OP(O)(OM₁)(OM₂), OSO₃M₁, R₁, O-glycoside (glucoside, galactoside, mannoside, glucuronoside/glucuronide, alloside, fructoside), NH-glycoside, S-glycoside or CH₂-glycoside; M₁ and M₂ are independently H, Na, K, Ca, Mg, NH₄, NR₁R₂R₃; L₁, and L₂ are defined the same as in Claim 1.

21. The compound according to claim 1, wherein the cytotoxic molecule is a Calicheamicin analog, and wherein the compound is selected from structures of C01 or C02:



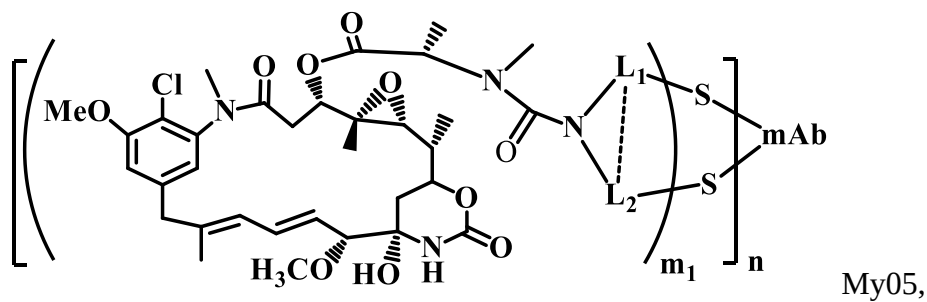
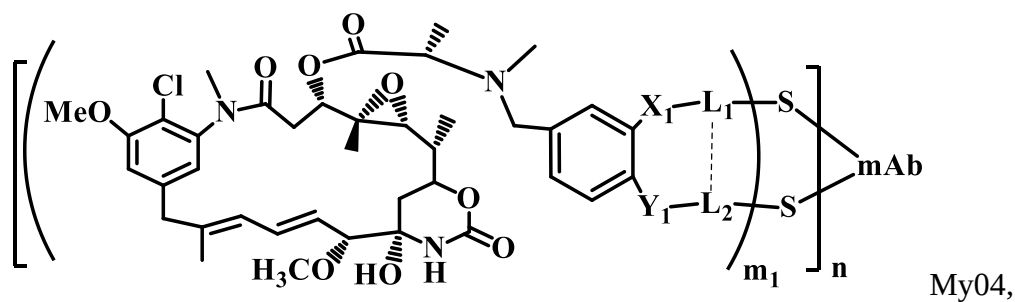
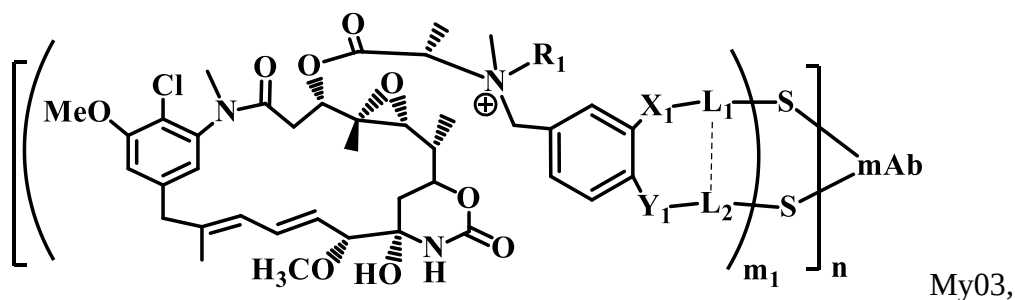
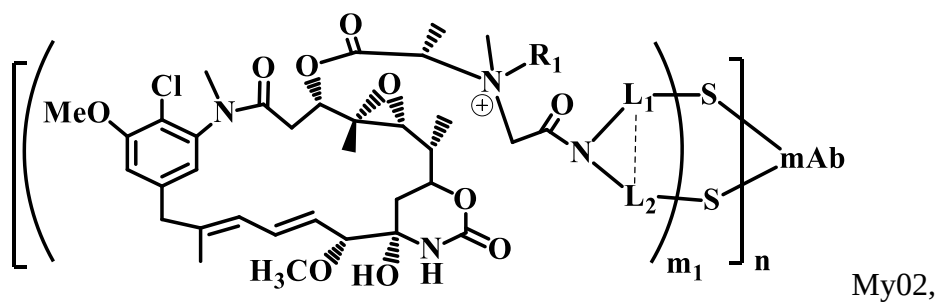
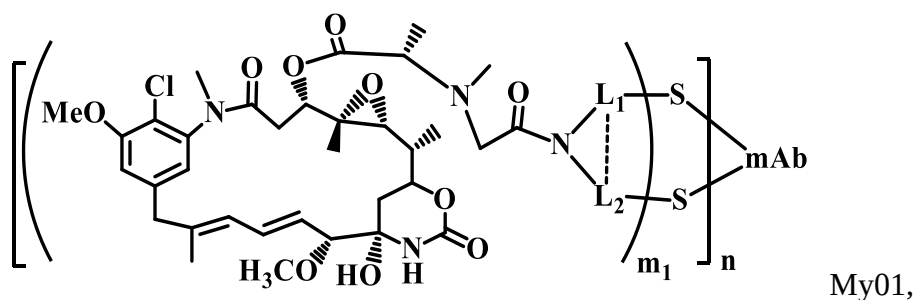
C01,

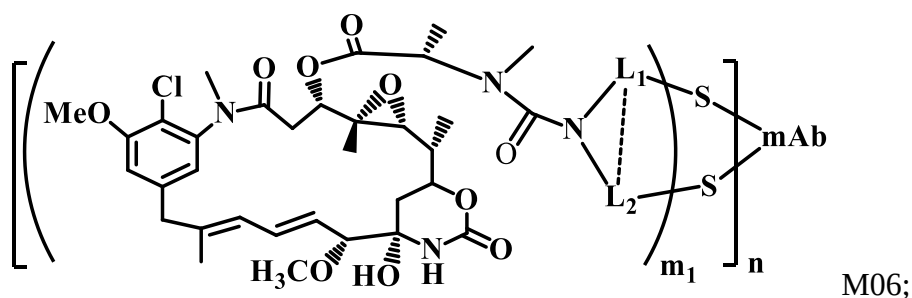


C02;

wherein “-----” is optionally either a single bond, or a double bond, or absent; X₁ and Y₁ are independently O, NH, NHNH, NR₅, S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH, NHC(O)S, OC(O)N(R₁), N(R₁)C(O)N(R₁), CH, C(O)NHNHC(O) and C(O)NR₁; mAb is antibody; n and m₁ are independently 1-20; p is 1 -5000; R₁, L₁, and L₂ are the same as defined in Claim 1.

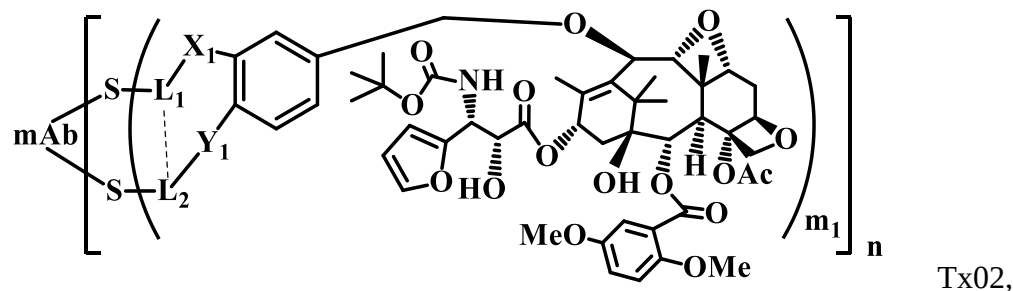
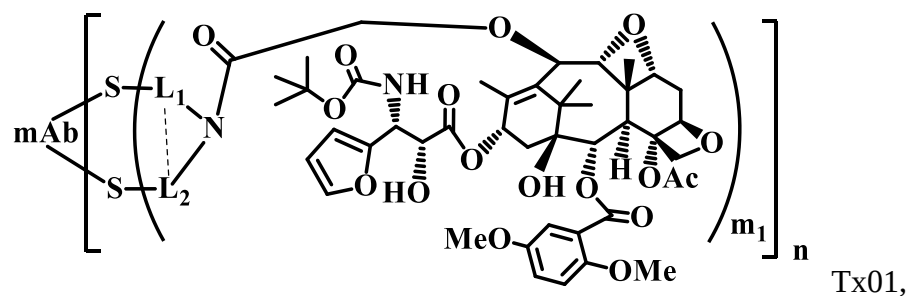
22. The compound according to claim 1, wherein the cytotoxic molecule is a Maytansinoid analog, and wherein the compound is selected from structures of the following My01, My02, My03, My04, My05, or My06:

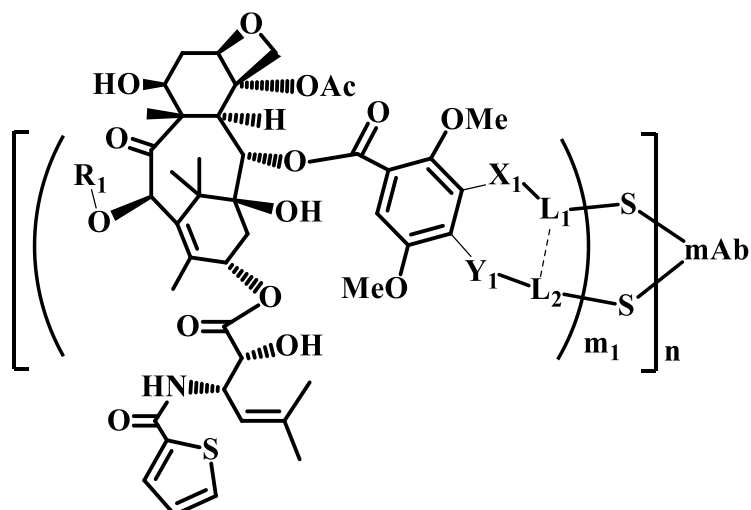




wherein “-----” is optionally either a single bond, or a double bond, or absent; X_1 and Y_1 are independently O, NH, NHNH, NR_5 , S, $C(O)O$, $C(O)NH$, $OC(O)NH$, $OC(O)O$, $NHC(O)NH$, $NHC(O)S$, $OC(O)N(R_1)$, $N(R_1)C(O)N(R_1)$, CH, $C(O)NHNHC(O)$ and $C(O)NR_1$; mAb is antibody; n and m_1 are independently 1-20; p is 1-5000; R_1 , L_1 , and L_2 are the same as defined in Claim 1.

23. The compound according to claim 1, wherein the cytotoxic molecule is a Taxane analog, and wherein the compound is selected from structures of Tx01, Tx02 or Tx03:

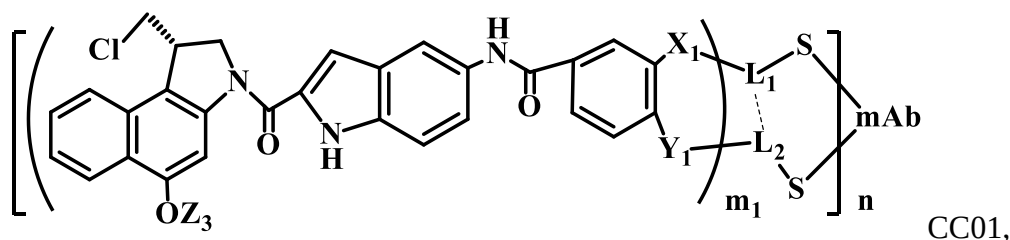




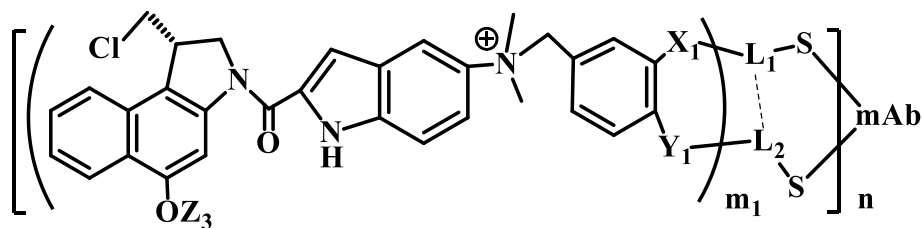
Tx03;

wherein “-----” is optionally either a single bond, or a double bond, or absent; X_1 and Y_1 are independently O, NH, NHNH, NR_5 , S, $C(O)O$, $C(O)NH$, $OC(O)NH$, $OC(O)O$, $NHC(O)NH$, $NHC(O)S$, $OC(O)N(R_1)$, $N(R_1)C(O)N(R_1)$, CH, $C(O)NHNHC(O)$ and $C(O)NR_1$; mAb is antibody; n and m_1 are independently 1-20; R_1 , L_1 , and L_2 are the same defined in Claim 1.

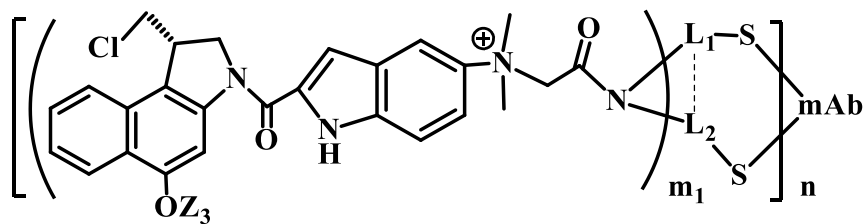
24. The compound according to claim 1, wherein the cytotoxic molecule is a CC-1065 analogue and/or duocarmycin analog, and wherein the compound is selected from structures of CC01, CC02, CC03, or CC04:



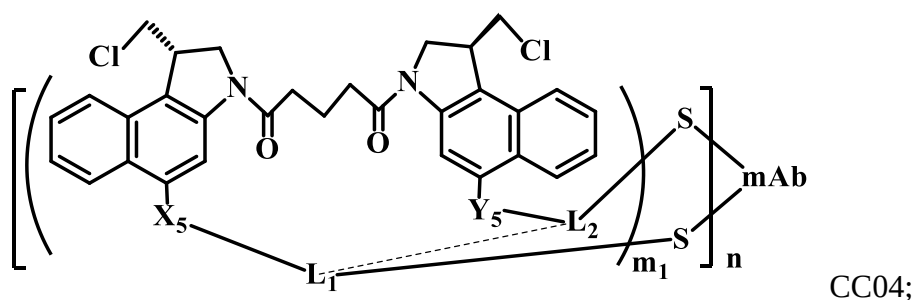
CC01,



CC02,

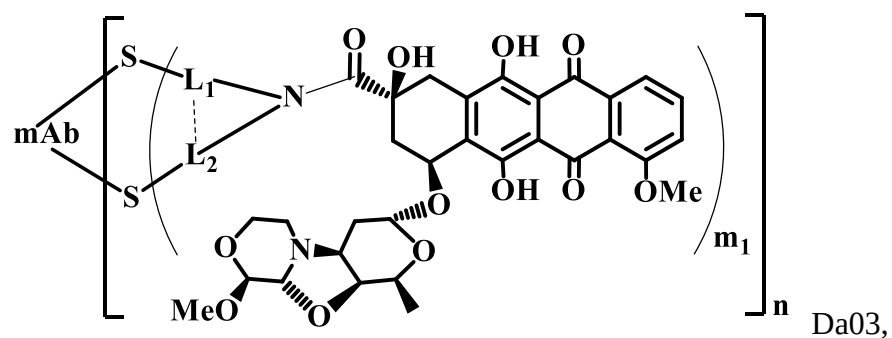
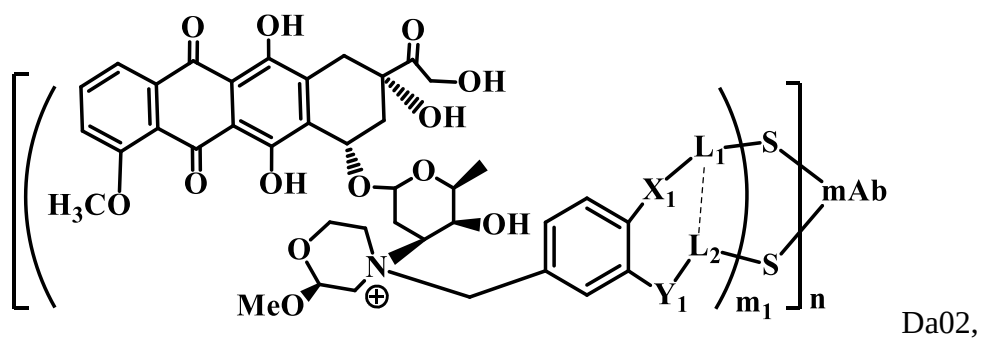
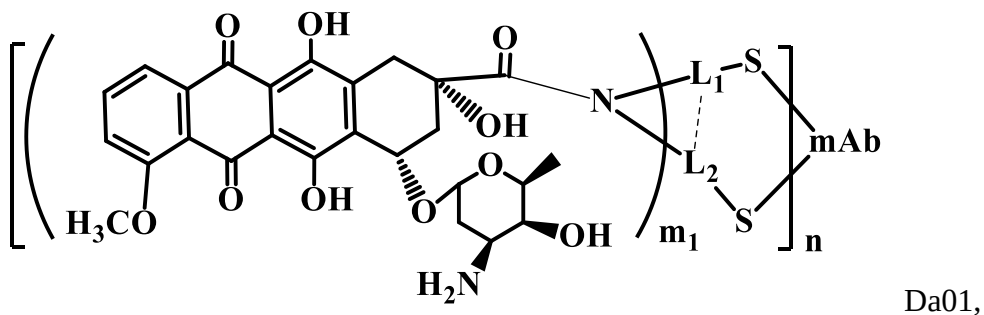


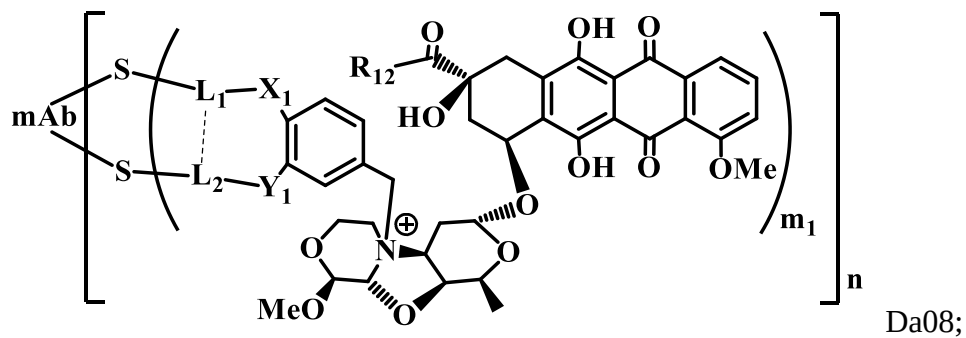
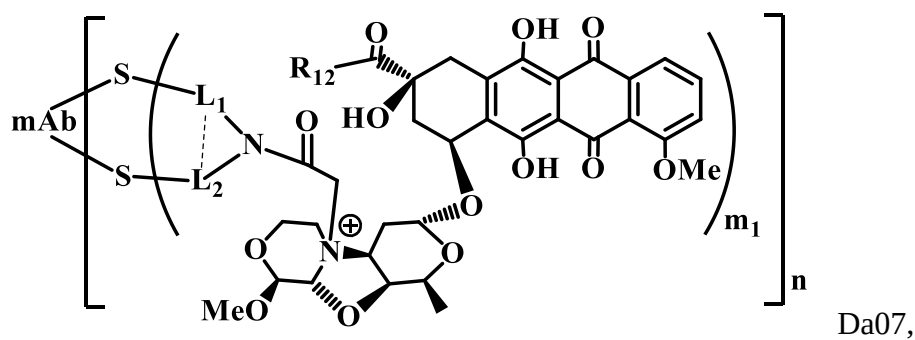
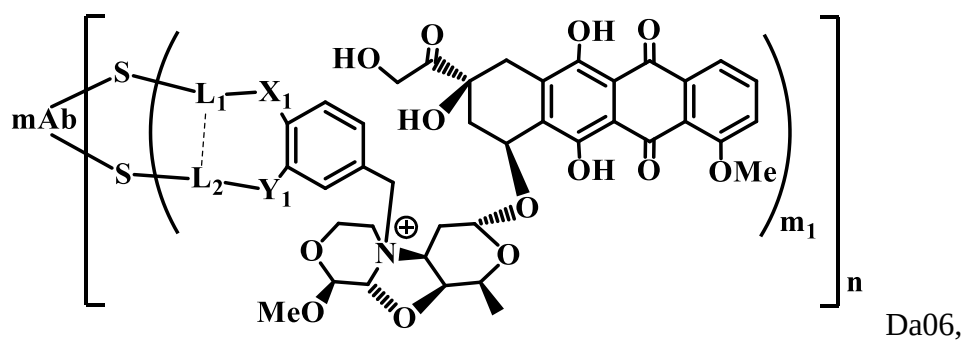
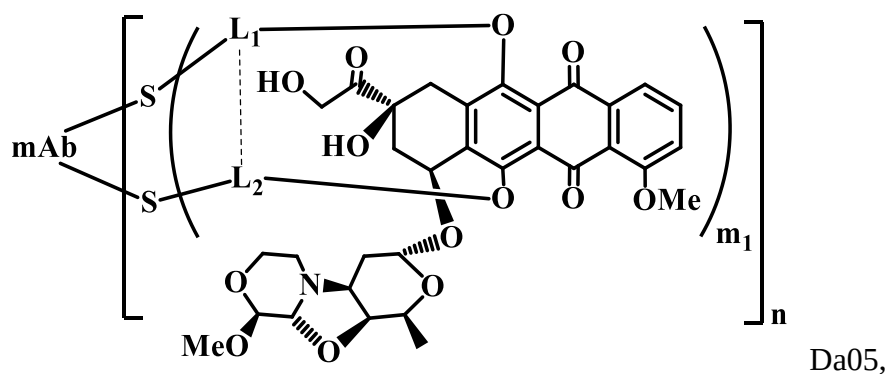
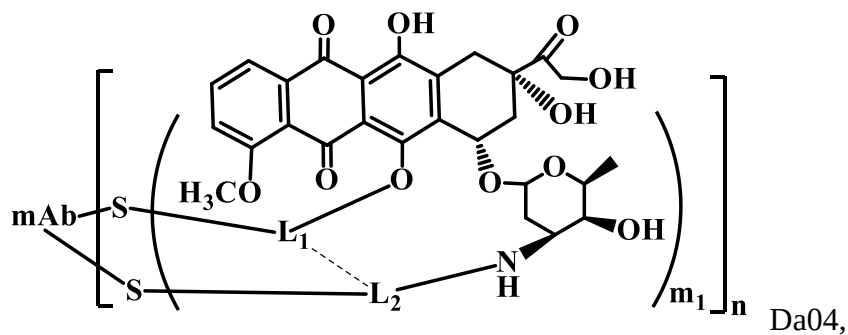
CC03,



wherein mAb is an antibody; Z₃ is H, PO(OM₁)(OM₂), SO₃M₁, CH₂PO(OM₁)(OM₂), CH₃N(CH₂CH₂)₂NC(O)-, O(CH₂CH₂)₂NC(O)-, R₁, or glycoside; wherein “-----” is either a single bond, or a double bond, or absent; X₁, X₅, Y₁ and Y₅ are independently O, NH, NHNH, NR₅, S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH, NHC(O)S, OC(O)N(R₁), N(R₁)C(O)N(R₁), CH, C(O)NHNHC(O) and C(O)NR₁; mAb is antibody; n and m₁ are independently 1-20; R₁, L₁, and L₂ are the same as defined in Claim 1.

25. The compound according to claim 1, wherein the cytotoxic molecule is a Daunorubicin or Doxorubicin analogue, and wherein the compound is selected from structures of Da01, Da02, Da03 Da04, Da05, Da06, Da07 or Da08:

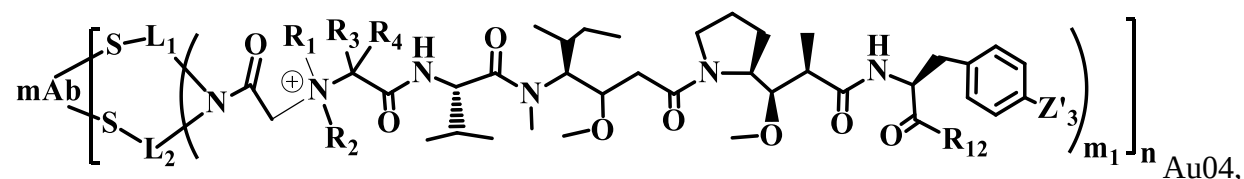
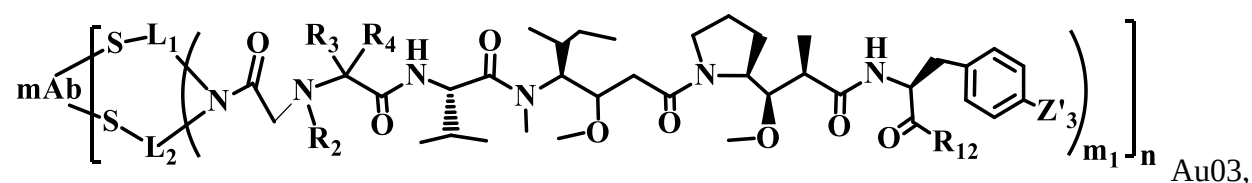
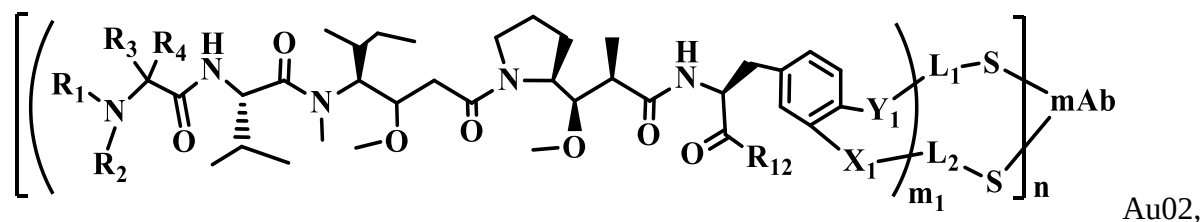


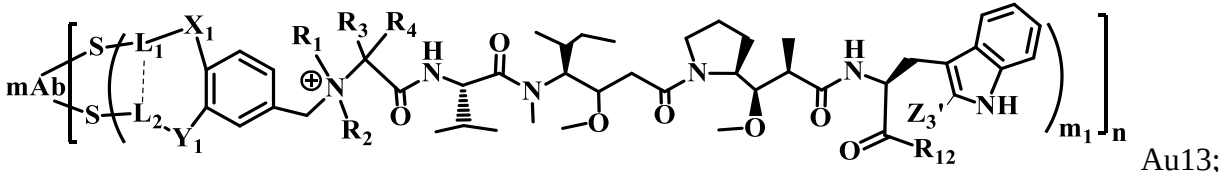
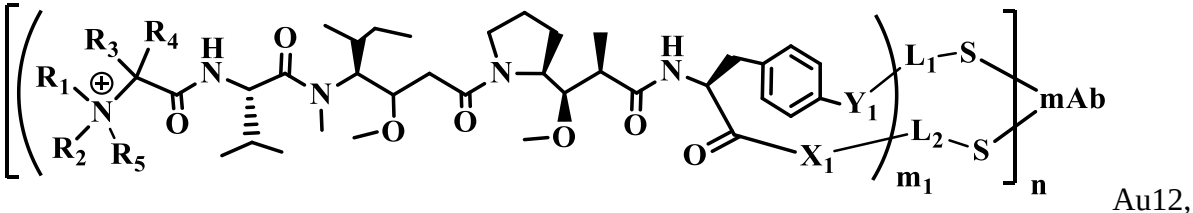
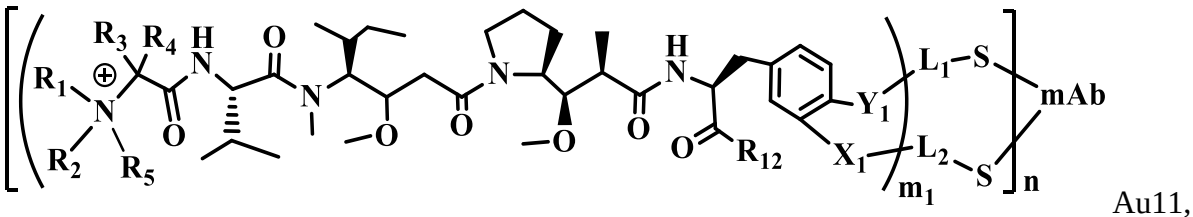
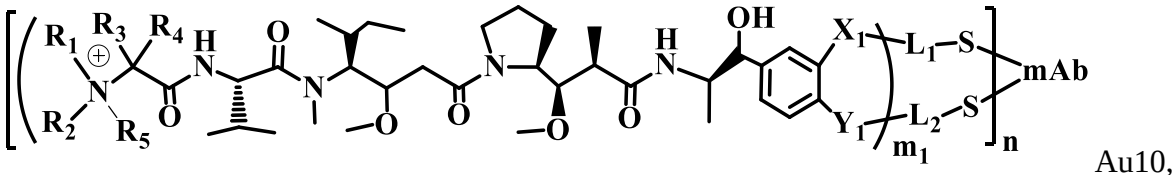
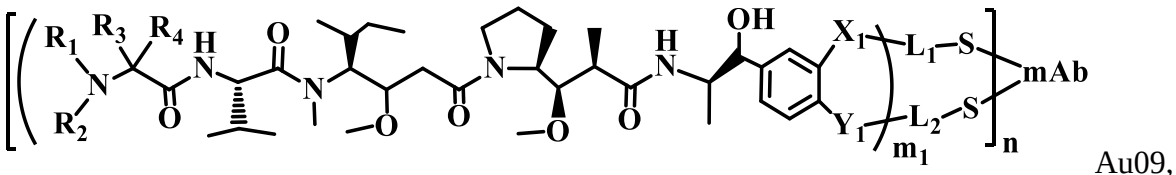
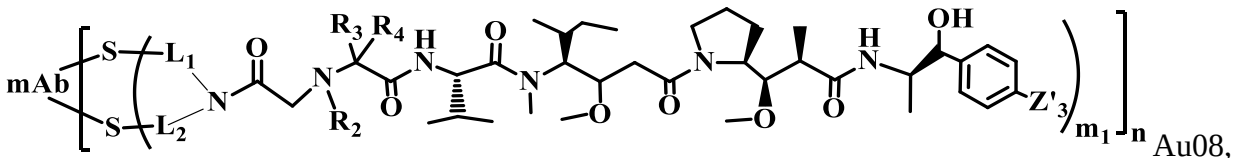
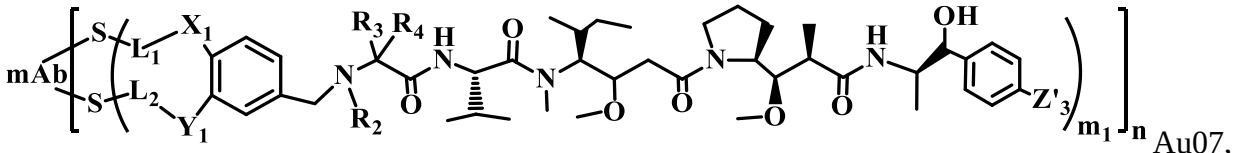
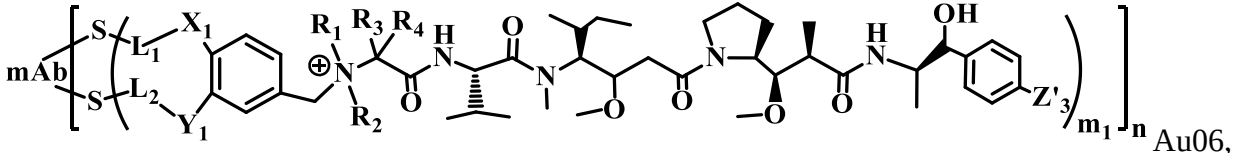
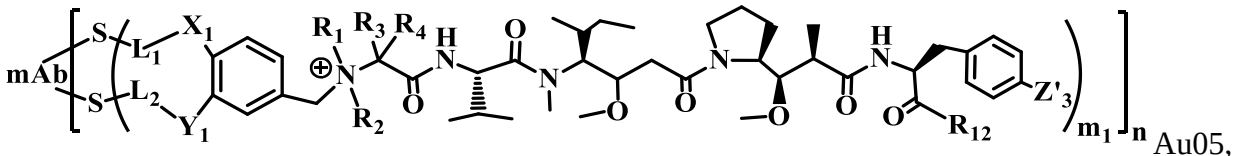


wherein “-----” is optionally either a single bond, or a double bond, or absent; X_1 , and Y_1 are independently O, NH, NHNH, NR_5 , S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH,

$$\left[\begin{array}{c} R_3 \\ R_4 \\ R_1-N-C(=O)-CH(NH-CH(CH_3)_2)-C(=O)-N-CH(CH_3)-CH(OCH_3)-CH_2-C(=O)-N-CH(CH_3)-CH(OCH_3)-CH_2-C(=O)-NH-CH(CH_3)-C(=O)-X_1 \\ R_2 \\ Y_1 \end{array} \right]_{mAb}^{L_1-S}_{L_2-S} \quad m_1 \quad n$$

Au01.

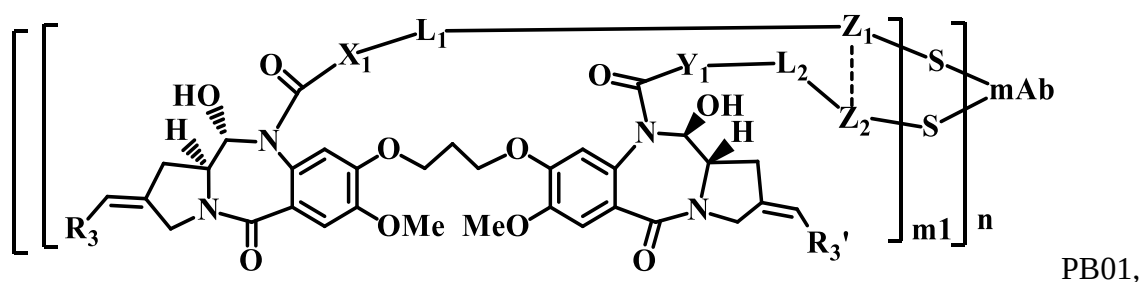




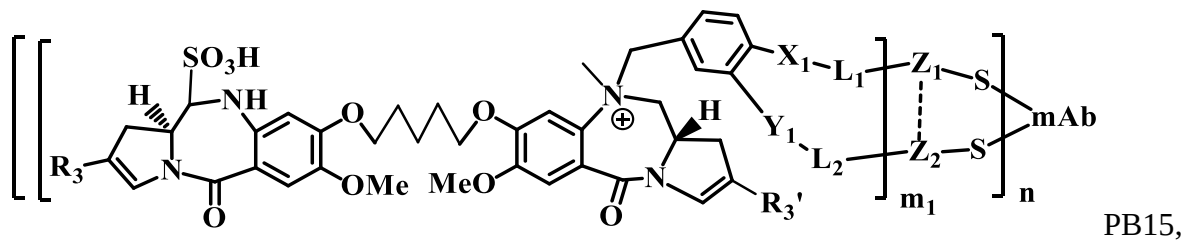
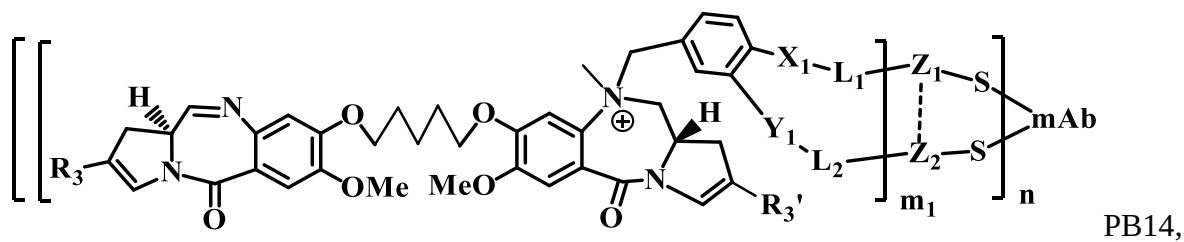
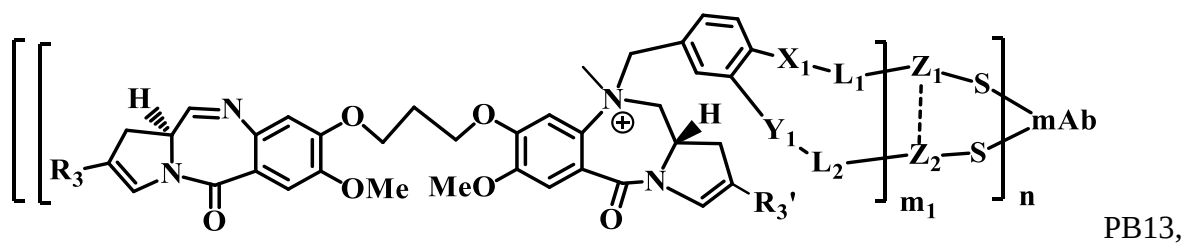
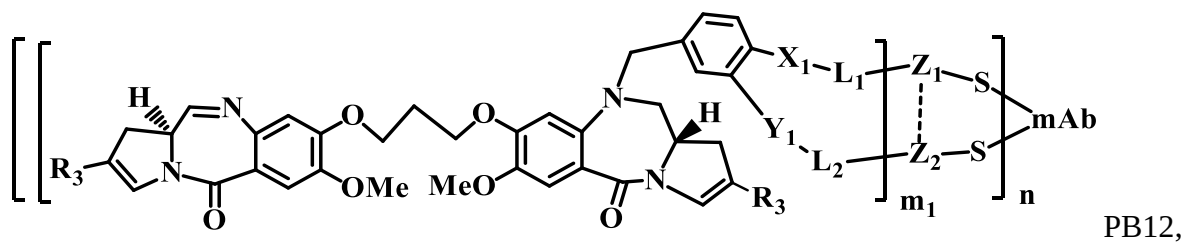
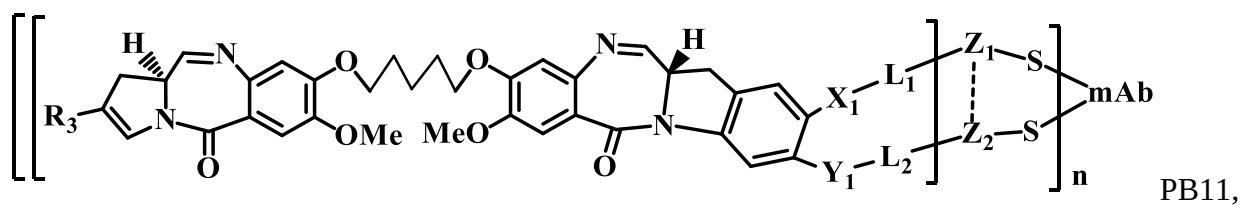
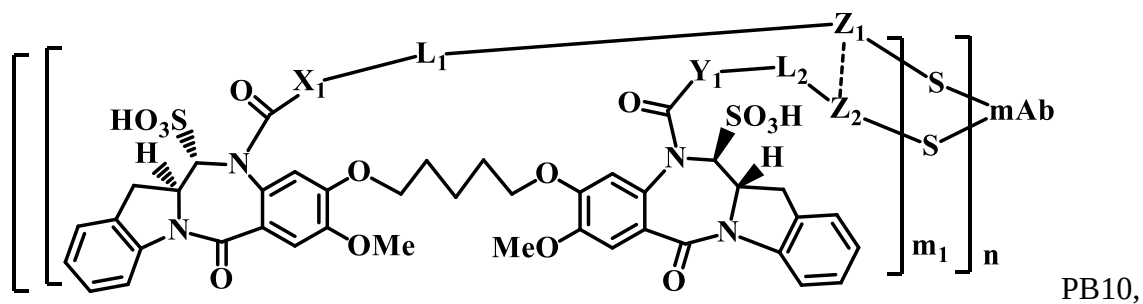
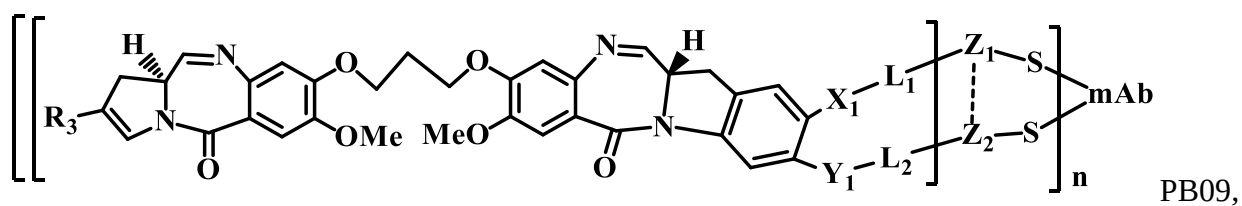
wherein “-----” is optionally either a single bond, or a double bond, or absent; X₁ and Y₁ are independently O, NH, NHHN, NR₅, S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH,

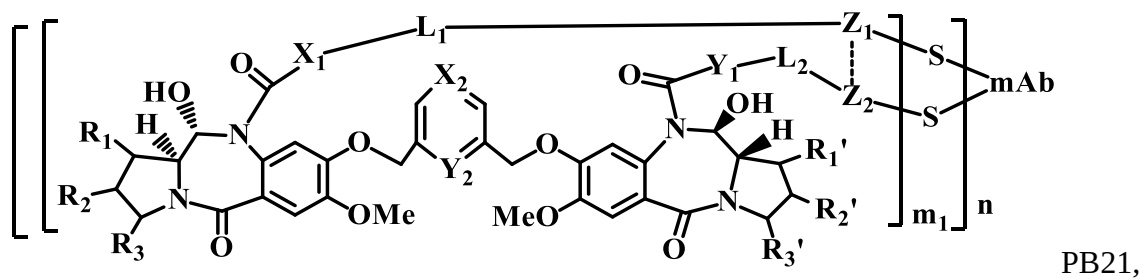
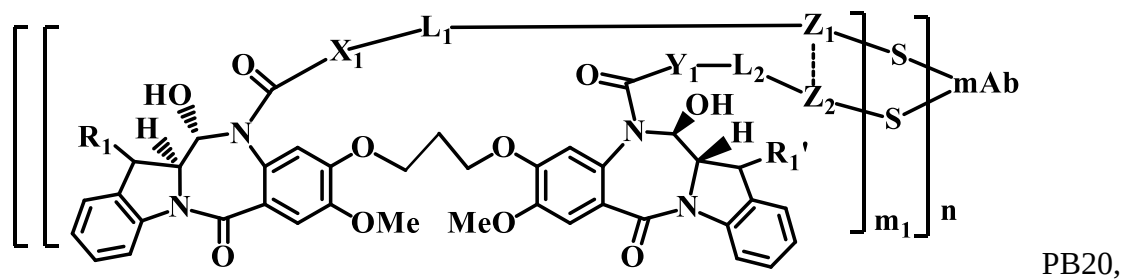
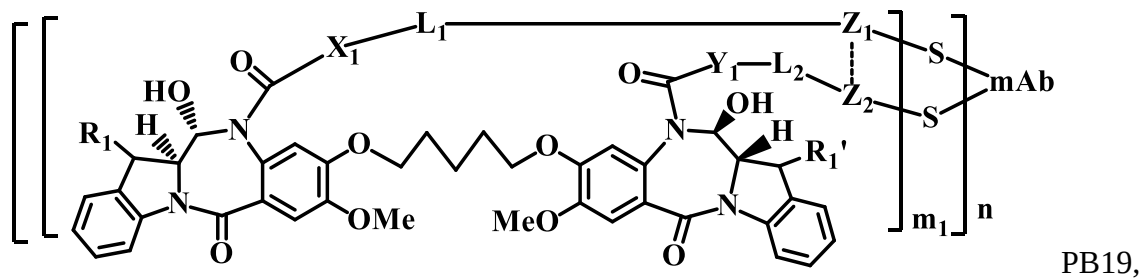
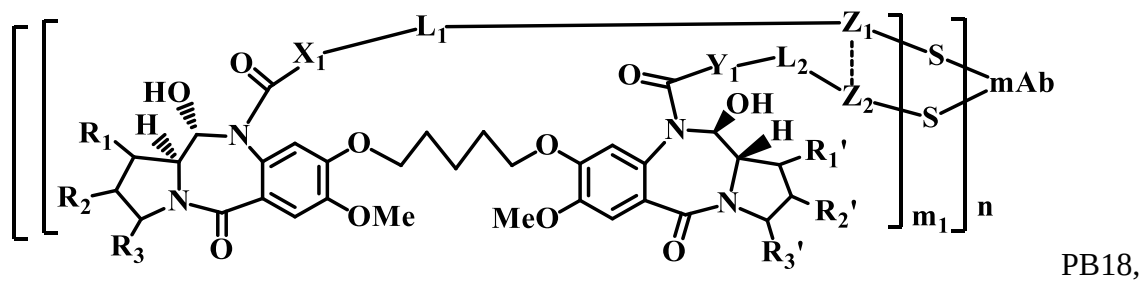
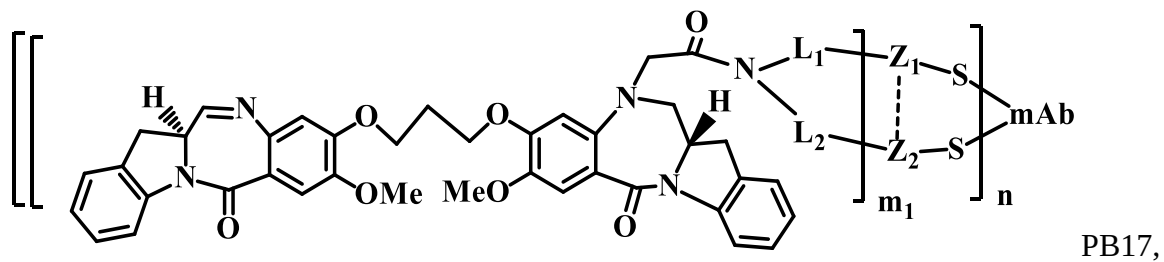
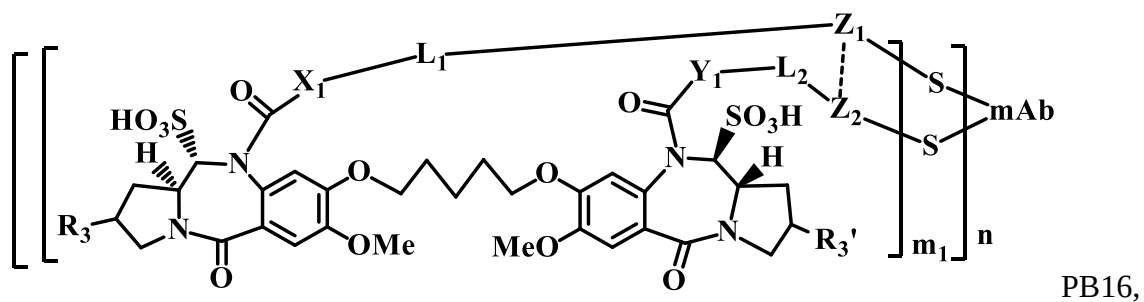
NHC(O)S, OC(O)N(R₁), N(R₁)C(O)N(R₁), CH, C(O)NHNHC(O) and C(O)NR₁; R₁₂ is OH, NH₂, NHR₁, NHNH₂, NHNHCOOH, O-R₁-COOH, NH-R₁-COOH, NH-(Aa)_nCOOH, O(CH₂CH₂O)_pCH₂CH₂OH, O(CH₂CH₂O)_pCH₂CH₂NH₂, NH(CH₂CH₂O)_pCH₂CH₂NH₂, NR₁R₁', NHOH, NHOR₁, O(CH₂CH₂O)_pCH₂CH₂COOH, NH(CH₂CH₂O)_pCH₂CH₂COOH, NH-Ar-COOH, NH-Ar-NH₂, O(CH₂CH₂O)_pCH₂CH₂NHSO₃H, NH(CH₂CH₂O)_pCH₂CH₂NH-SO₃H, R₁-NHSO₃H, NH-R₁-NHSO₃H, O(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, NH(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, OR₁, R₁-NHPO₃H₂, R₁-OPO₃H₂, O(CH₂CH₂O)_pCH₂CH₂OPO₃H₂, OR₁-NHPO₃H₂, NH-R₁-NHPO₃H₂, NH(CH₂CH₂NH)_pCH₂CH₂NH₂, NH(CH₂CH₂S)_pCH₂CH₂NH₂, NH(CH₂CH₂NH)_pCH₂CH₂OH, NH(CH₂CH₂S)_pCH₂CH₂OH, NH-R₁-NH₂, or NH(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, wherein Aa is 1-8 amino acids; p is 1-5000; mAb is antibody; n and m₁ are independently 1-20; p is 1-5000; R₁, R₂, R₃, and R₄ are independently H; C₁-C₈ lineal or branched alkyl, aryl, heteroaryl, heteroalkyl, alkylcycloalkyl, ester, ether, amide, amines, heterocycloalkyl, or acyloxylamines; or peptides containing 1-8 amino acids, or polyethyleneoxy unit having formula (OCH₂CH₂)_p or (OCH₂CH(CH₃))_p, wherein p is an integer from 1 to about 5000; The two Rs: R₁R₂, R₂R₃, R₁R₃ or R₃R₄ can form 3~8 member cyclic ring of alkyl, aryl, heteroaryl, heteroalkyl, or alkylcycloalkyl group; X₃ is H, CH₃ or X₁'R₁', wherein X₁' is NH, N(CH₃), NHNH, O, or S, and R₁' is H or C₁-C₈ lineal or branched alkyl, aryl, heteroaryl, heteroalkyl, alkylcycloalkyl, acyloxylamines; R₃' is H or C₁-C₆ lineal or branched alkyl; Z₃' is H, COOR₁, NH₂, NHR₁, OR₁, CONHR₁, NHCOR₁, OCOR₁, OP(O)(OM₁)(OM₂), OCH₂OP(O)(OM₁)(OM₂), OSO₃M₁, R₁, or O-glycoside (glucoside, galactoside, mannoside, glucuronoside/glucuronide, alloside, fructoside), NH-glycoside, S-glycoside or CH₂-glycoside; M₁ and M₂ are independently H, Na, K, Ca, Mg, NH₄, NR₁R₂R₃; L₁, and L₂ are the same as defined in Claim 1.

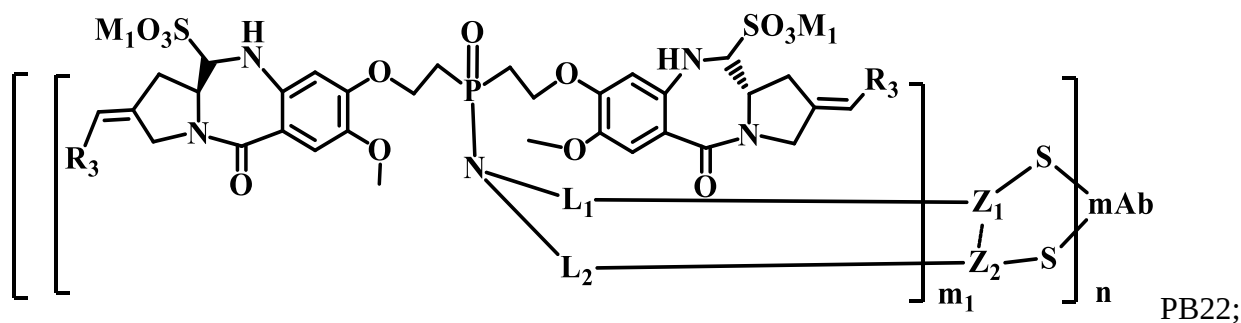
27. The compound according to claim 1, wherein the cytotoxic molecule is a dimer of benzodiazepine analogues, and wherein the compound is selected from structures of PB01, PB02, PB03, PB04, PB05, PB06, PB07, PB08, PB09, PB10, PB11, PB12, PB13, PB14, PB15, PB16, PB17, PB18, PB19, PB20, PB21 or PB22:





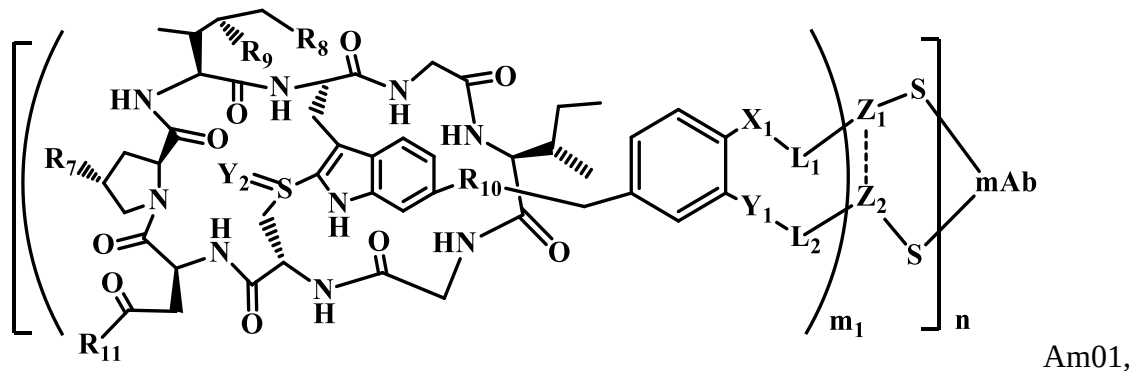


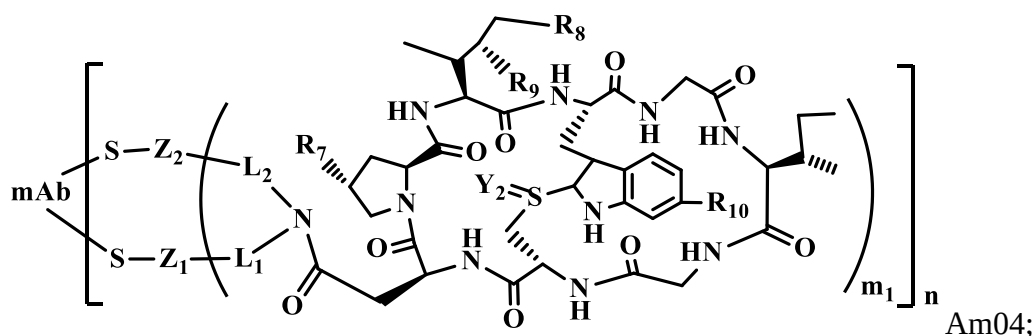
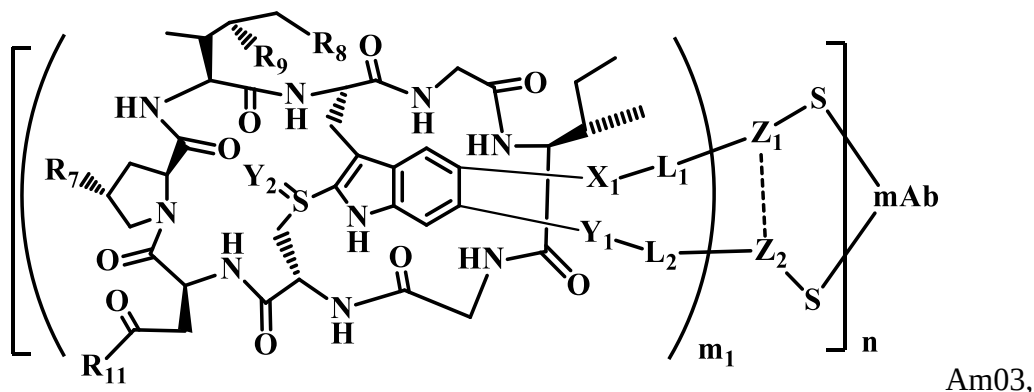
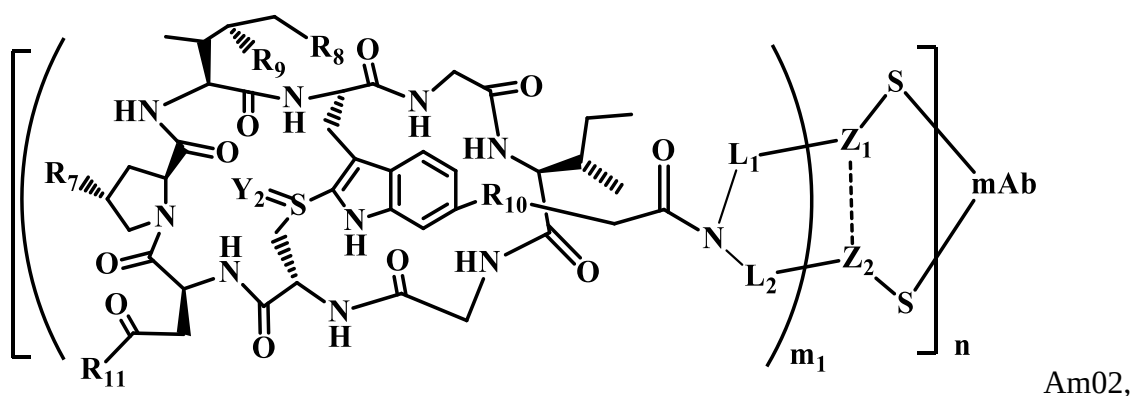




wherein “-----” is optionally either a single bond, or a double bond, or absent; X_1 and Y_1 are independently O, NH, NHNH, NR_5 , S, $C(O)O$, $C(O)NH$, $OC(O)NH$, $OC(O)O$, $NHC(O)NH$, $NHC(O)S$, $OC(O)N(R_1)$, $N(R_1)C(O)N(R_1)$, CH, $C(O)NHNHC(O)$ and $C(O)NR_1$; mAb is antibody; n and m_1 are independently 1-20; L_1 , L_2 , Z_1 , and Z_2 , are the same defined in Claim 1; R_1 , R_2 , R_3 , R_1' , R_2' , and R_3' are independently H; F; Cl; =O; =S; OH; SH; C_1 - C_8 linear or branched alkyl, aryl, alkenyl, heteroaryl, heteroalkyl, alkylcycloalkyl, ester ($COOR_5$ or $-OC(O)R_5$), ether (OR_5), amide ($CONR_5$), carbamate ($OCONR_5$), amines (NHR_5 , NR_5R_5'), heterocycloalkyl, or acyloxylamines ($-C(O)NHOH$, $-ONHC(O)R_5$); or a peptide containing 1-8 natural or unnatural amino acids; or a polyethyleneoxy unit of formula $(OCH_2CH_2)_p$ or $(OCH_2CH(CH_3))_p$, wherein p is an integer from 1 to about 5000; the two Rs: R_1R_2 , R_2R_3 , R_1R_3 , $R_1'R_2'$, $R_2'R_3'$, or $R_1'R_3'$ can independently form 3-8 member cyclic ring of alkyl, aryl, heteroaryl, heteroalkyl, or alkylcycloalkyl group; X_2 and Y_2 are independently N, CH_2 or CR_5 , wherein R_5 is H, OH, NH_2 , $NH(CH_3)$, $NHNH_2$, $COOH$, SH, OZ_3 , SZ_3 , or C_1 - C_8 lineal or branched alkyl, aryl, heteroaryl, heteroalkyl, alkylcycloalkyl, acyloxylamines; Z_3 is H, $OP(O)(OM_1)(OM_2)$, $OCH_2OP(O)(OM_1)(OM_2)$, OSO_3M_1 , or O-glycoside (glucoside, galactoside, mannoside, glucuronoside/glucuronide, alloside, fructoside), NH-glycoside, S-glycoside or CH_2 -glycoside; M_1 and M_2 are independently H, Na, K, Ca, Mg, NH_4 , $NR_1R_2R_3$.

28. The compound according to claim 1, wherein the cytotoxic molecule is an amanitin analogue, and wherein the compound is selected from structures of Am01, Am02, Am03, or Am04:

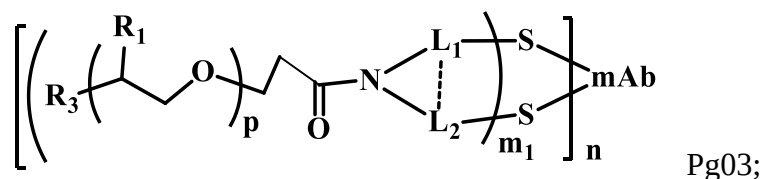
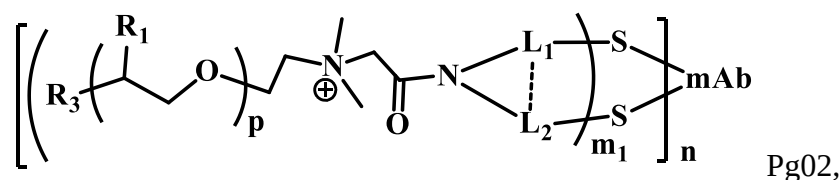
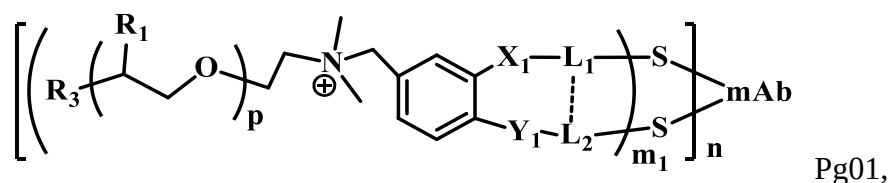




wherein “-----” is optionally either a single bond, or a double bond, or can optionally be absent; X_1 and Y_1 are independently O, NH, NHNH, NR_5 , S, $C(O)O$, $C(O)NH$, $OC(O)NH$, $OC(O)O$, $NHC(O)NH$, $NHC(O)S$, $OC(O)N(R_1)$, $N(R_1)C(O)N(R_1)$, CH, $C(O)NHNHC(O)$ and $C(O)NR_1$; mAb is antibody, preferably monoclonal antibody; n and m_1 are independently 1-20; R_7 , R_8 , and R_9 are independently H, OH, OR_1 , NH_2 , NHR_1 , C_1 - C_6 alkyl, or absent; Y_2 is O, O_2 , NR_1 , NH, or absent; R_{10} is CH_2 , O, NH, NR_1 , $NHC(O)$, $NHC(O)NH$, $NHC(O)O$, $OC(O)O$, $C(O)$, $OC(O)$, $OC(O)(NR_1)$, $(NR_1)C(O)(NR_1)$, $C(O)R_1$ or absent; R_{11} is OH, NH_2 , NHR_1 , $NHNH_2$, $NHNHCOOH$, $O-R_1-COOH$, $NH-R_1-COOH$, $NH-(Aa)_nCOOH$, $O(CH_2CH_2O)_pCH_2CH_2OH$, $O(CH_2CH_2O)_pCH_2CH_2NH_2$, $NH(CH_2CH_2O)_pCH_2CH_2NH_2$, NR_1R_1' , $O(CH_2CH_2O)_pCH_2CH_2COOH$, $NH(CH_2CH_2O)_pCH_2CH_2COOH$, $NH-Ar-COOH$, $NH-Ar-NH_2$, $O(CH_2CH_2O)_pCH_2CH_2NHSO_3H$, $NH(CH_2CH_2O)_pCH_2CH_2NHSO_3H$, R_1-NHSO_3H , $NH-R_1-NHSO_3H$, $O(CH_2CH_2O)_pCH_2CH_2NHPO_3H_2$, $NH(CH_2CH_2O)_pCH_2CH_2NHPO_3H_2$, OR_1 , $R_1-NHPO_3H_2$, $R_1-OPO_3H_2$, $O(CH_2CH_2O)_pCH_2CH_2OPO_3H_2$, $OR_1-NHPO_3H_2$, $NH-R_1-$

NHPO₃H₂, or NH(CH₂CH₂O)_pCH₂CH₂NHPO₃H₂, wherein Aa is 1-8 amino acids; n and m₁ are independently 1-20; p is 1-5000; R₁, L₁, and L₂ are the same defined in Formula (I); L₁, L₂, R₁, Z₁, and Z₂, are the same as defined in Claim 1.

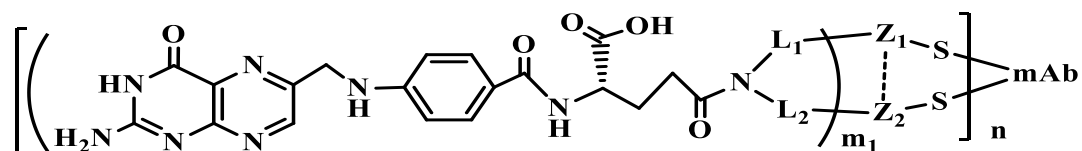
29. The compound according to claim 1 or claim 12, wherein the cytotoxic molecule is a polyalkylene glycol analog, and wherein the compound is selected from structures of Pg01, Pg02, or Pg03:



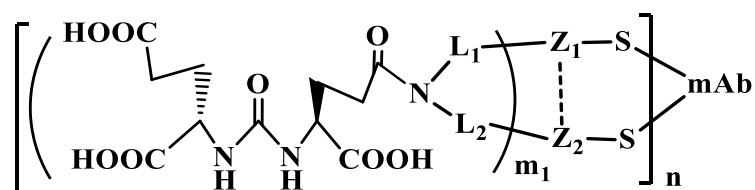
wherein “-----” is a single bond, a double bond, or absent; X₁, and Y₁ are independently O, NH, NHNH, NR₅, S, C(O)O, C(O)NH, OC(O)NH, OC(O)O, NHC(O)NH, NHC(O)S, OC(O)N(R₁), N(R₁)C(O)N(R₁), CH, C(O)NHNHC(O) and C(O)NR₁; mAb is antibody; n and m₁ are independently 1-20; p is 1-5000; R₁ and R₃ is H, OH, OCH₃, CH₃, or OC₂H₅ independently; L₁, and L₂ are the same as defined in Claim 1.

30. The compound according to claim 1, wherein the cytotoxic molecule is a cell-binding ligand or cell receptor agonist or their analogs, and wherein the conjugate compound is selected from structures of: LB01 (Folate conjugate), LB02 (PMSA ligand conjugate), LB03 (PMSA ligand conjugate), LB04 (PMSA ligand conjugate), LB05 (Somatostatin conjugate), LB06 (Somatostatin conjugate), LB07 (Octreotide, a Somatostatin analog conjugate), LB08 (Lanreotide, a Somatostatin analog conjugate), LB09 (Vapreotide (Sanvar), a Somatostatin analog conjugate), LB10 (CAIX ligand conjugate), LB11 (CAIX ligand conjugate), LB12 (Gastrin releasing peptide receptor (GRPr), MBA conjugate), LB13 (luteinizing hormone-releasing hormone (LH-RH) ligand and GnRH conjugate), LB14 (luteinizing hormone-releasing hormone (LH-RH) and GnRH ligand conjugate), LB15 (GnRH antagonist, Abarelix conjugate),

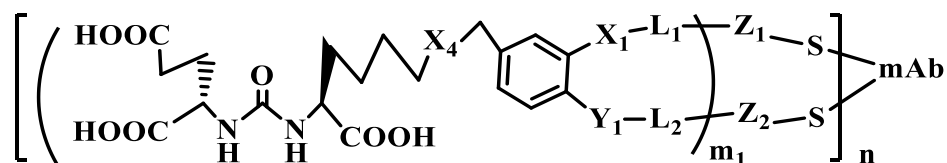
LB16 (cobalamin, vitamin B12 analog conjugate), LB17 (cobalamin, vitamin B12 analog conjugate), LB18 (for $\alpha_v\beta_3$ integrin receptor, cyclic RGD pentapeptide conjugate), LB19 (hetero-bivalent peptide ligand conjugate for VEGF receptor), LB20 (Neuromedin B conjugate), LB21 (bombesin conjugate for a G-protein coupled receptor), LB22 (TLR₂ conjugate for a Toll-like receptor), LB23 (for an androgen receptor), LB24 (Cilengitide/cyclo(-RGDfV-) conjugate for an α_v integrin receptor, LB23 (Fludrocortisone conjugate), LB25 (Rifabutin analog conjugate), LB26 (Rifabutin analog conjugate), LB27 (Rifabutin analog conjugate), LB28 (Fludrocortisone conjugate), LB29 (Dexamethasone conjugate), LB30 (fluticasone propionate conjugate), LB31 (Beclometasone dipropionate conjugate), LB32 (Triamcinolone acetonide conjugate), LB33 (Prednisone conjugate), LB34 (Prednisolone conjugate), LB35 (Methylprednisolone conjugate), LB36 (Betamethasone conjugate), LB37 (Irinotecan analog conjugate), LB38 (Crizotinib analog conjugate), LB39 (Bortezomib analog conjugate), LB40 (Carfilzomib analog conjugate), LB41 (Carfilzomib analog conjugate), LB42 (Leuprolide analog conjugate), LB43 (Triptorelin analog conjugate), LB44 (Clindamycin conjugate), LB45 (Liraglutide analog conjugate), LB46 (Semaglutide analog conjugate), LB47 (Retapamulin analog conjugate), LB48 (Indibulin analog conjugate), LB49 (Vinblastine analog conjugate), LB50 (Lixisenatide analog conjugate), LB51 (Osimertinib analog conjugate) LB52 (a nucleoside analog conjugate), LB53 (Erlotinib analog conjugate) or LB54 (Lapatinib analog conjugate) which are shown in the following structures:



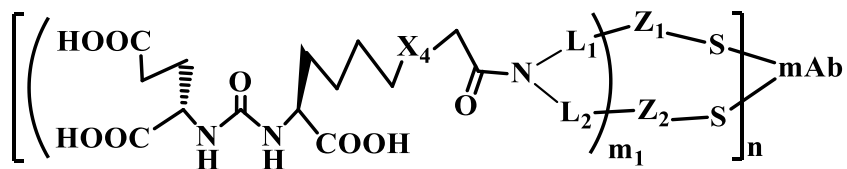
LB01 (Folate conjugate),



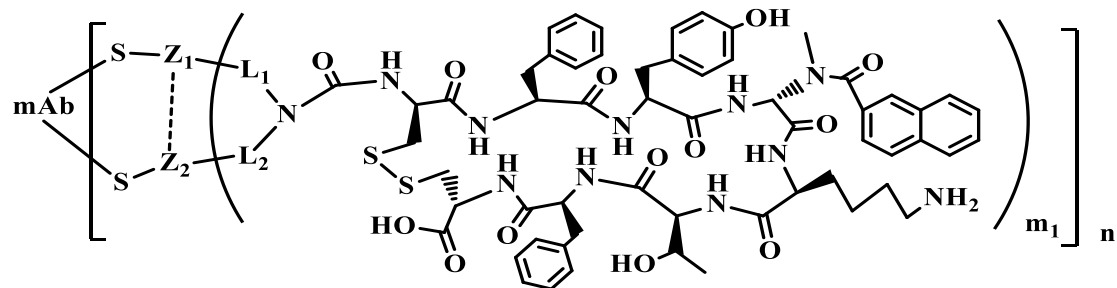
LB02 (PMSA ligand conjugate),



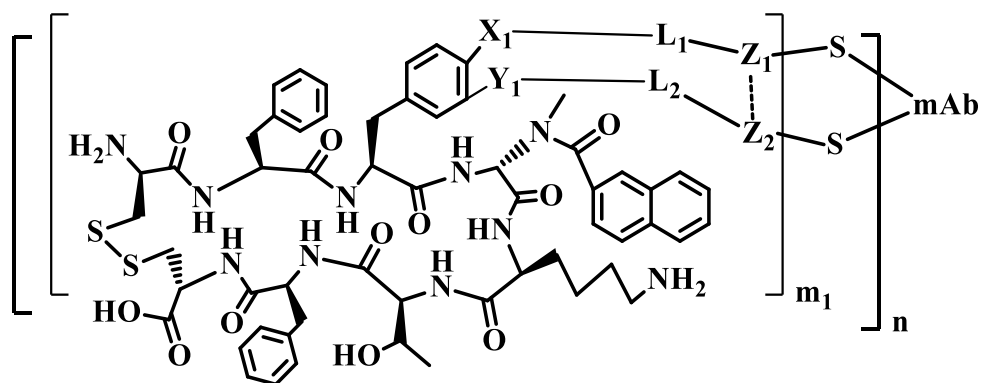
LB03 (PMSA ligand conjugate),



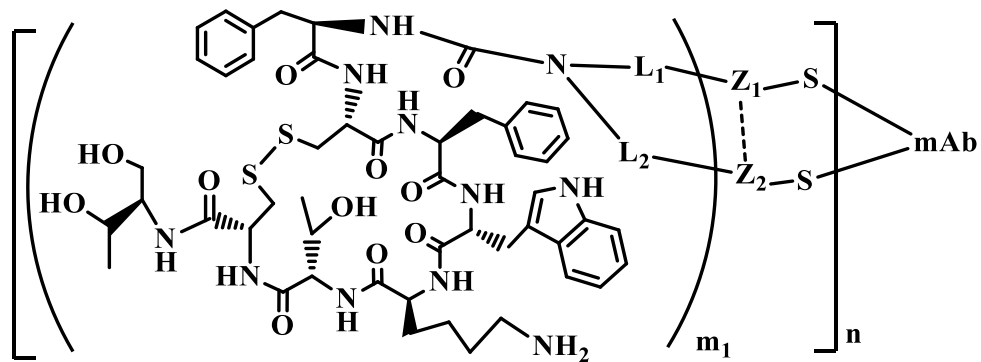
LB04 (PMSA ligand conjugate),



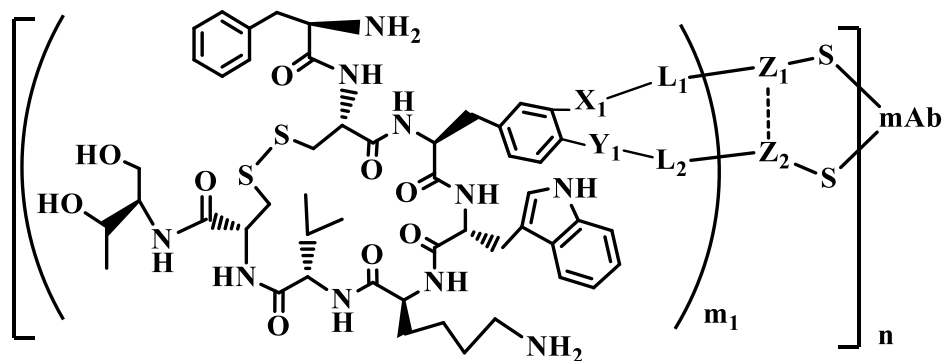
LB05 (Somatostatin conjugate),



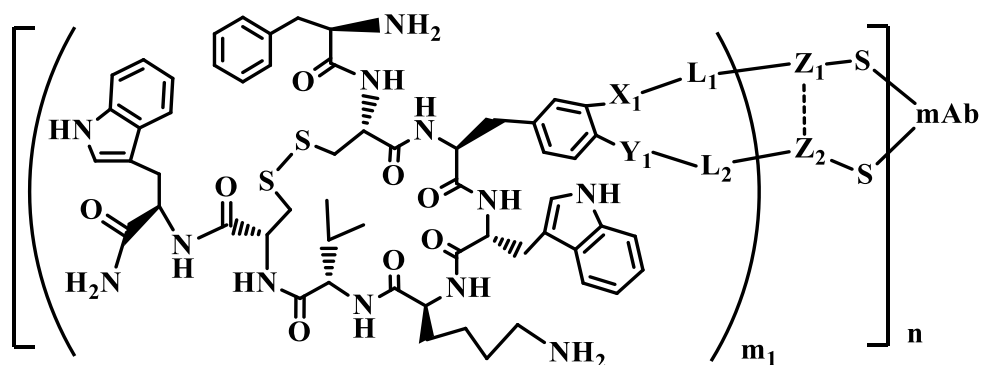
LB06 (Somatostatin conjugate),



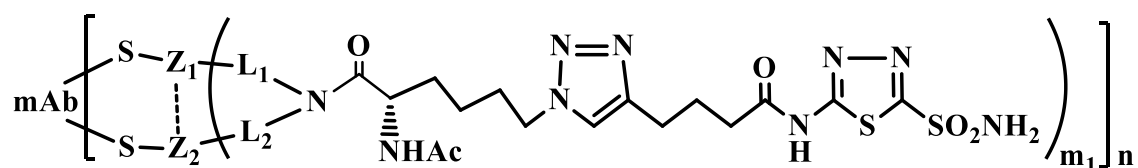
LB07 (Octreotide, a Somatostatin analog conjugate),



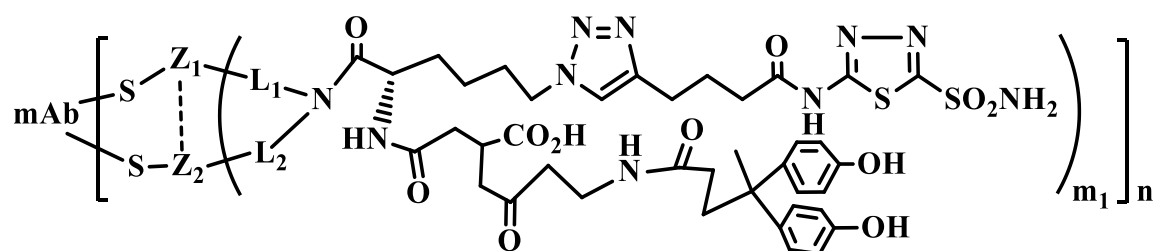
LB08 (Lanreotide, a Somatostatin analog conjugate),



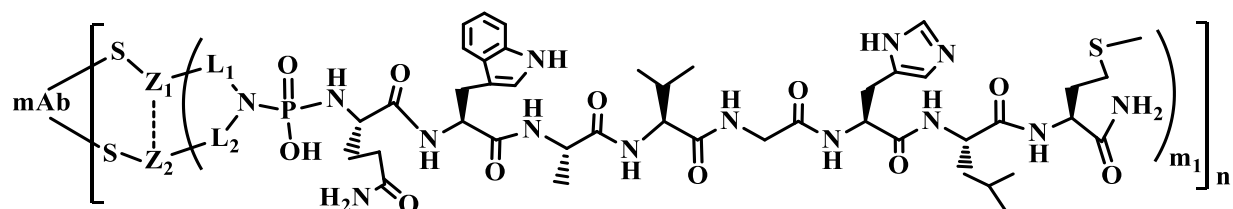
LB09 (Vapreotide (Sanvar), a Somatostatin analog conjugate),



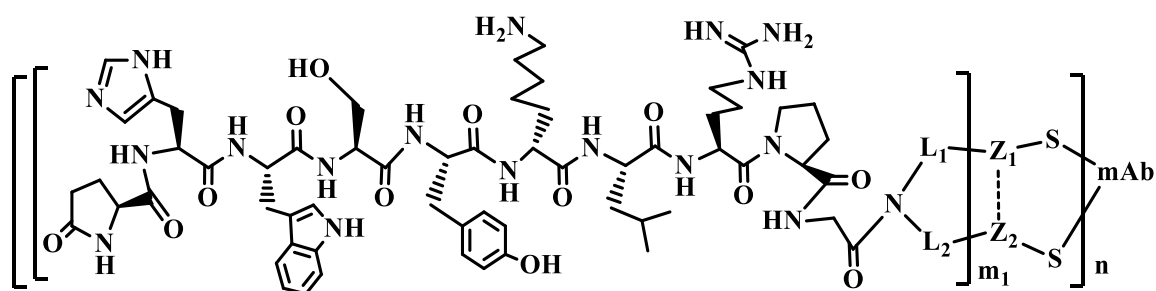
LB10 (CAIX ligand conjugate),



LB11 (CAIX ligand conjugate),

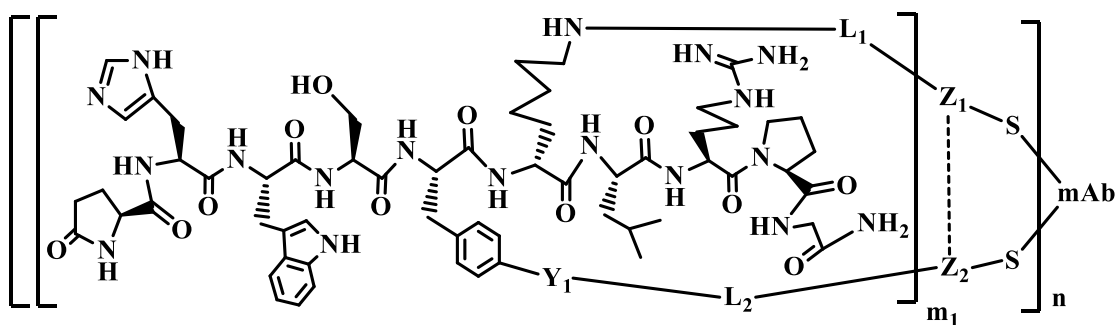


LB12 (Gastrin releasing peptide receptor (GRPr), MBA conjugate),

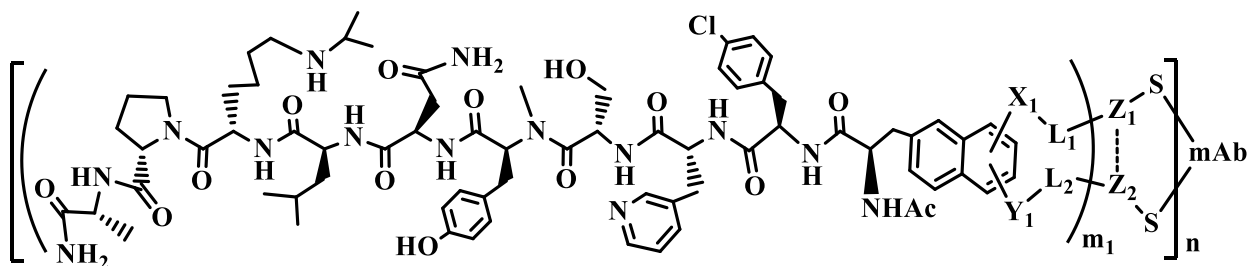


LB13

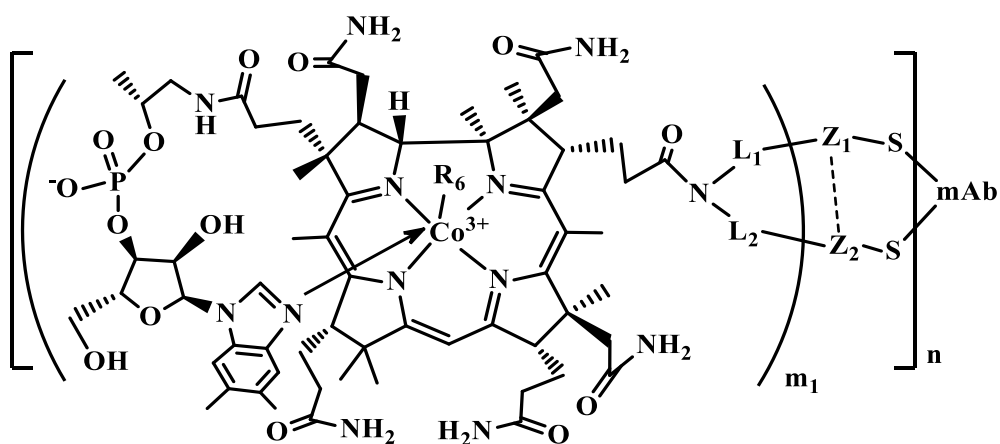
(luteinizing hormone-releasing hormone (LH-RH) ligand and GnRH conjugate),



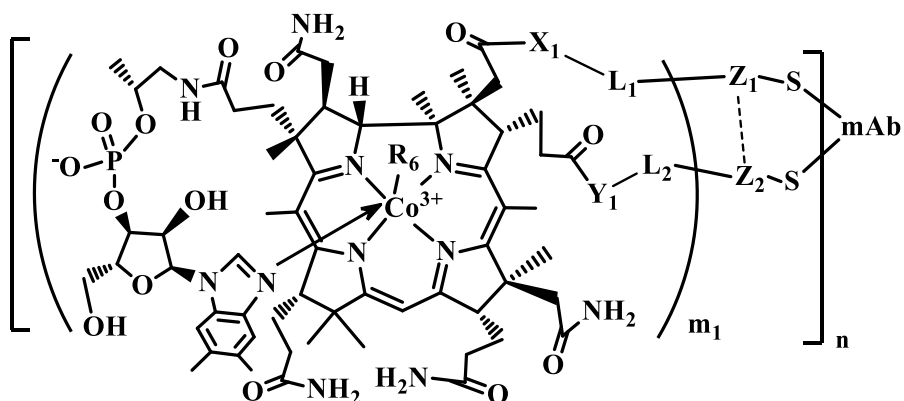
LB14 (luteinizing hormone-releasing hormone (LH-RH) and GnRH ligand conjugate),



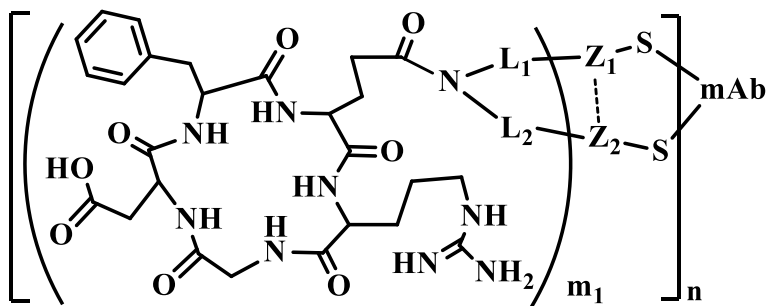
LB15 (GnRH antagonist, Abarelix conjugate),



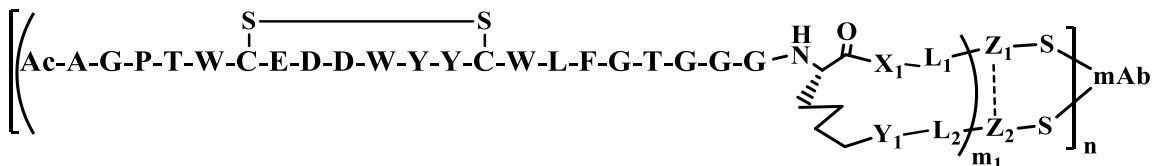
LB16 (cobalamin, vitamin B12 analog conjugate),



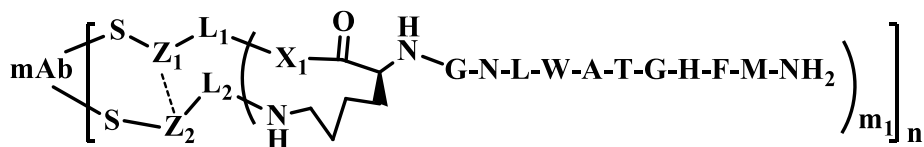
LB17 (cobalamin, vitamin B12 analog conjugate),



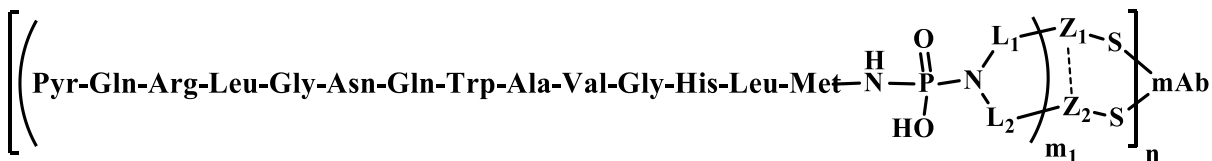
LB18 (for $\alpha_v\beta_3$ integrin receptor, cyclic RGD pentapeptide conjugate),



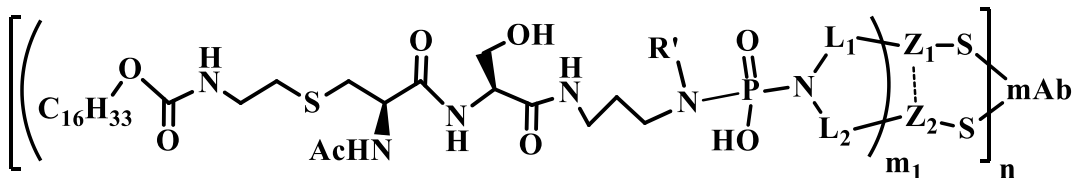
LB19 (hetero-bivalent peptide ligand conjugate for VEGF receptor),



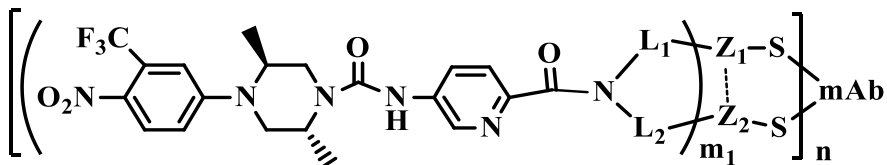
LB20 (Neuromedin B conjugate),



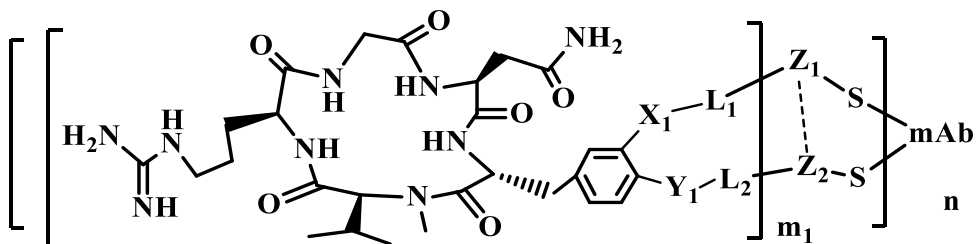
LB21 (bombesin conjugate for a G-protein coupled receptor),



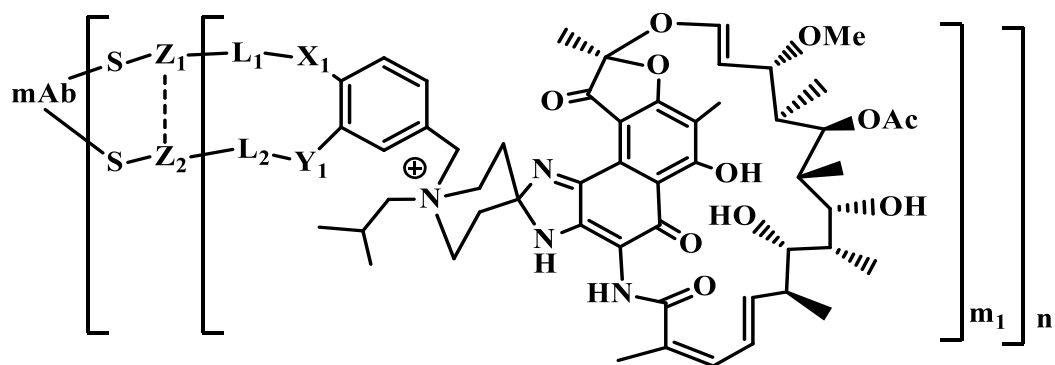
LB22 (TLR₂ conjugate for a Toll-like receptor),



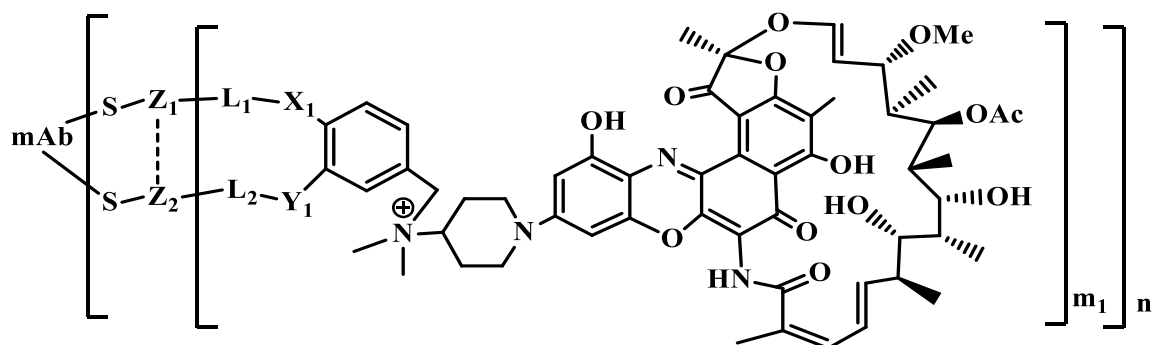
LB23 (an androgen receptor),



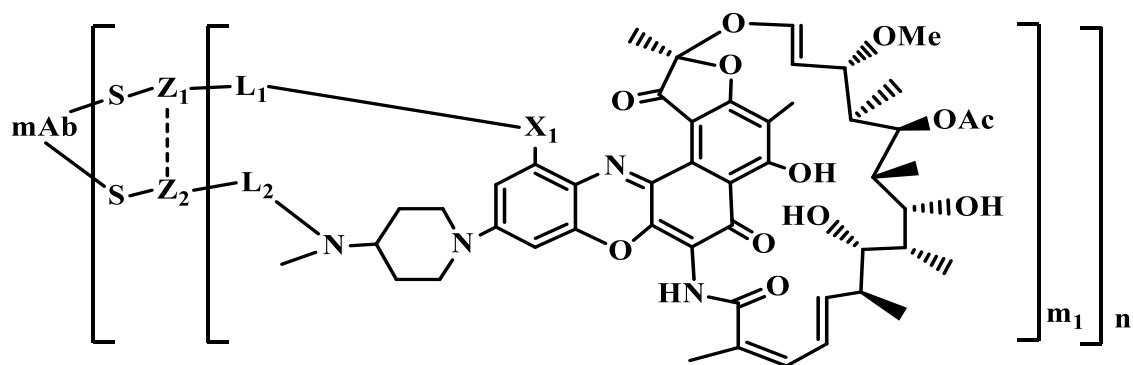
LB24 (Cilengitide/cyclo(-RGDfV-) conjugate for an α_v integrin receptor),



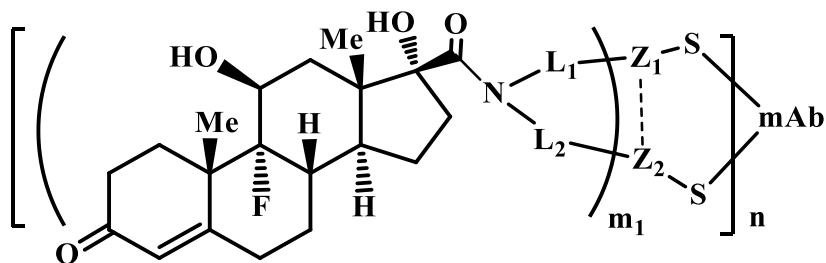
LB25 (Rifabutin analog conjugate),



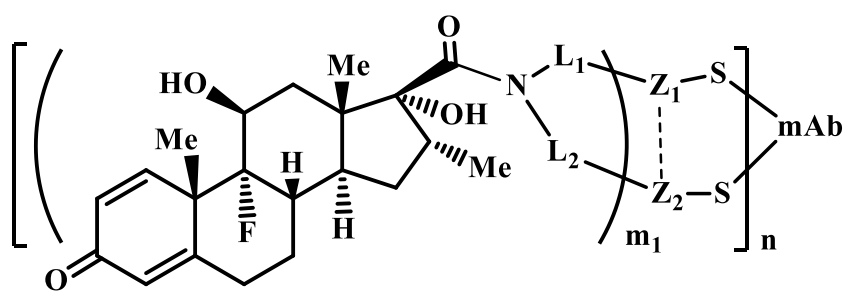
LB26 (Rifabutin analog conjugate),



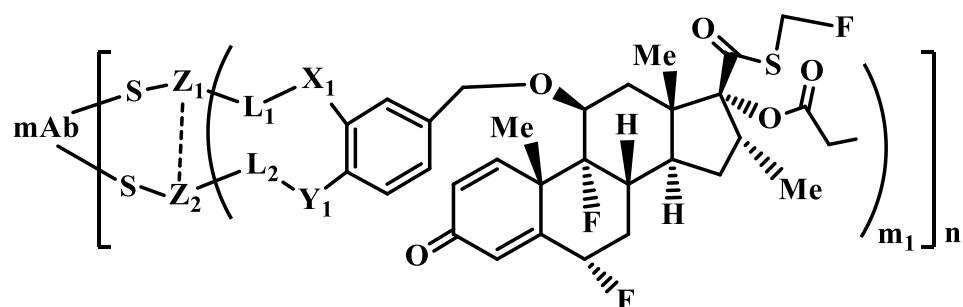
LB27 (Rifabutin analog conjugate),



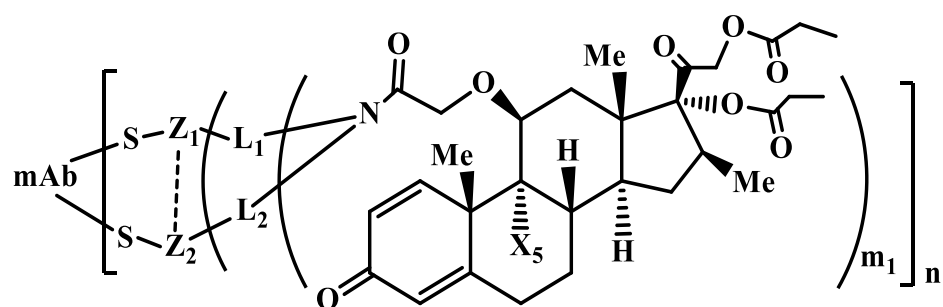
LB28 (Fludrocortisone conjugate),



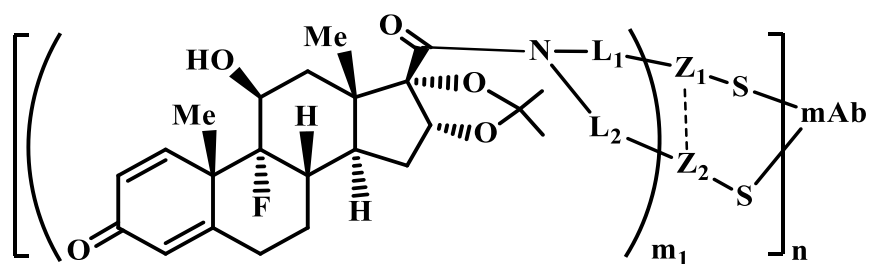
LB29 (Dexamethasone conjugate),



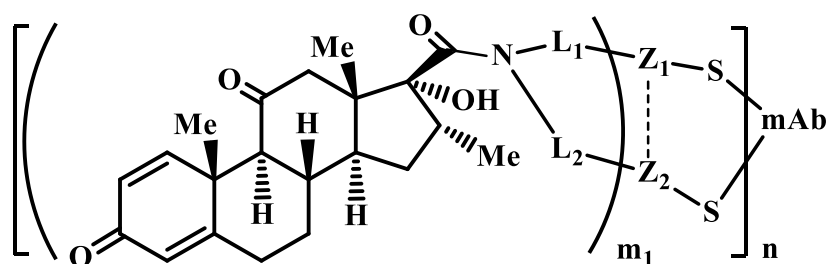
LB30 (fluticasone propionate conjugate),



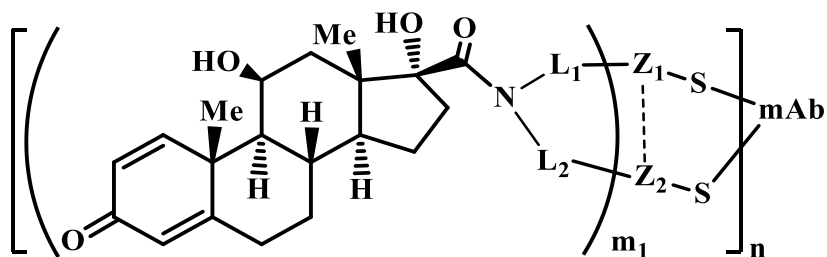
LB31 (Beclometasone dipropionate),



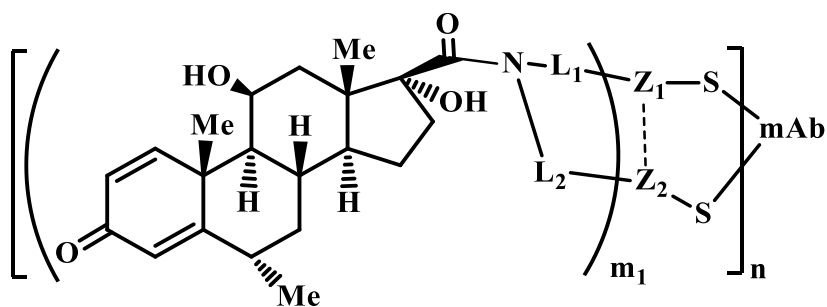
LB32 (Triamcinolone acetonide conjugate),



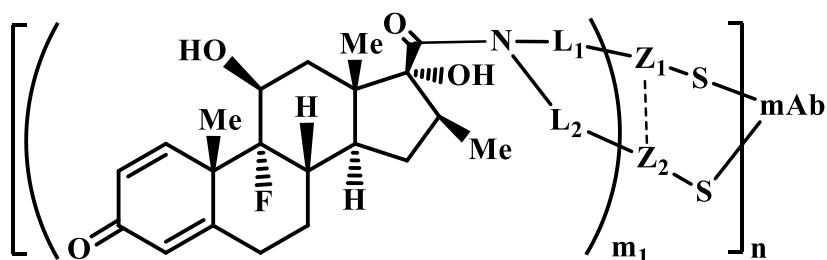
LB33 (Prednisone conjugate),



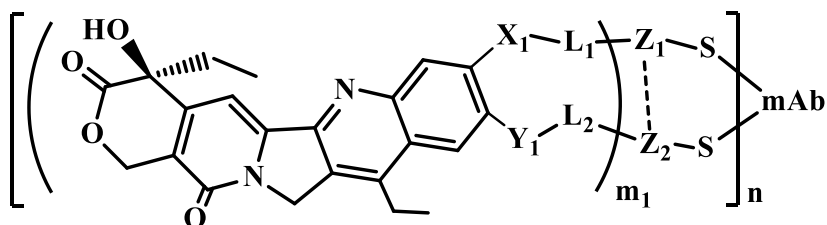
LB34 (Prednisolone conjugate),



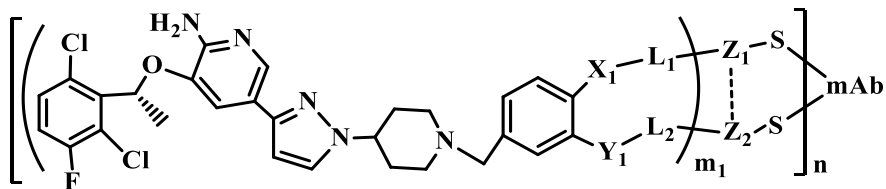
LB35 (Methylprednisolone conjugate),



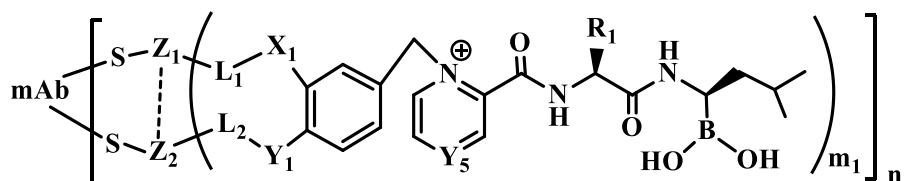
LB36 (Betamethasone conjugate),

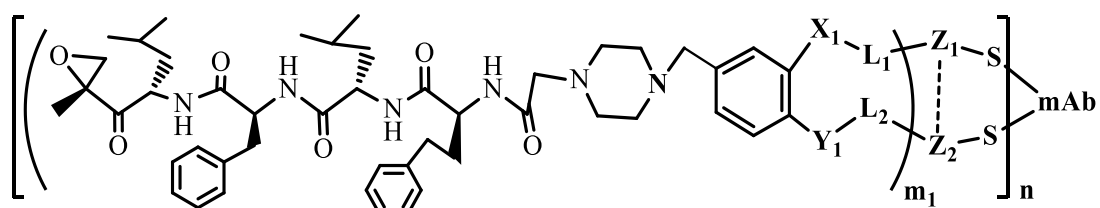


LB37 (Irinotecan analog),

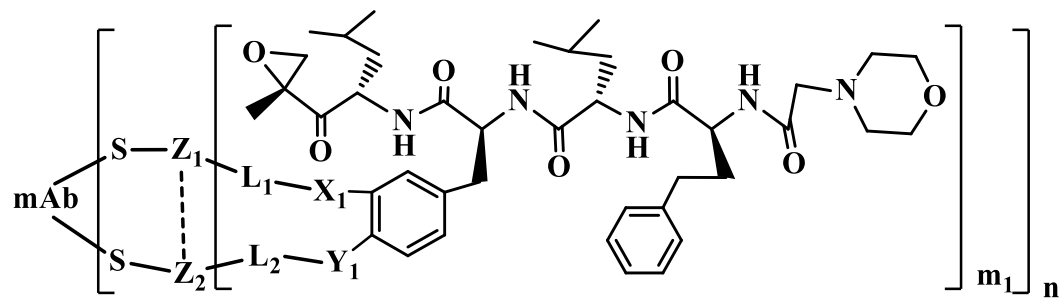


LB38 (Crizotinib analog conjugate),

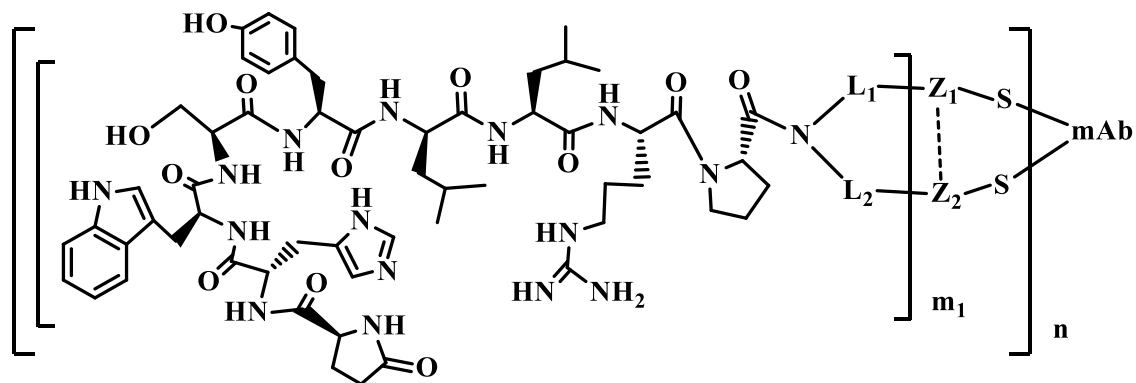
LB39 (Bortezomib analog conjugate), wherein Y₅ is N, CH, C(Cl), C(CH₃), or C(COOR₁); R₁ is H, C₁-C₆ Alkyl, or C₃-C₈ Ar,



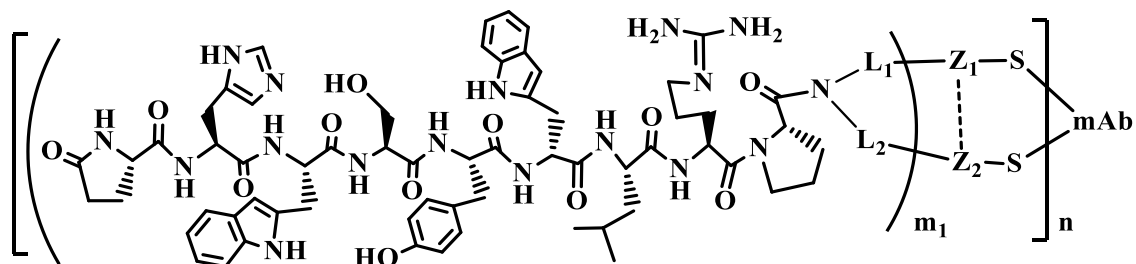
LB40 (Carfilzomib analog conjugate),



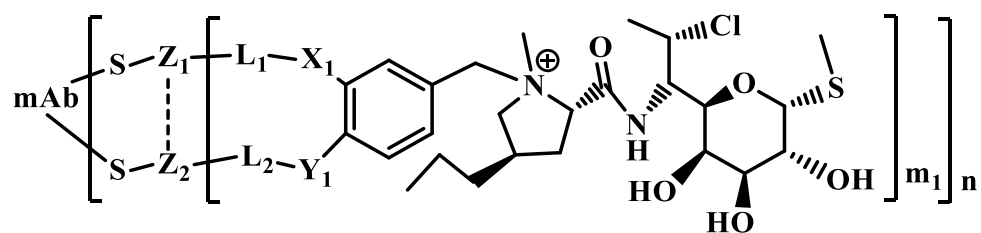
LB41 (Carfilzomib analog conjugate),



LB42 (Leuprolide analog conjugate),



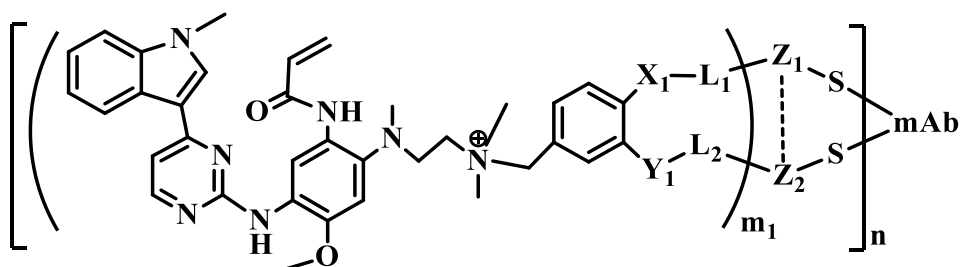
LB43 (Triptorelin analog conjugate),



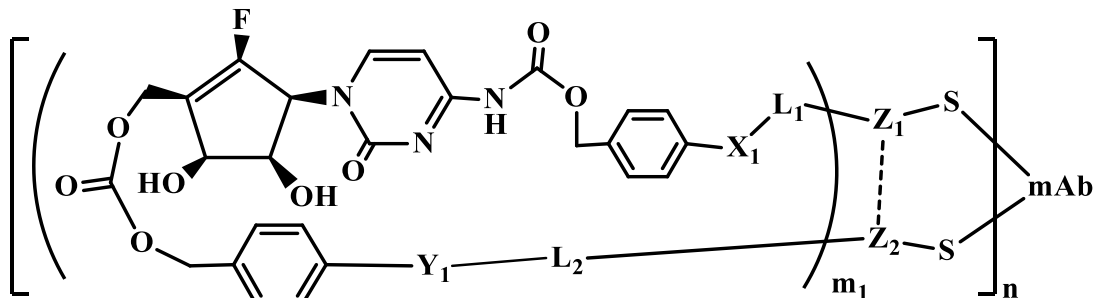
LB44 (Clindamycin conjugate),

$$mAb \left[\begin{array}{c} S - (Z_1 - L_1 - \text{HN-H-AIB-Q-G-T-F-T-S-D} \\ S - (Z_2 - L_2 - \text{H-N} \begin{array}{c} \diagup \text{K-A-A-Q-G-Q-L-Y-S-S-V} \\ \diagdown \text{Q-F-I-A-W-L-V-R-G-R-G-COOH} \end{array} \end{array} \right)_{m_1} \right]_n$$
$$\left[\text{mAb} \left[\begin{array}{c} \text{S}-\text{Z}_1-\text{L}_1-\text{X}_1 \\ \vdots \\ \text{S}-\text{Z}_2-\text{L}_2-\text{Y}_1 \end{array} \right] \text{C}_6\text{H}_4 \text{CH}_2 \text{N}^+ \text{C}_{10}\text{H}_{15} \text{S} \text{CH}_2 \text{C}(=\text{O}) \text{O} \text{C}_{15}\text{H}_{25}\text{O}_2 \right]_{m_1} \right]_n$$
$$\text{mAb} \left[\begin{array}{c} \text{S}-\text{Z}_1-\left[\text{L}_1-\text{X}_1-\text{C}_6\text{H}_4-\text{CH}_2-\text{N}^+\text{C}_5\text{H}_4\text{N}-\text{NH}-\text{C}(=\text{O})-\text{C}_5\text{H}_4\text{N}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Cl} \right] \\ \text{S}-\text{Z}_2-\left[\text{L}_2-\text{Y}_1-\text{C}_6\text{H}_4-\text{CH}_2-\text{N}^+\text{C}_5\text{H}_4\text{N}-\text{NH}-\text{C}(=\text{O})-\text{C}_5\text{H}_4\text{N}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Cl} \right] \end{array} \right]_{\text{m}_1} \text{n}$$
$$\left[\text{mAb} \left[\begin{array}{c} \text{S} - \text{Z}_1 - \text{L}_1 - \text{X}_1 \\ \text{S} - \text{Z}_2 - \text{L}_2 - \text{Y}_1 \end{array} \right] \left[\begin{array}{c} \text{C}_6\text{H}_3\text{N} \\ \text{Indole} \\ \text{Piperidine} \\ \text{Carboxylate} \\ \text{Benzene} \\ \text{Quinoline} \\ \text{Hydroxyl} \end{array} \right] \right]_{\text{m}_1} \text{m}_2 \text{m}_3$$
$$\left[\begin{array}{c} \text{HOOC-H-G-E-G-T-F-T-S-D-L-S-K-Q-M} \\ \text{G-G-N-K-L-W-E-I-F-L-R-V-A-E-E-E} \\ \text{P-S-S-G-A-P-P-S-K-K-K-K-K-K-NH} \end{array} \begin{array}{c} \text{---} \text{L}_1 \text{---} \\ \text{---} \text{L}_2 \text{---} \\ \text{---} \text{N} \text{---} \end{array} \begin{array}{c} \text{Z}_1 \text{---} \text{S} \text{---} \\ \text{---} \text{Z}_2 \text{---} \text{S} \text{---} \end{array} \right]_n \text{mAb}$$

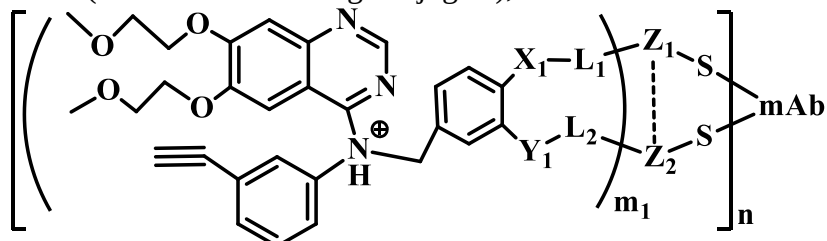
LB50 (Lixisenatide analog conjugate),



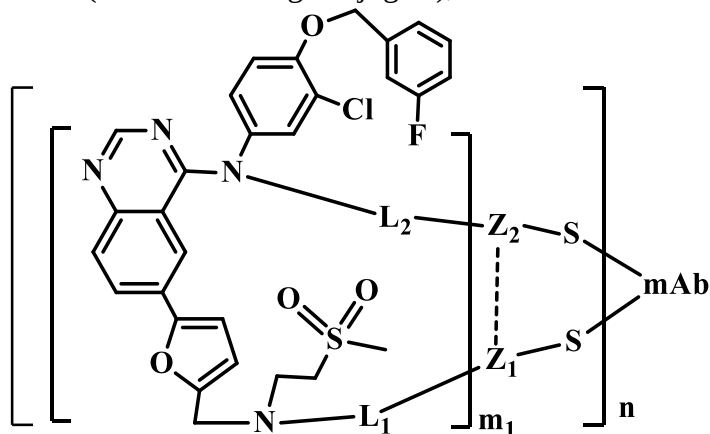
LB51 (Osimertinib analog conjugate),



LB52 (a nucleoside analog conjugate),

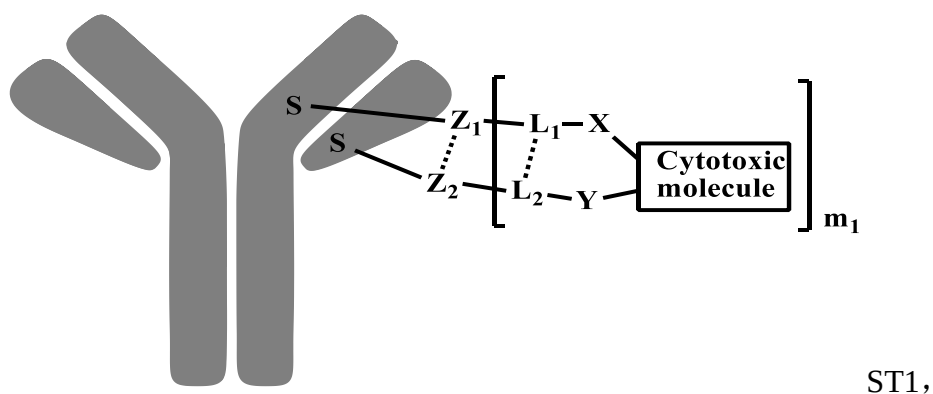


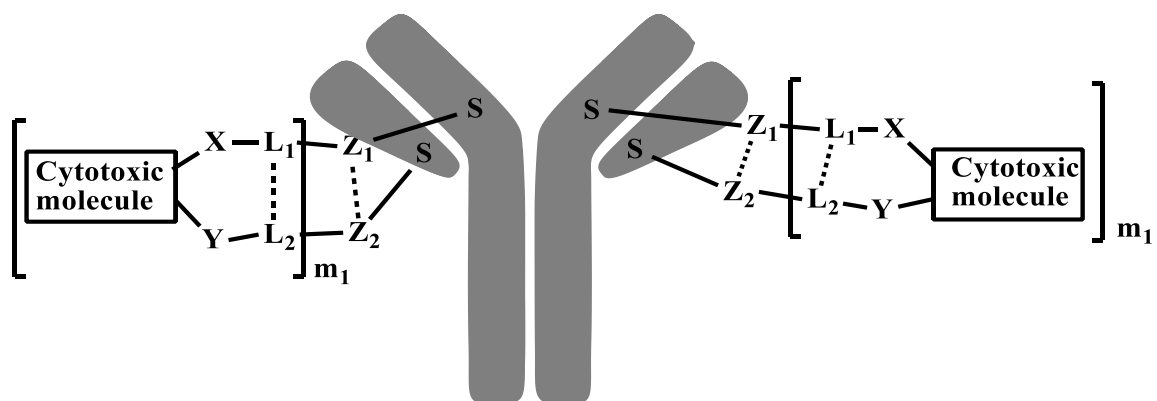
LB53 (Erlotinib analog conjugate),



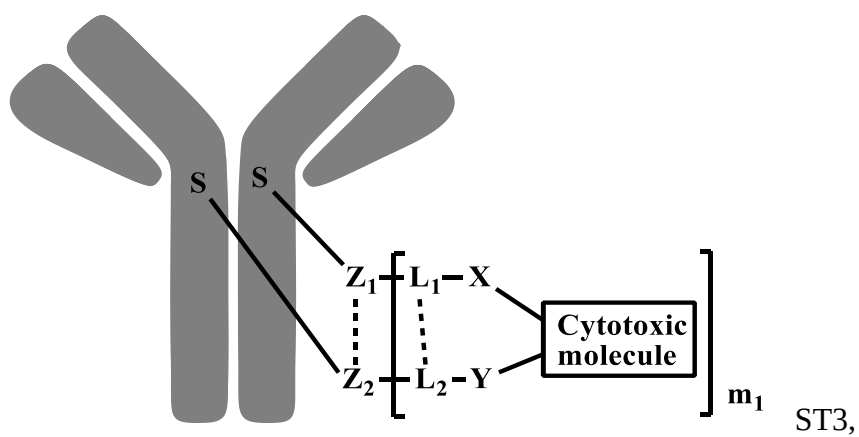
LB54 (Lapatinib analog conjugate);

wherein “-----” is optionally either a single bond, or a double bond, or absent; X_1 , and Y_1 are independently O, NH, NHNH, NR_5 , S, $C(O)O$, $C(O)NH$, $OC(O)NH$, $OC(O)O$, $NHC(O)NH$, $NHC(O)S$, $OC(O)N(R_1)$, $N(R_1)C(O)N(R_1)$, CH, $C(O)NHNHC(O)$ and $C(O)NR_1$; mAb is antibody; n and m_1 are independently 1-20; X_3 is CH_2 , O, NH, $NHC(O)$, $NHC(O)NH$, $C(O)$, $OC(O)$, $OC(O)(NR_3)$, R_1 , NHR_1 , NR_1 , $C(O)R_1$ or absent; X_4 is H, CH_2 , OH, O, $C(O)$, $C(O)NH$, $C(O)N(R_1)$, R_1 , NHR_1 , NR_1 , $C(O)R_1$ or $C(O)O$; X_5 is H, CH_3 , F, or Cl; M_1 and M_2 are independently H, Na, K, Ca, Mg, NH_4 , $NR_1R_2R_3$; R_6 is 5'-deoxyadenosyl, Me, OH, or CN; L_2 , R_1 , R_1' , R_2 , Z_1 , and Z_2 , are defined the same as in Claim 1.

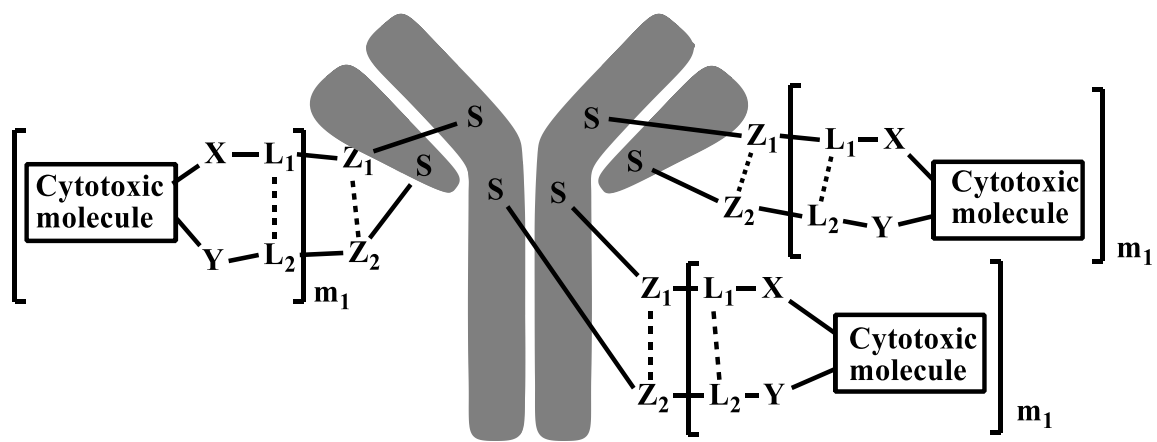




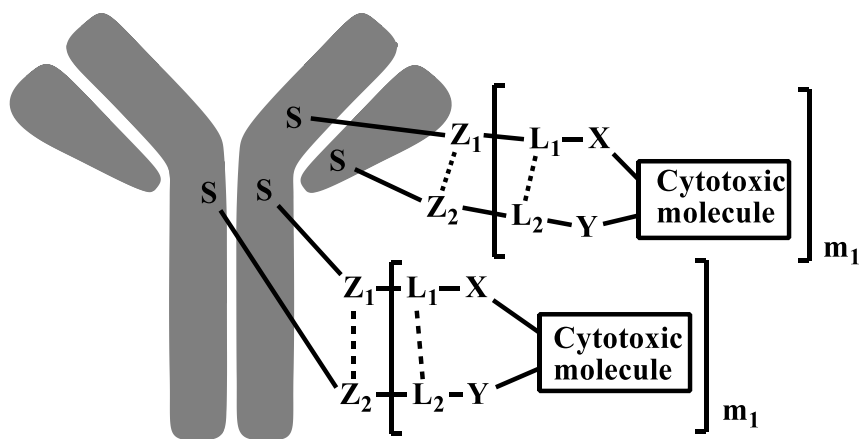
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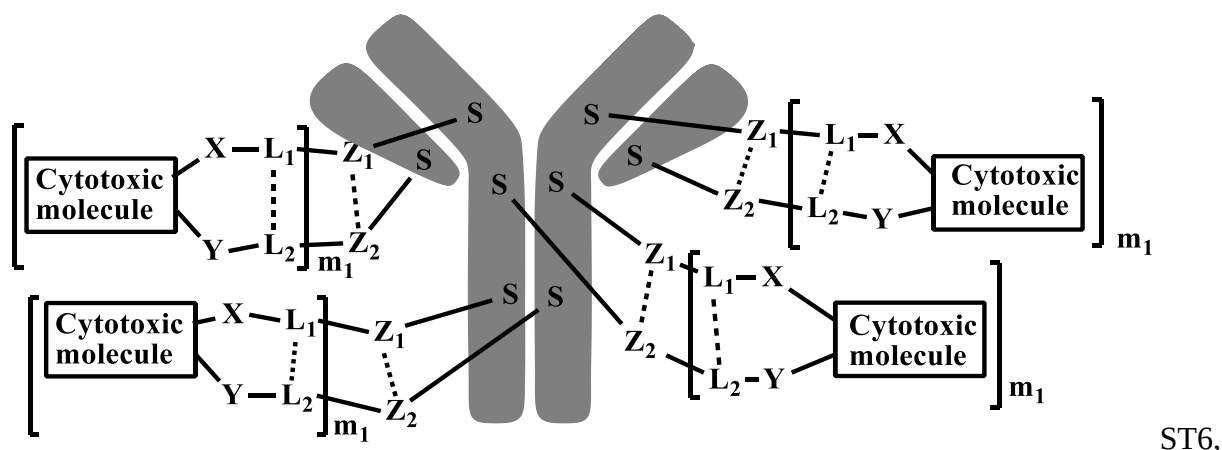
ST3,



ST4,



ST5,

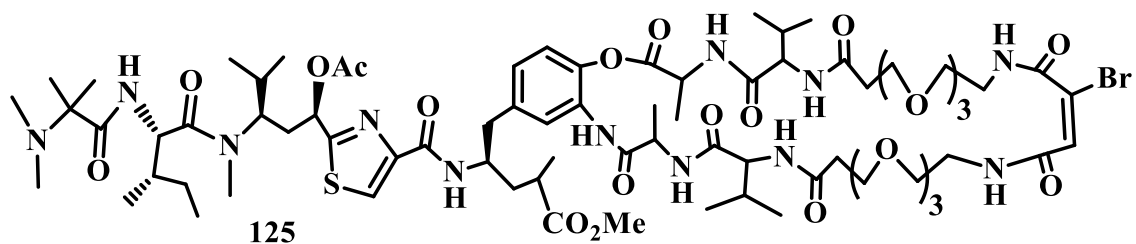
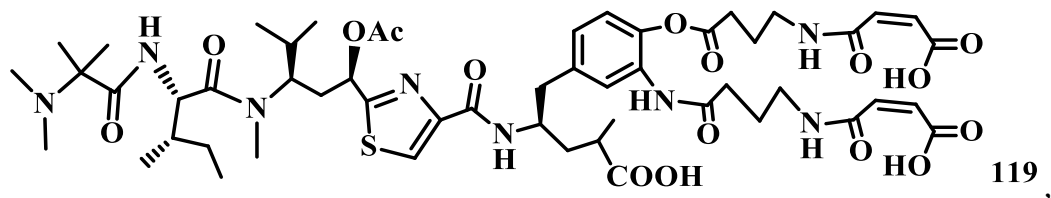
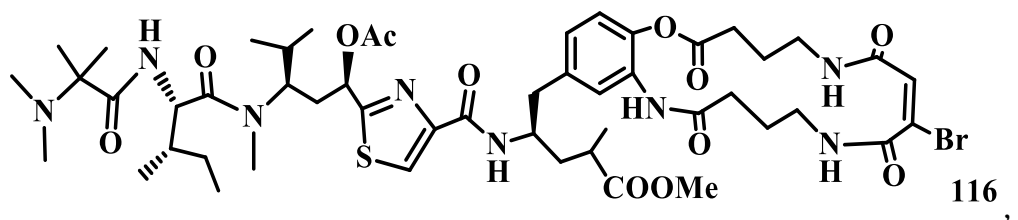
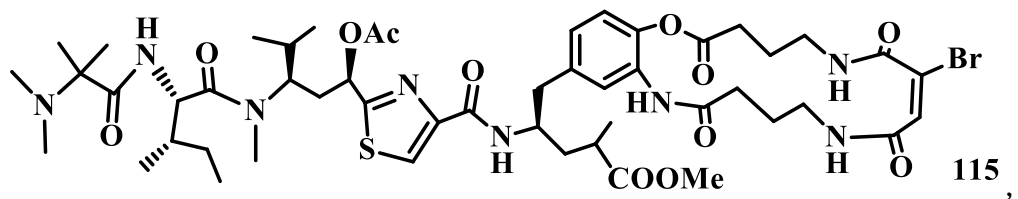
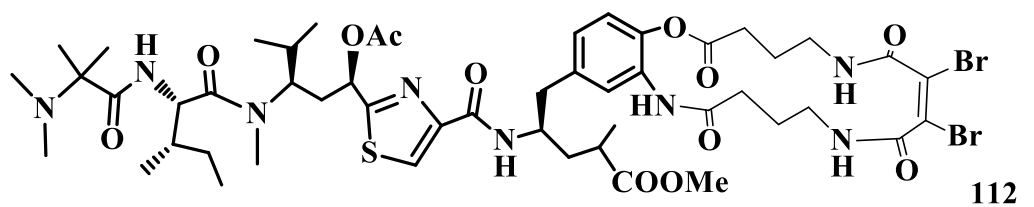
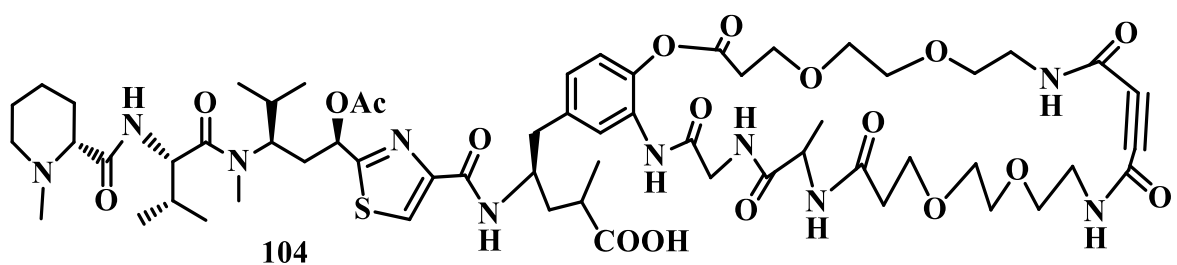
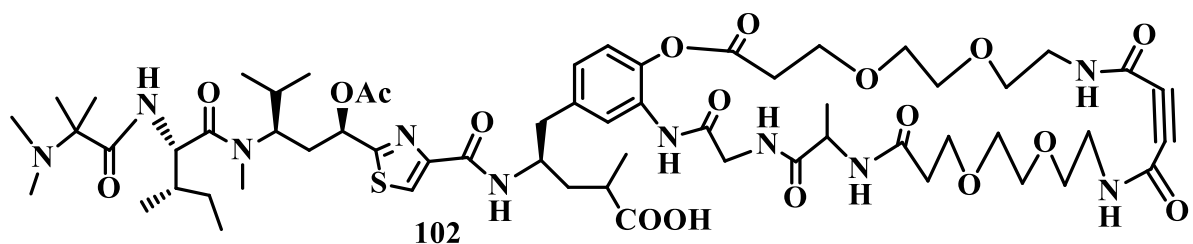


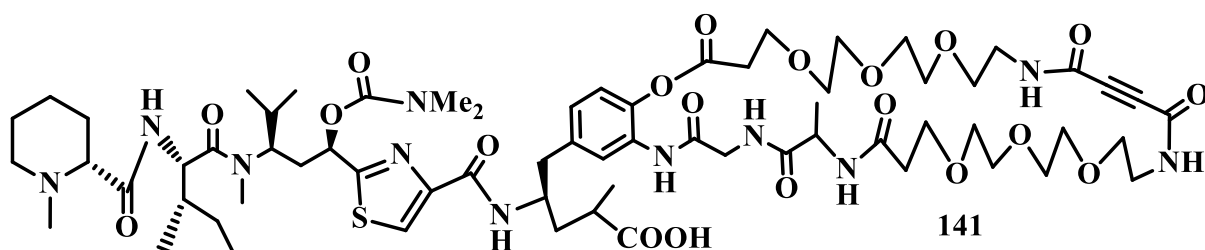
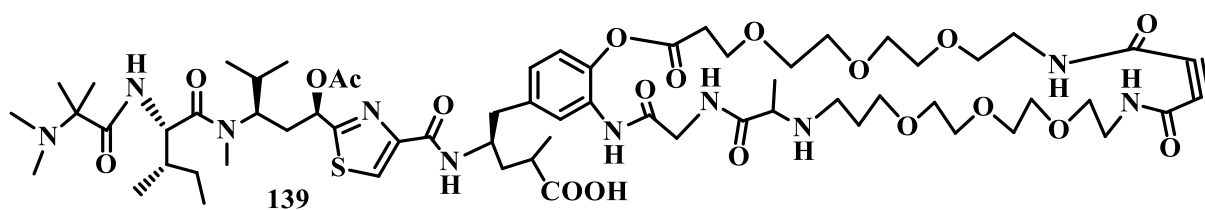
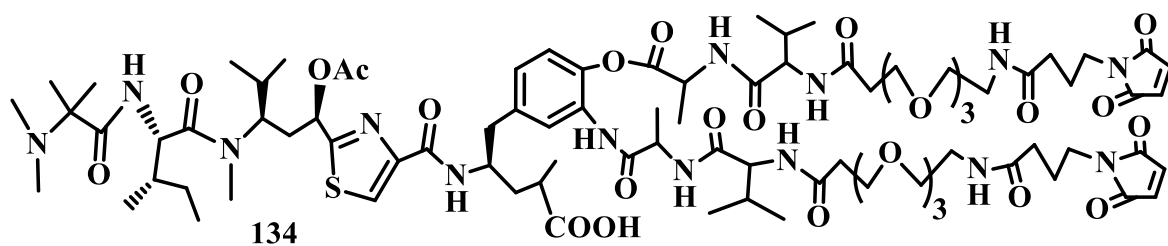
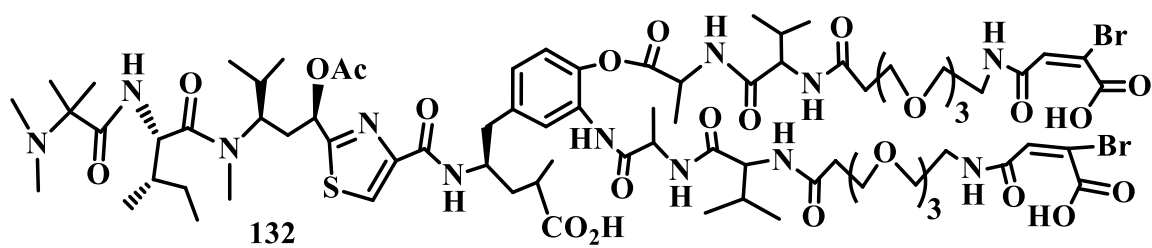
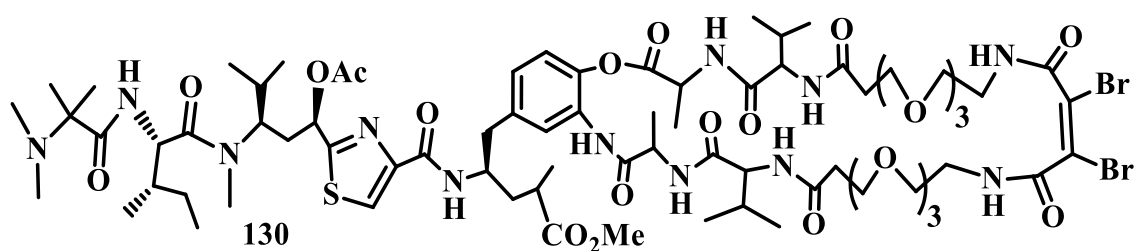
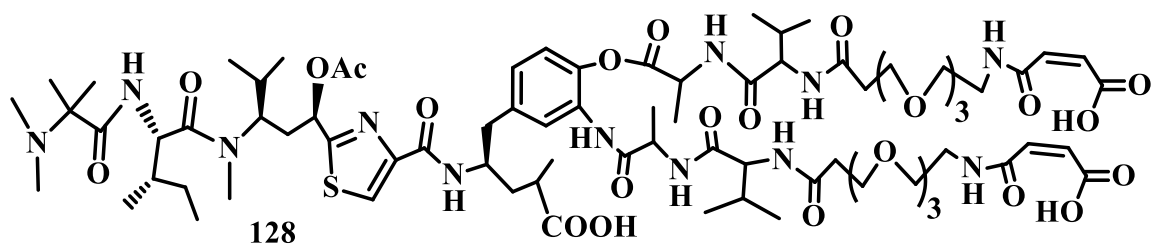
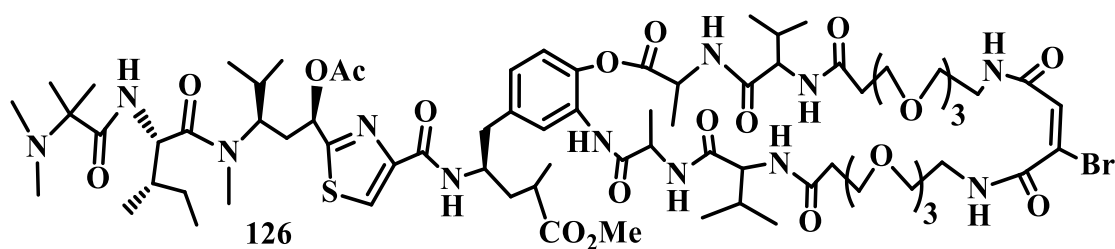
wherein Z_1 , Z_2 , X , Y , L_1 , L_2 , “-----”, m_1 , and the cytotoxic molecule are defined the same as in Claim 1.

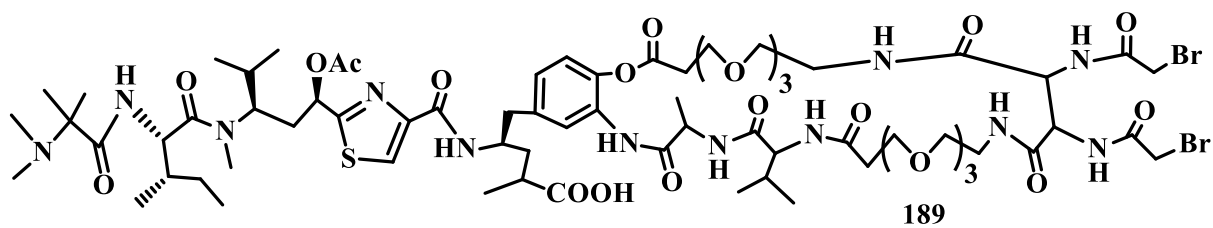
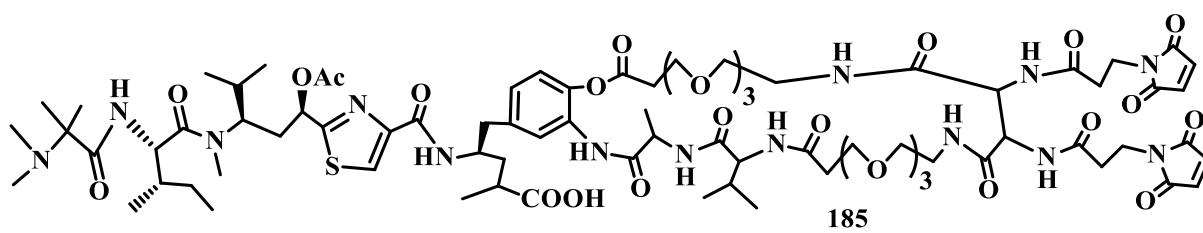
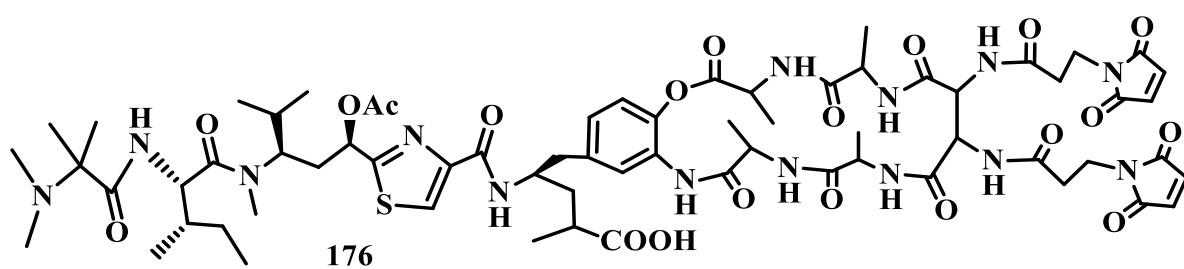
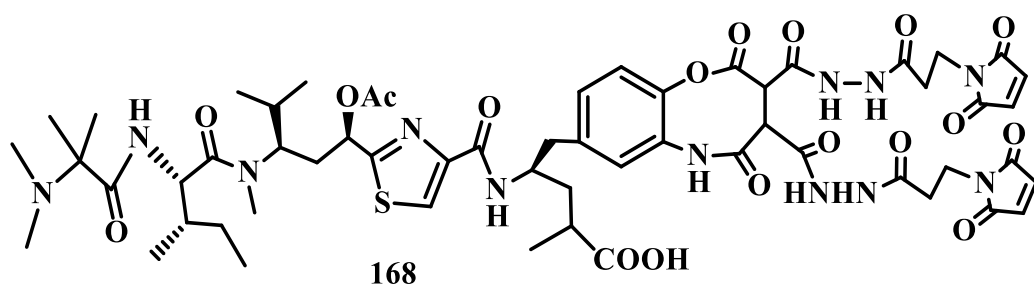
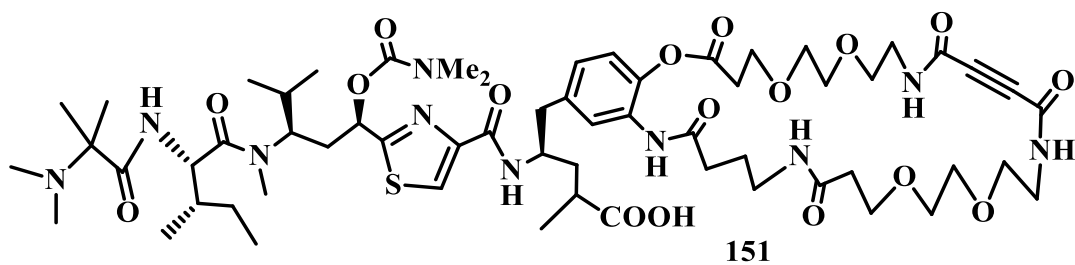
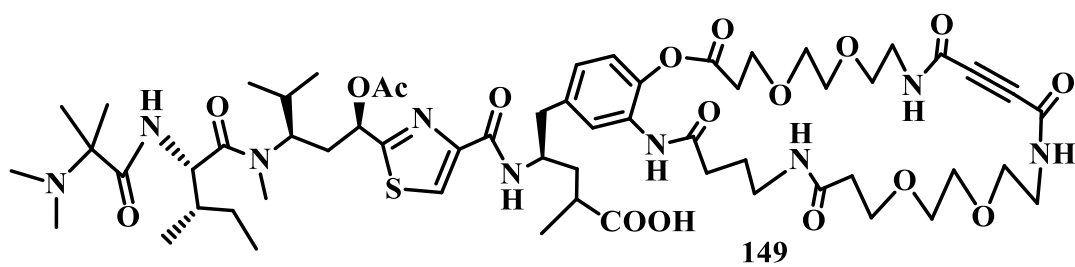
33. The compound according to claim 32, wherein the cytotoxic molecule and m_1 at different conjugation site of the cell-binding agent/molecule are different when the cytotoxic molecules containing the same or different bis-linkers are conjugated to the cell-binding agent/molecule sequentially, or when different cytotoxic molecules containing the same or different bis-linkers are added stepwise in a conjugation reaction mixture containing the cell-binding agent/molecule.

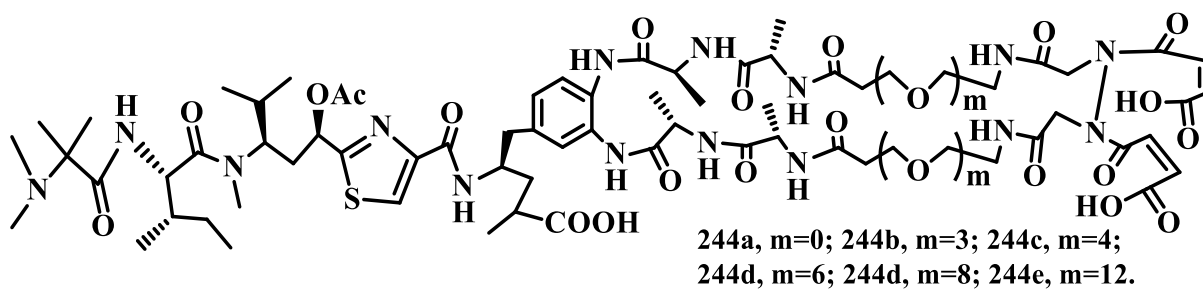
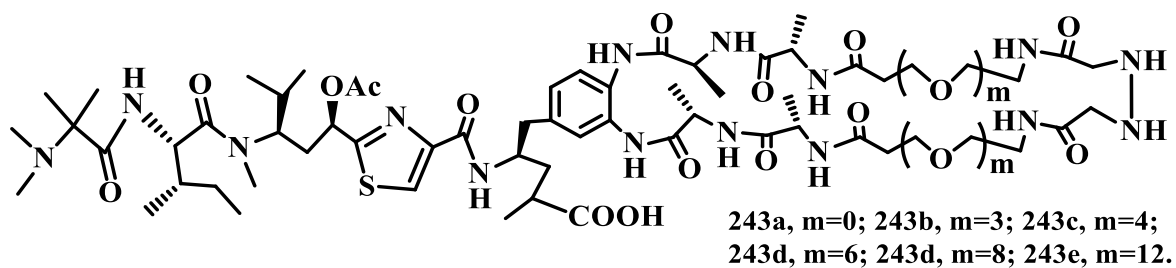
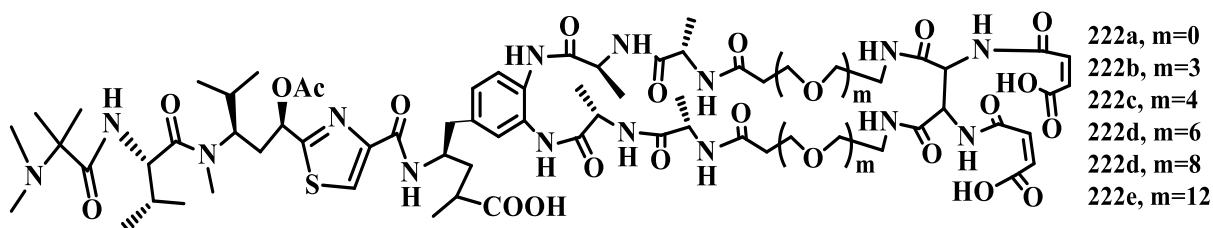
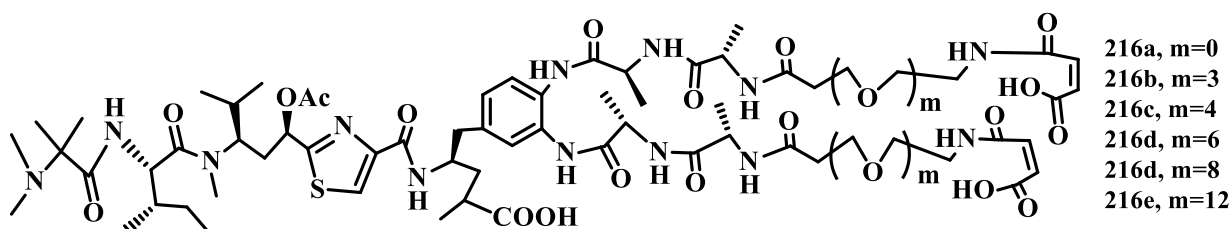
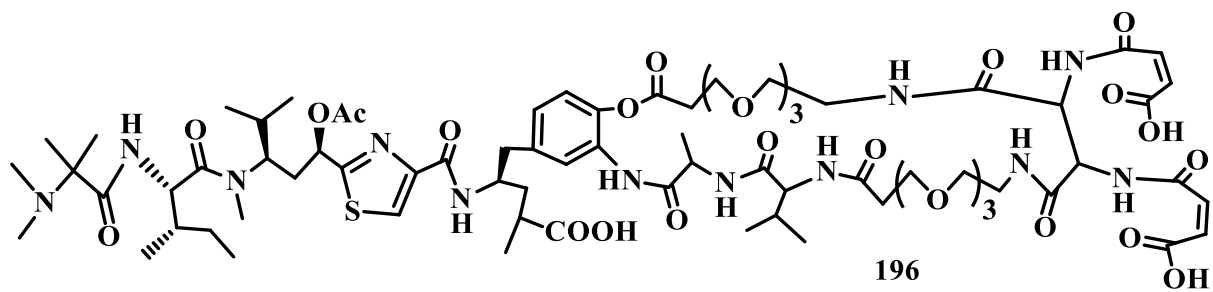
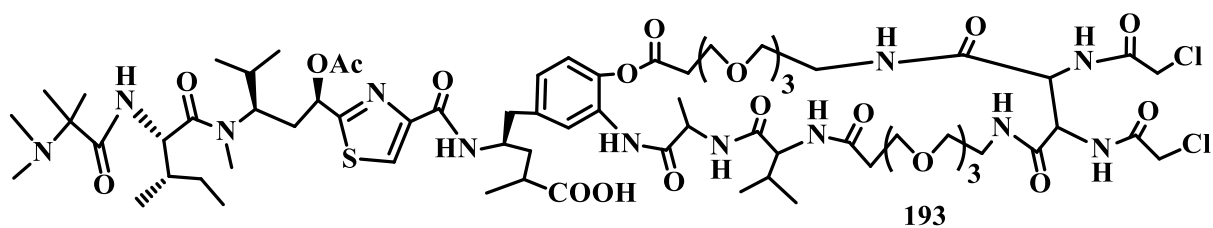
34. The compound according to claim 32 or claim 33, wherein the cytotoxic molecule is selected from tubulysins, maytansinoids, taxanoids (taxanes), CC-1065 analogs, daunorubicin and doxorubicin compounds, indolecarboxamide, benzodiazepine dimers, pyrrolobenzodiazepine (PBD) dimers, tomaymycin dimers, anthramycin dimers, indolinobenzodiazepines dimers, imidazobenzothiadiazepines dimers, oxazolidinobenzodiazepines dimers, calicheamicins and the enediyne antibiotics, actinomycin, amanitins, amatoxins, azaserines, bleomycins, epirubicin, eribulin, tamoxifen, idarubicin, dolastatins, auristatins (comprising monomethyl auristatin E, MMAE, MMAF, auristatin PYE, auristatin TP, Auristatins 2-AQ, 6-AQ, EB (AEB), EFP (AEFP) and their analogs), duocarmycins, geldanamycins or other HSP90 inhibitors, centanamycin, methotrexates, thiotepa, vindesines, vincristines, hemiasterlins, nazumamides, microginins, radiosumins, streptonigtin, SN38 or other analogs or metabolites of camptothecin, alterobactins, microsclerodermins, theonellamides, esperamicins, PNU-159682, and their analogues or derivatives, pharmaceutically acceptable salts, acids, derivatives, hydrate or hydrated salt, a crystalline structure, an optical isomer, racemate, diastereomer or enantiomer of any of the above drugs thereof; or the cytotoxic molecule as defined in Claim 10.

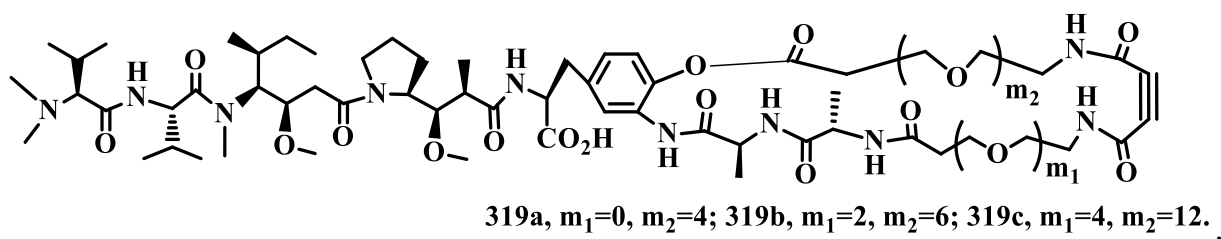
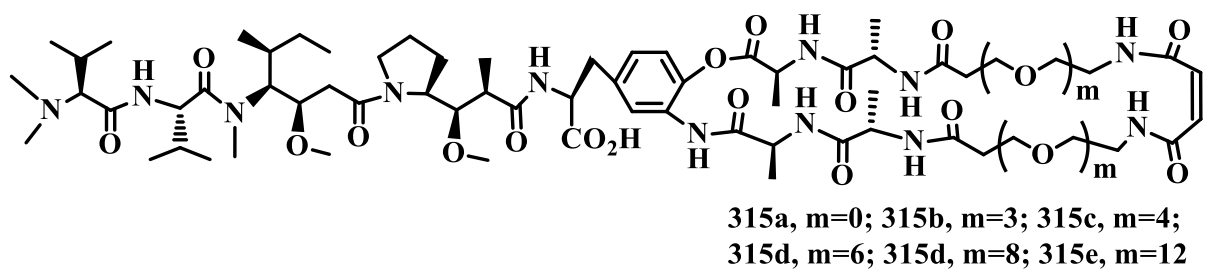
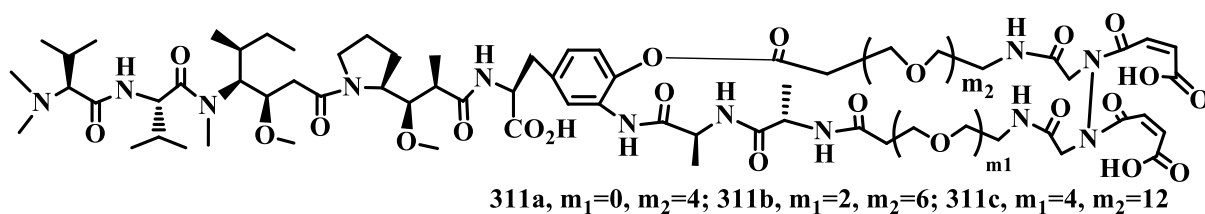
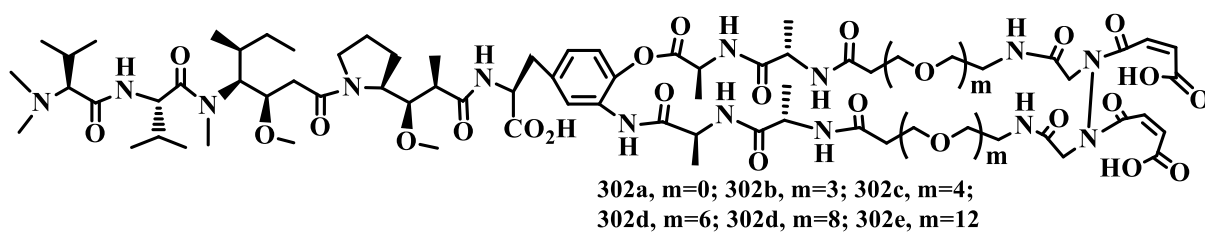
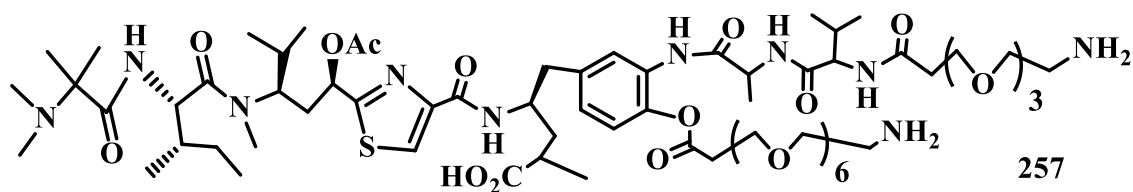
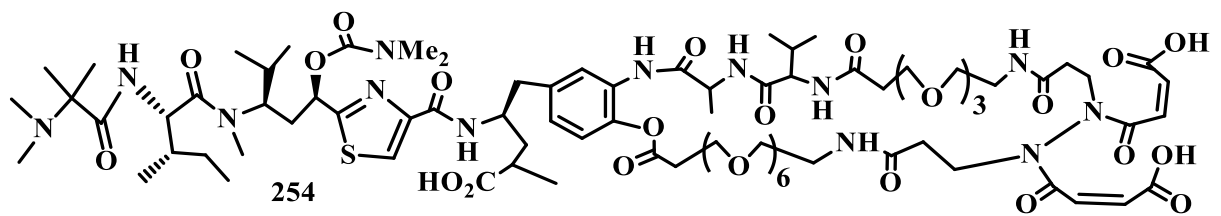
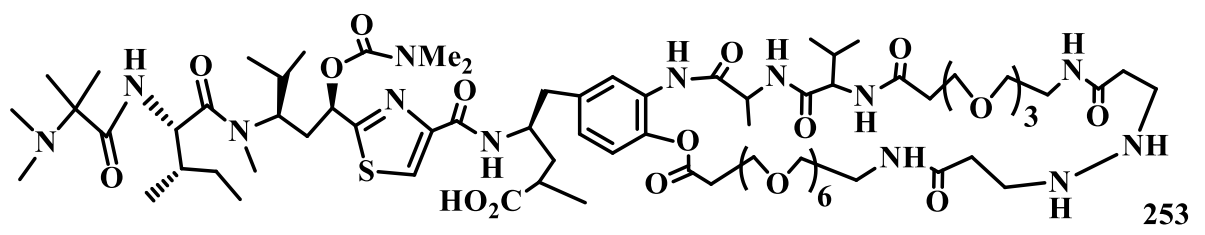
35. The compound according to Claim 2, having one of the following structures:

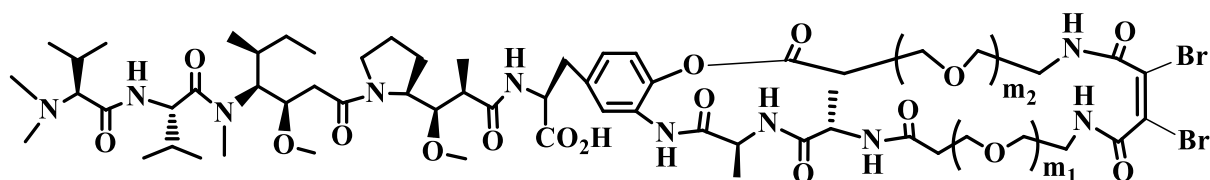
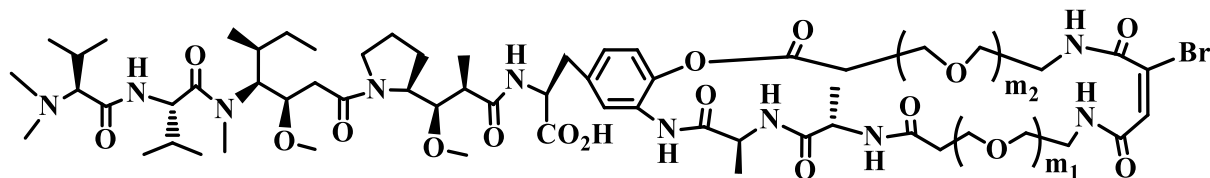
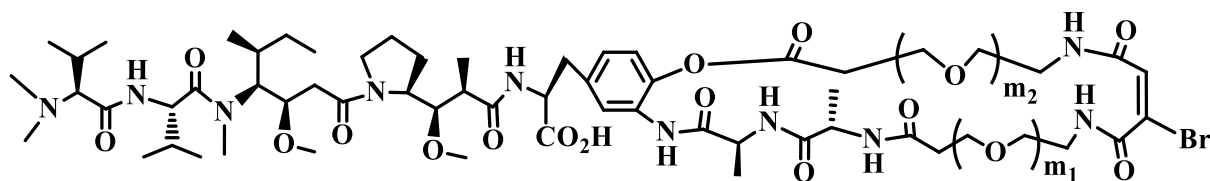
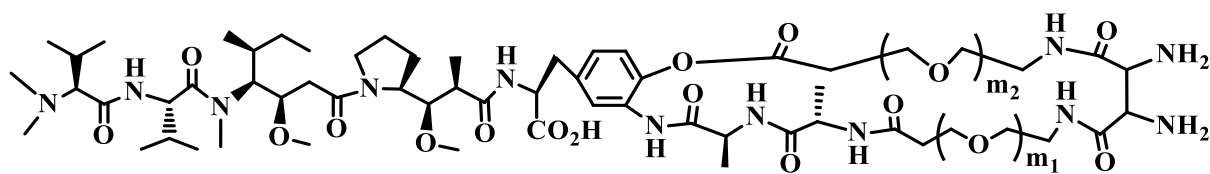
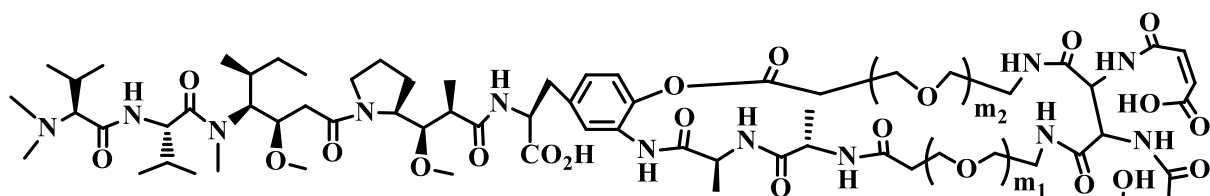
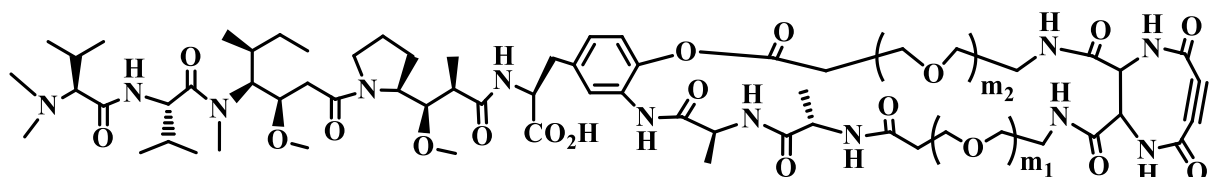
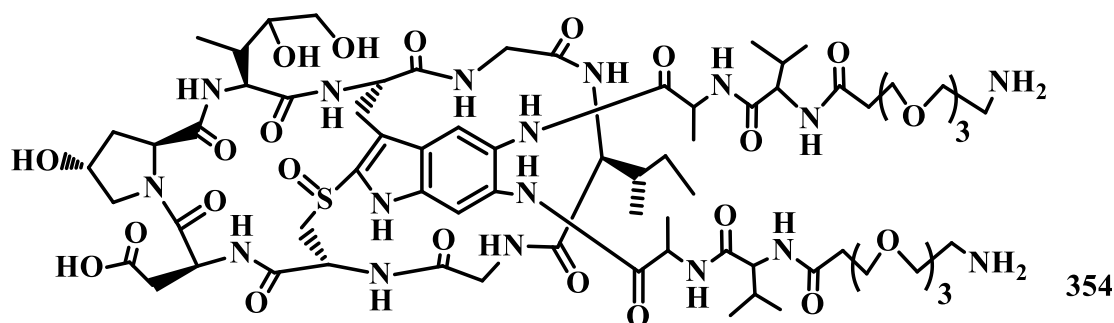




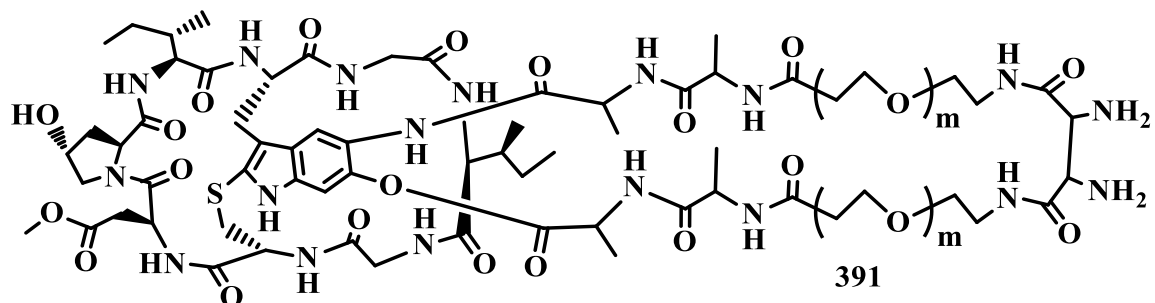
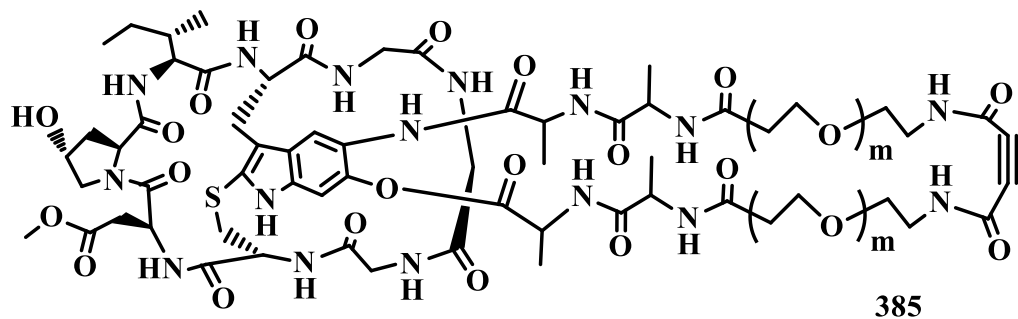
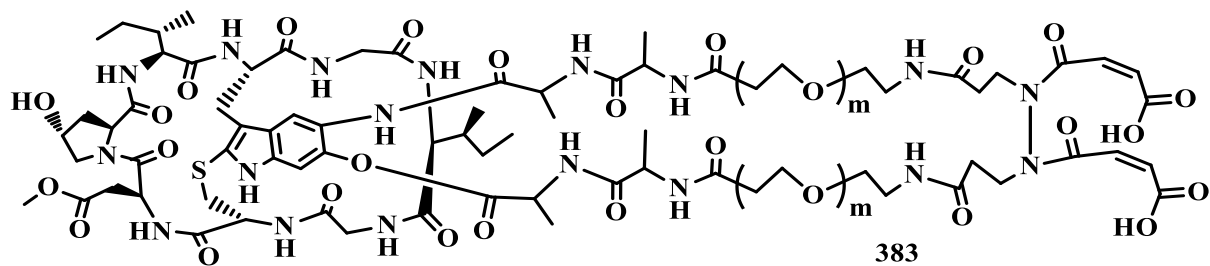
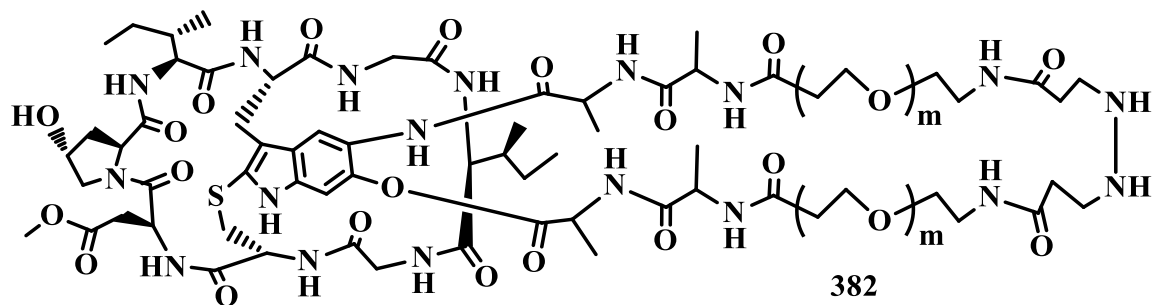
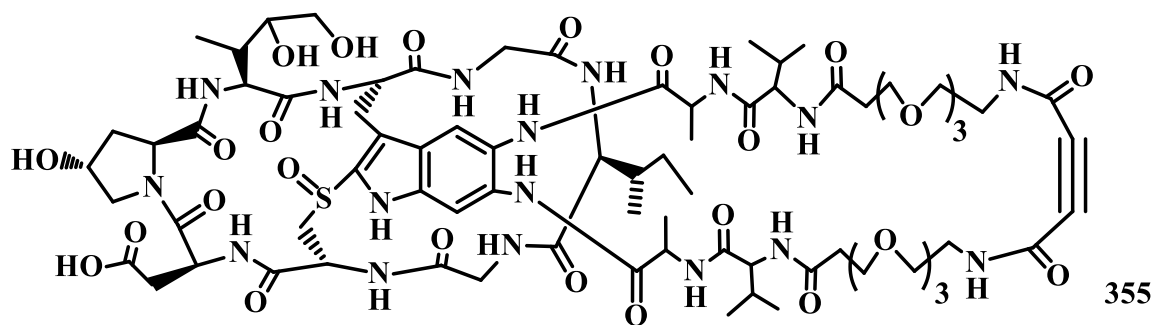


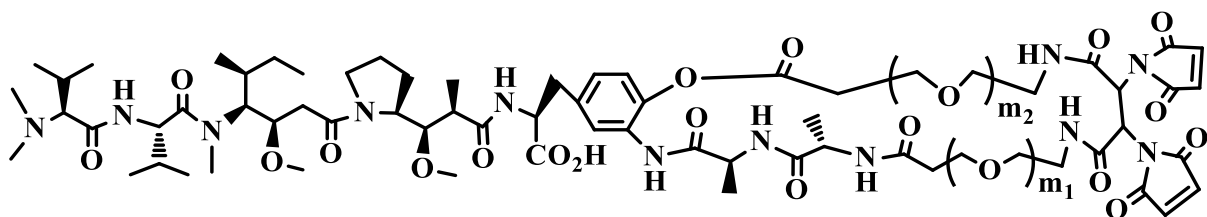
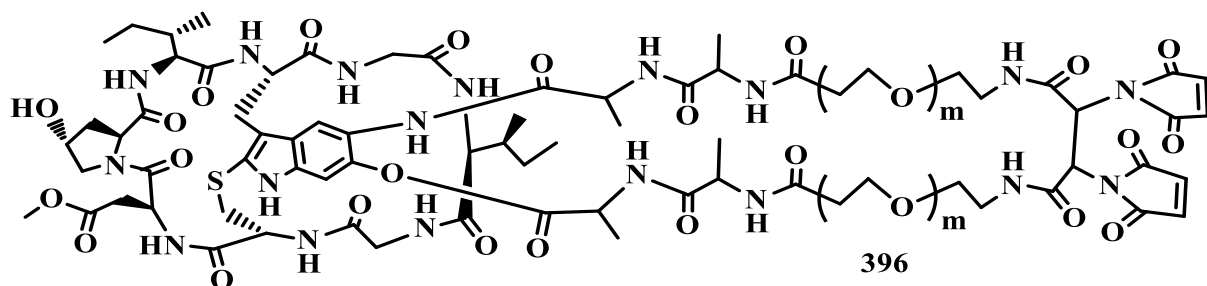
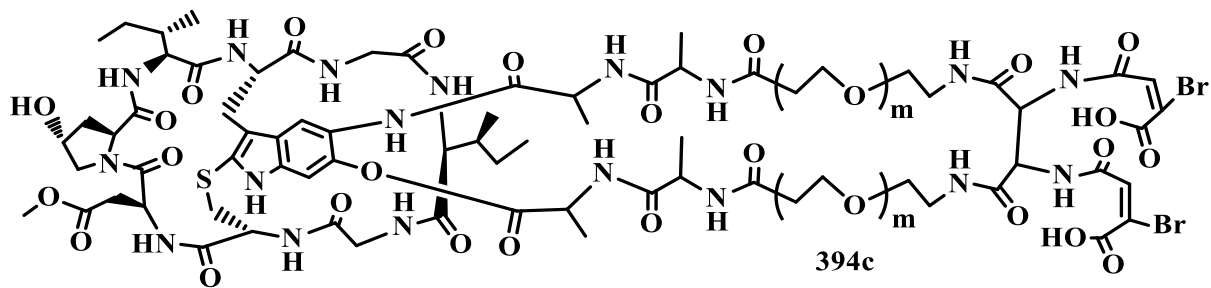
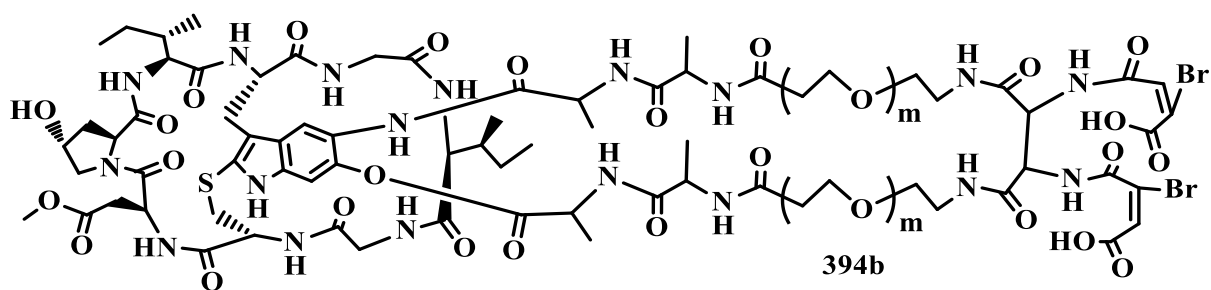
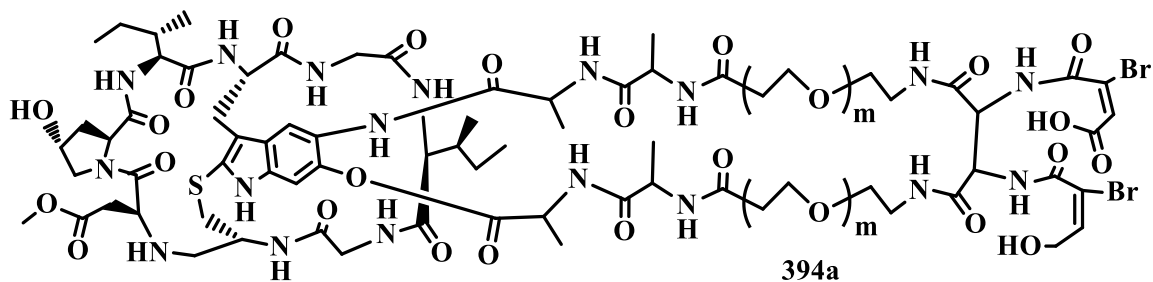
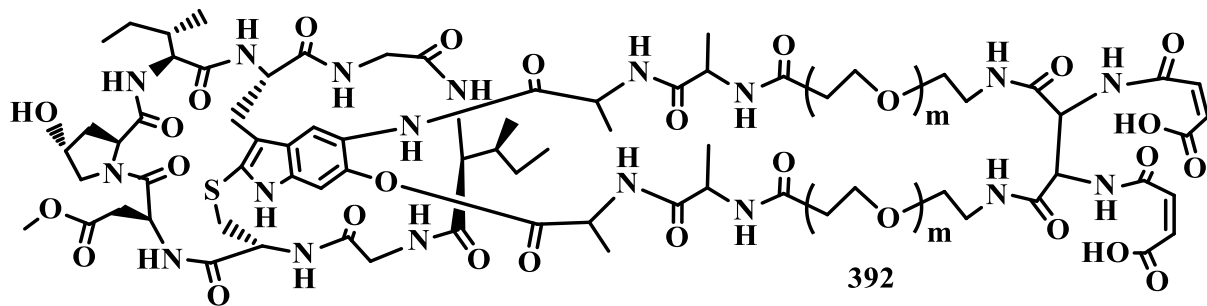


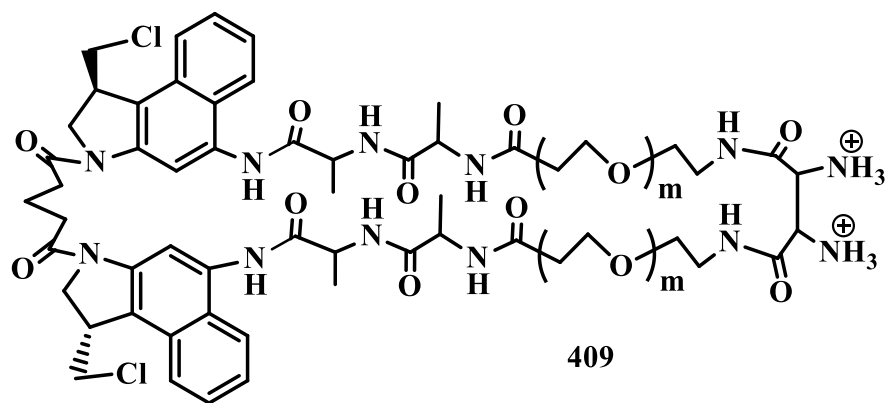
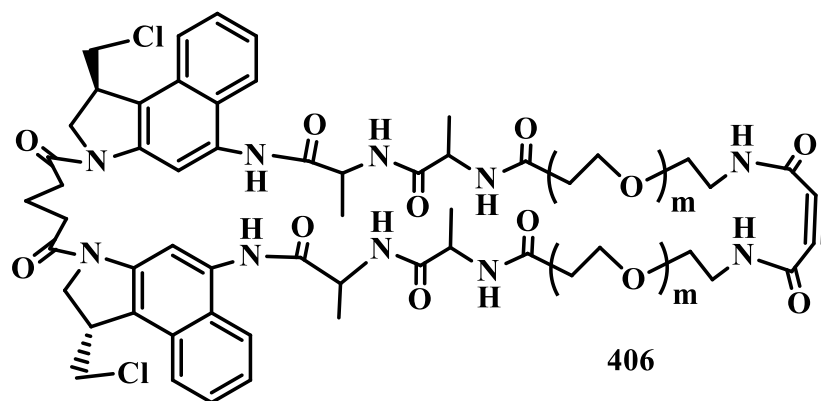
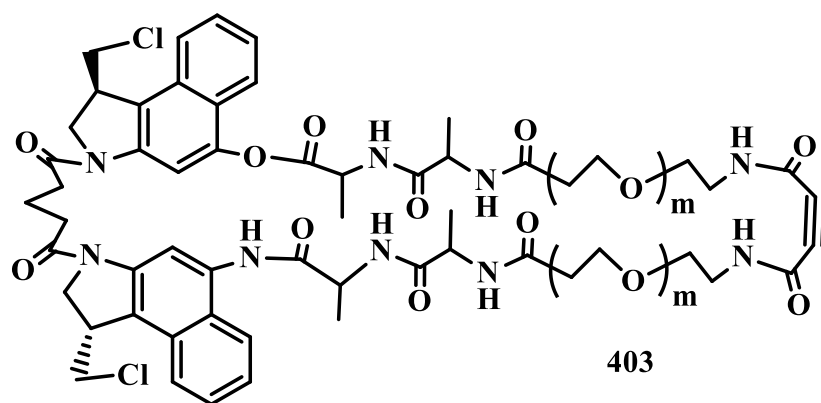
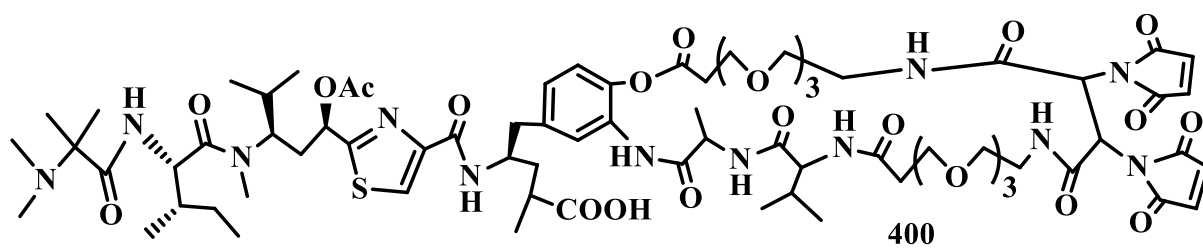


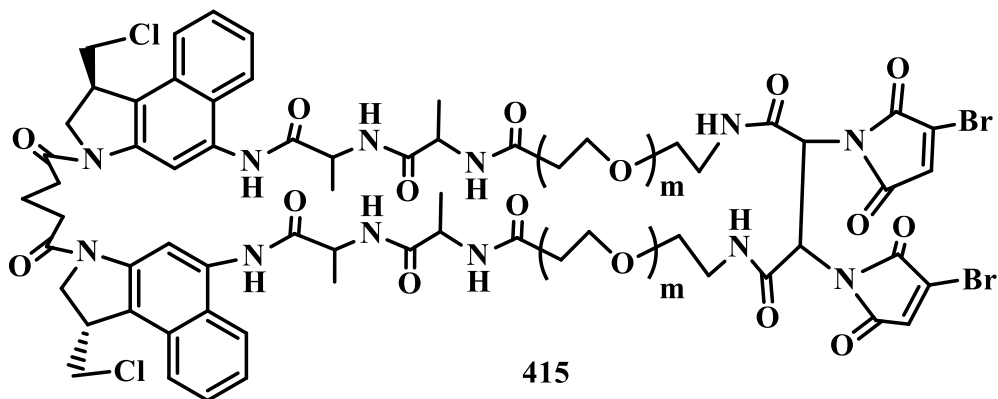
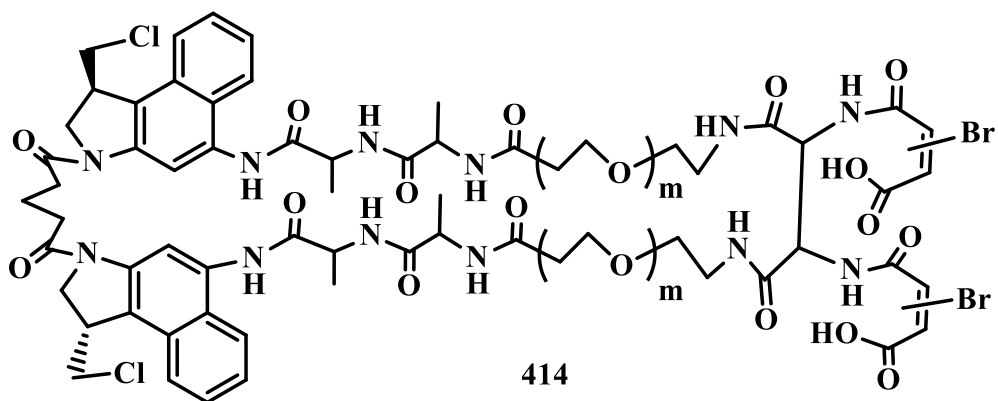
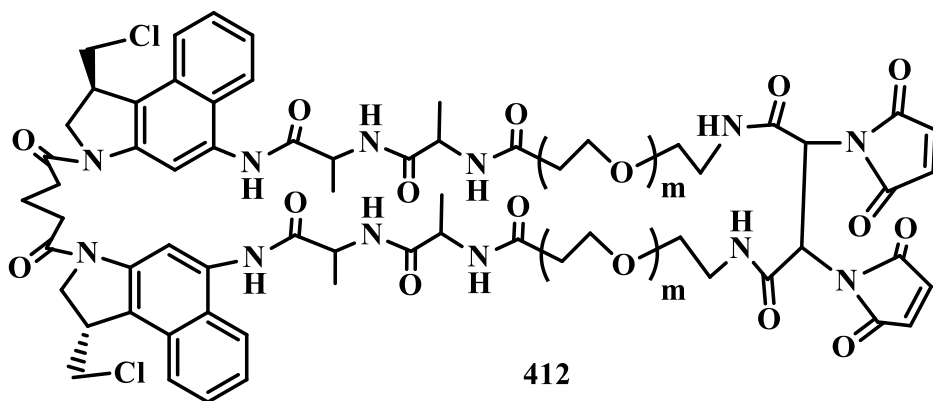
324a, $m_1=0$, $m_2=4$; 324b, $m_1=2$, $m_2=6$; 324c, $m_1=4$, $m_2=12$.332a, $m_1=0$, $m_2=4$; 332b, $m_1=2$, $m_2=6$; 332c, $m_1=4$, $m_2=12$.333a, $m_1=0$, $m_2=4$; 333b, $m_1=2$, $m_2=6$; 333c, $m_1=4$, $m_2=12$.338a, $m_1=2$, $m_2=6$; 338b, $m_1=2$, $m_2=8$; 338c, $m_1=4$, $m_2=12$.339a, $m_1=2$, $m_2=6$; 339b, $m_1=2$, $m_2=8$; 339c, $m_1=4$, $m_2=12$.341a, $m_1=2$, $m_2=6$; 341b, $m_1=2$, $m_2=8$; 341c, $m_1=4$, $m_2=12$.

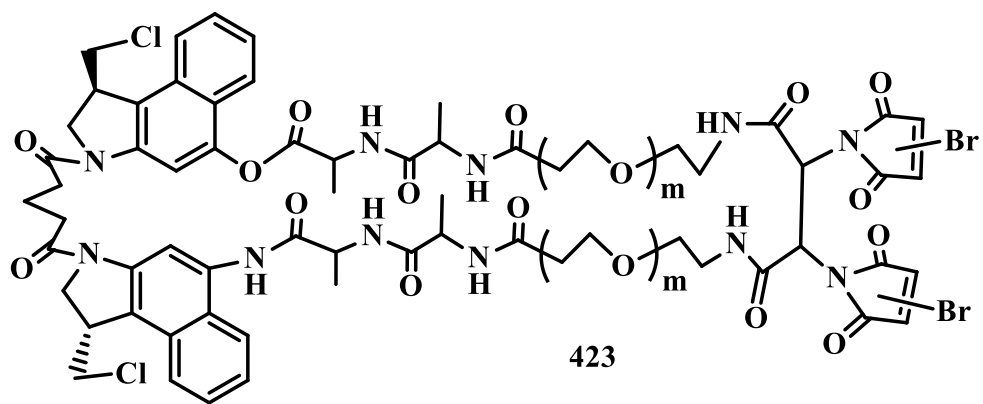
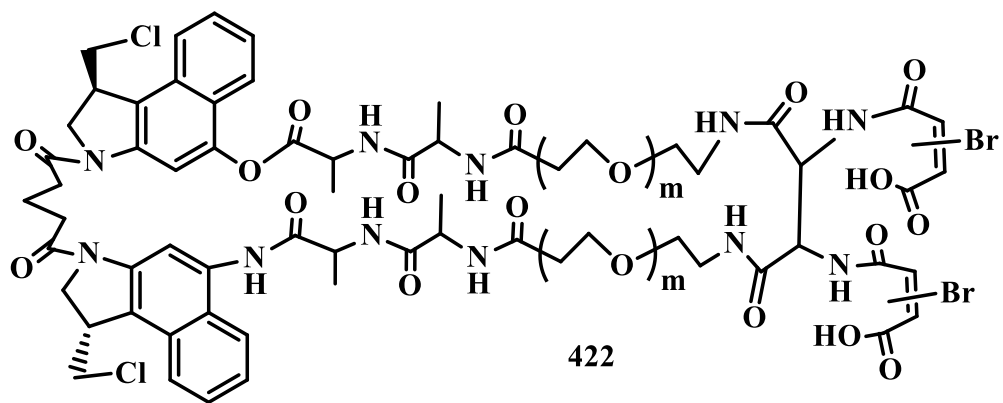
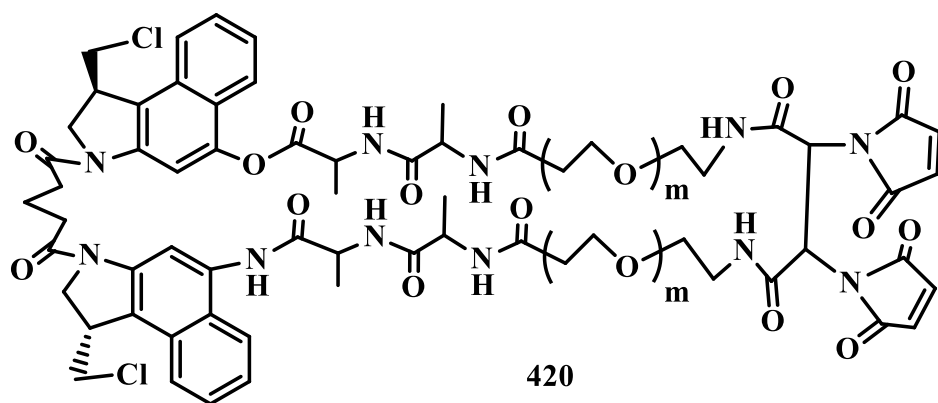
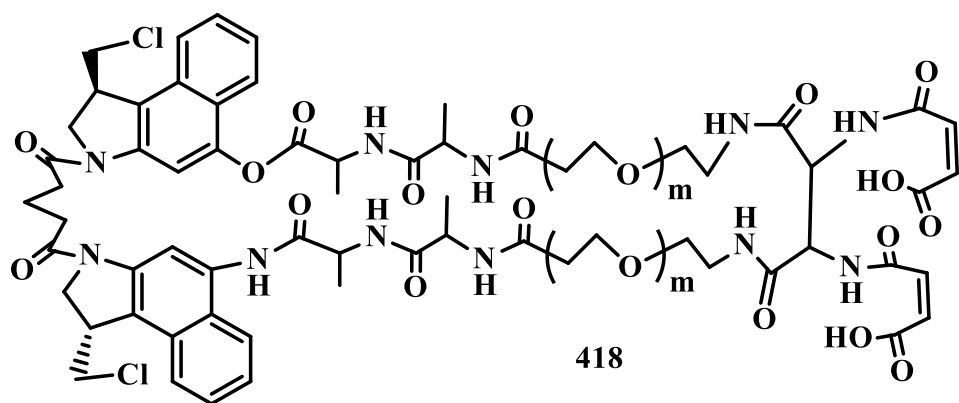
354

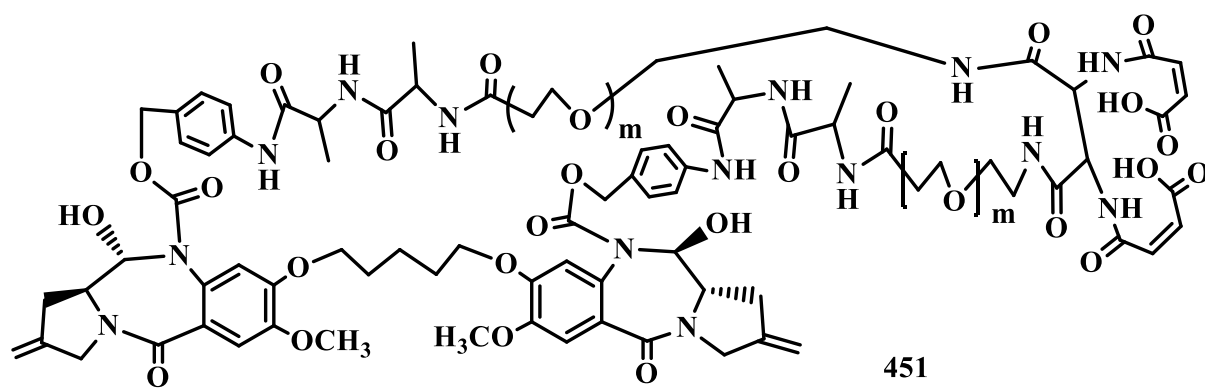
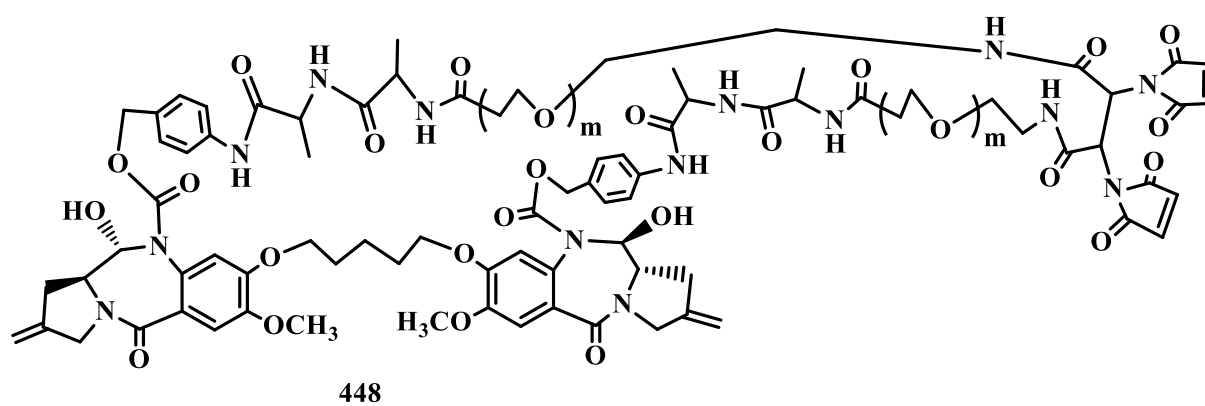
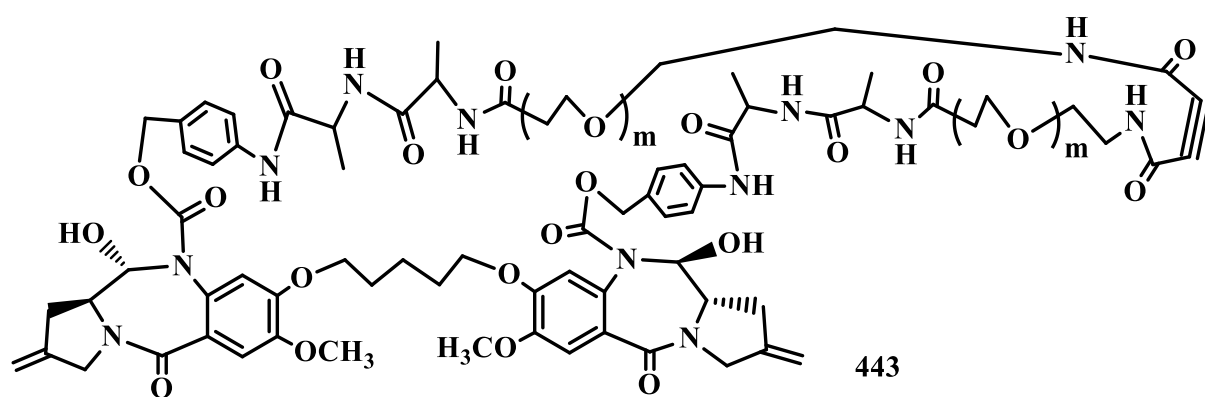
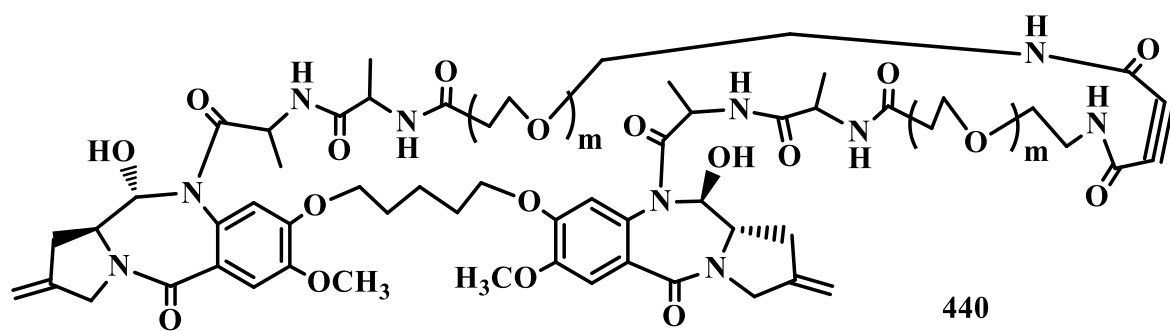




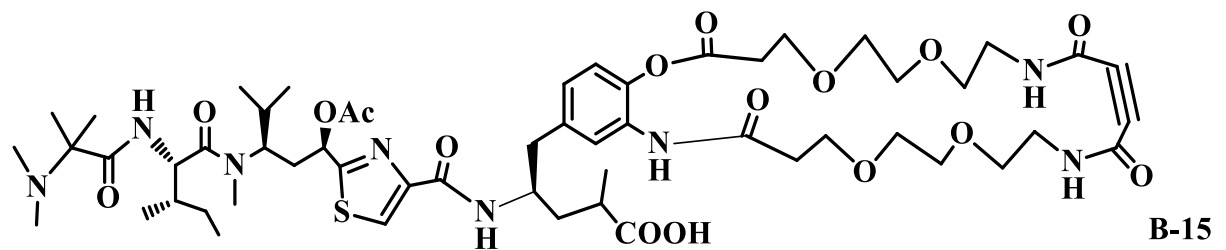
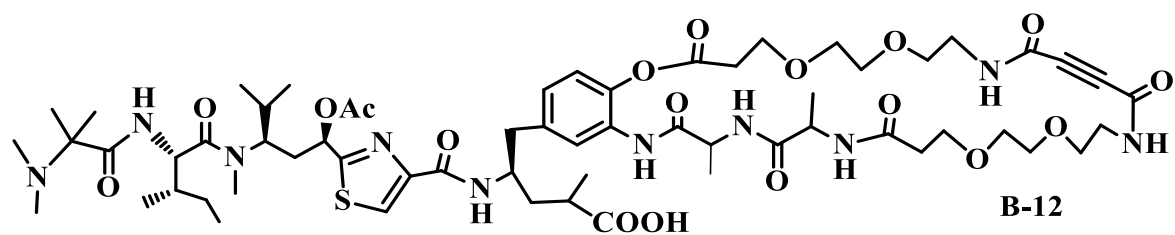
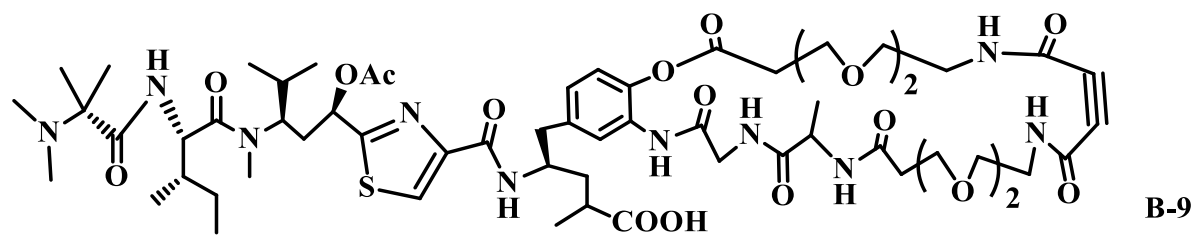
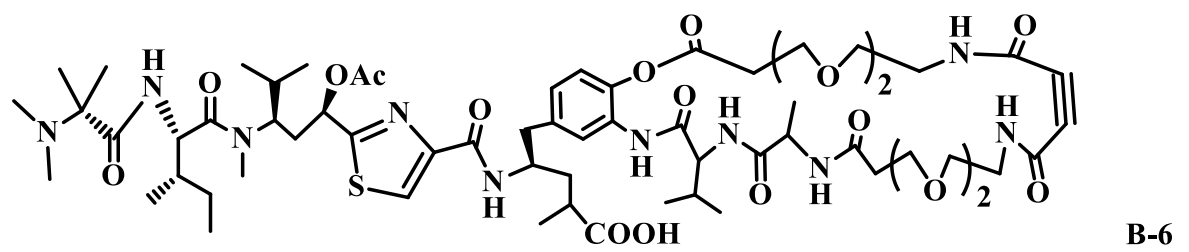
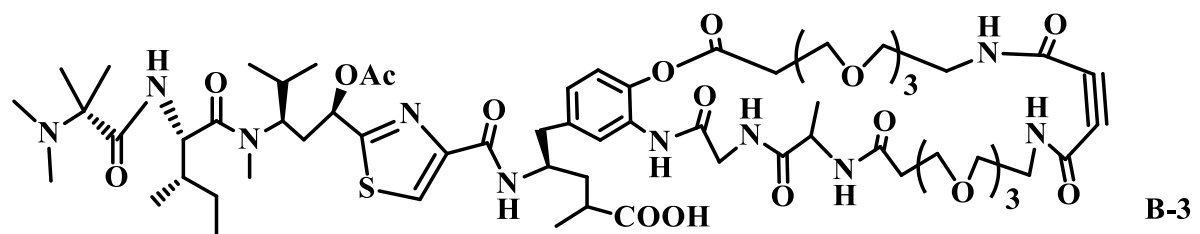
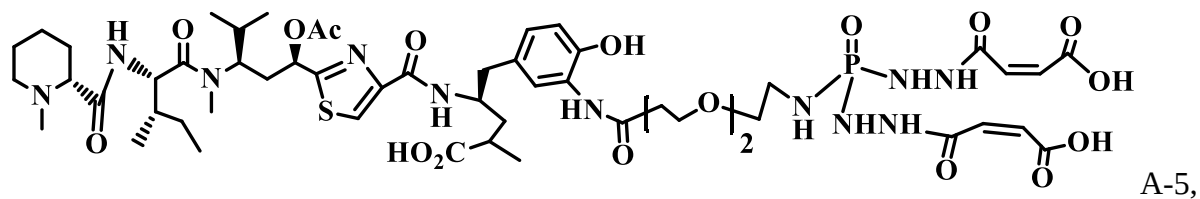


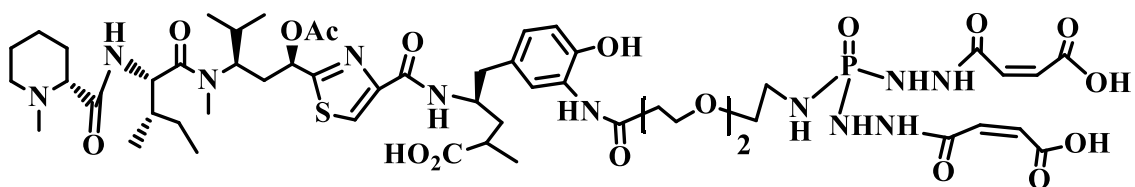
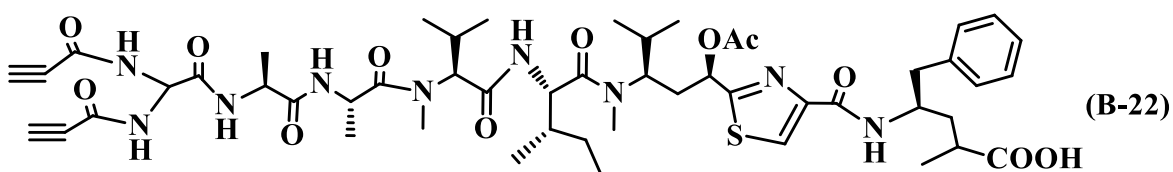
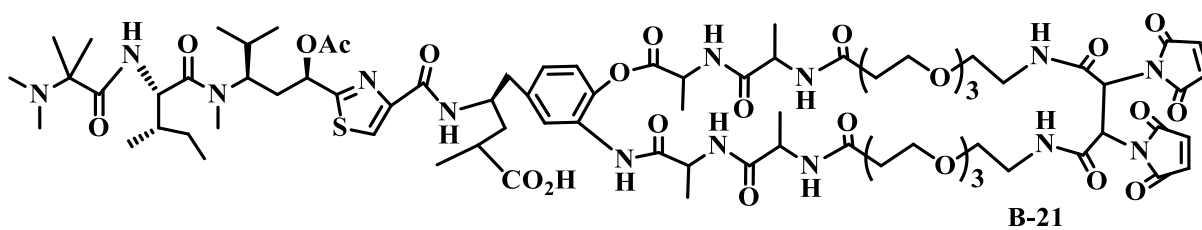
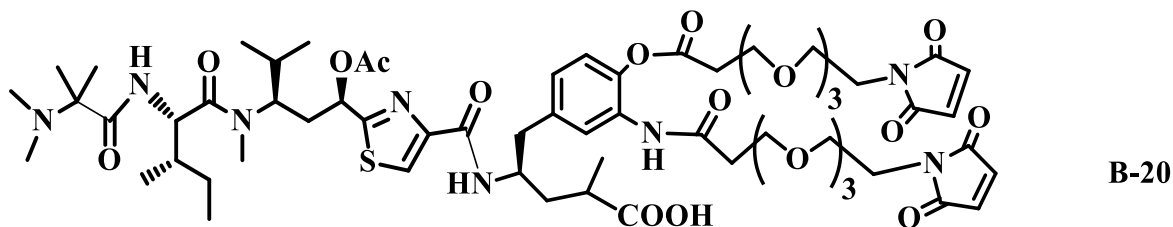
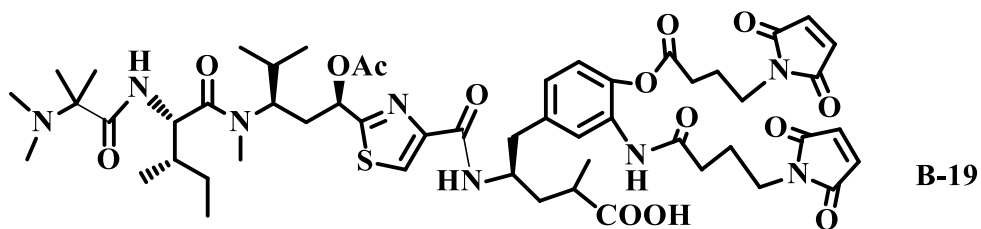
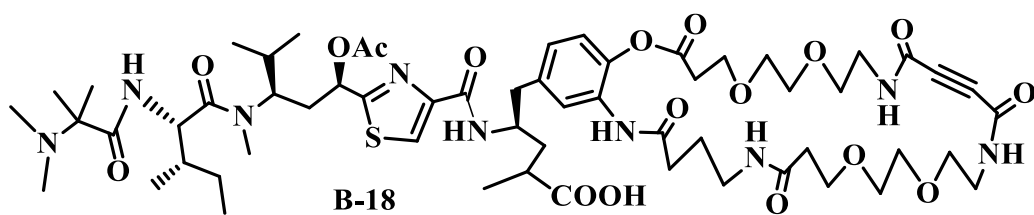


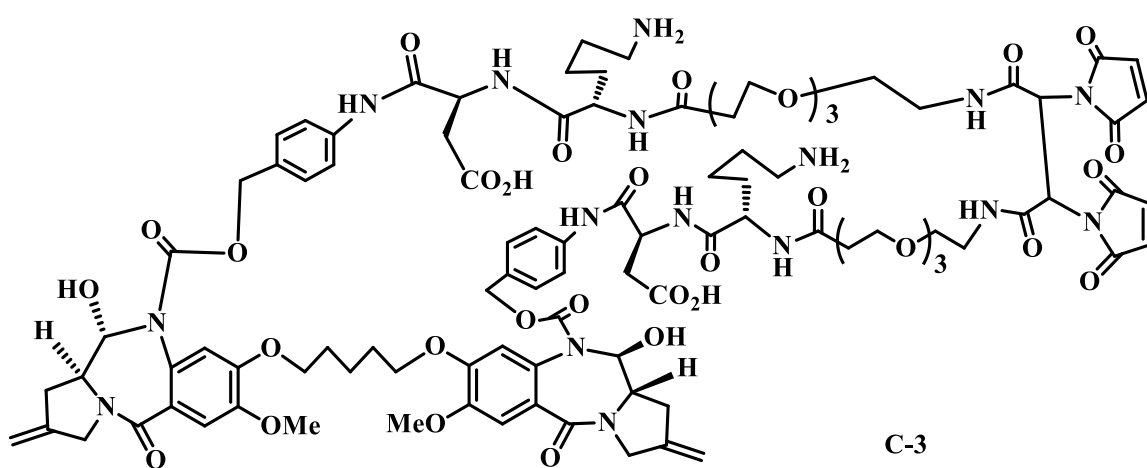
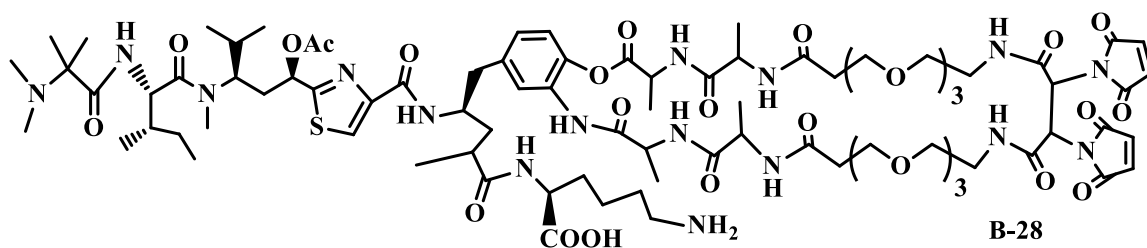
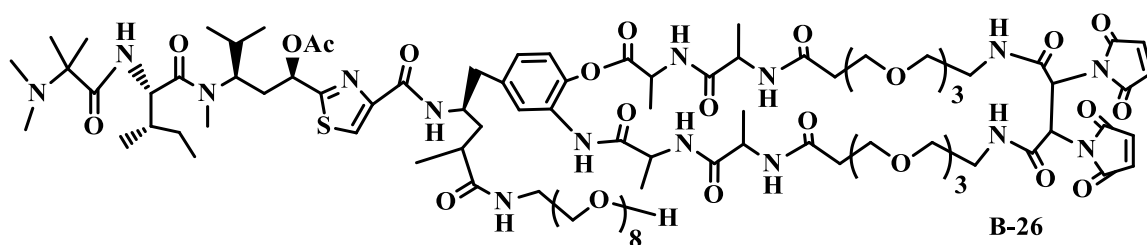
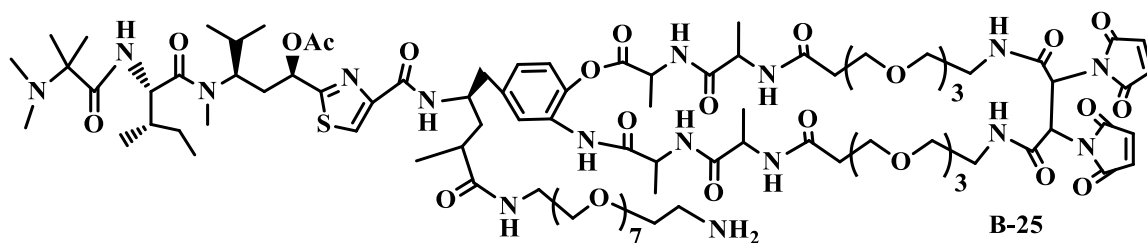
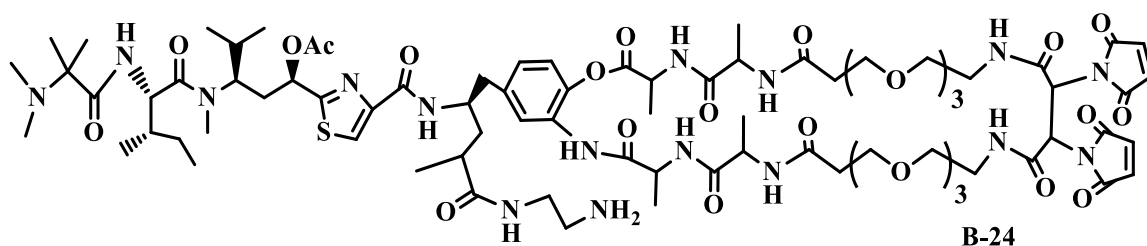


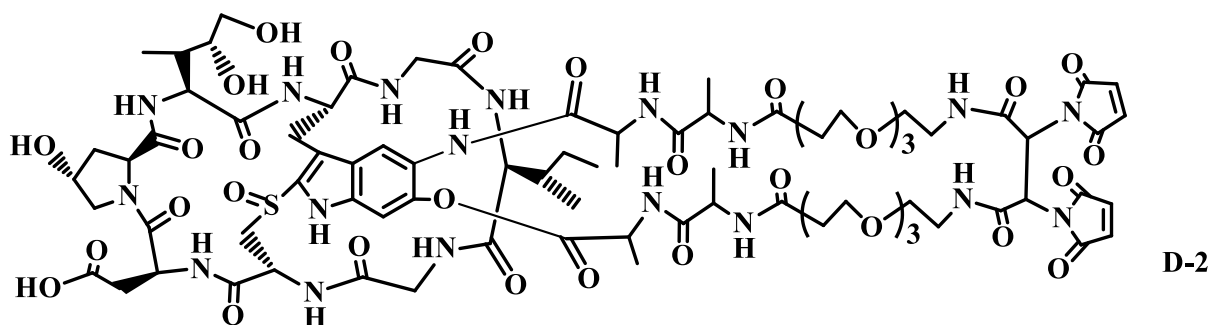
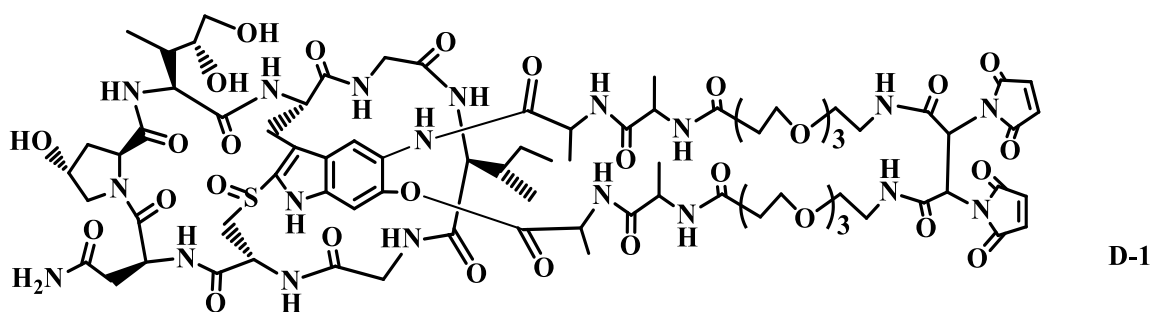
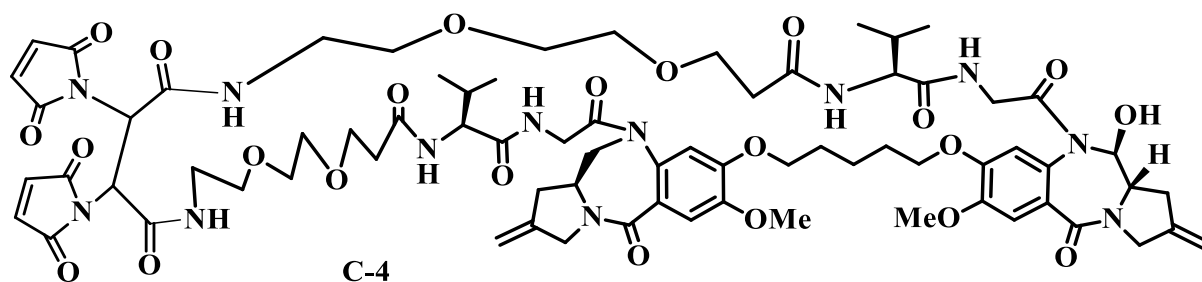




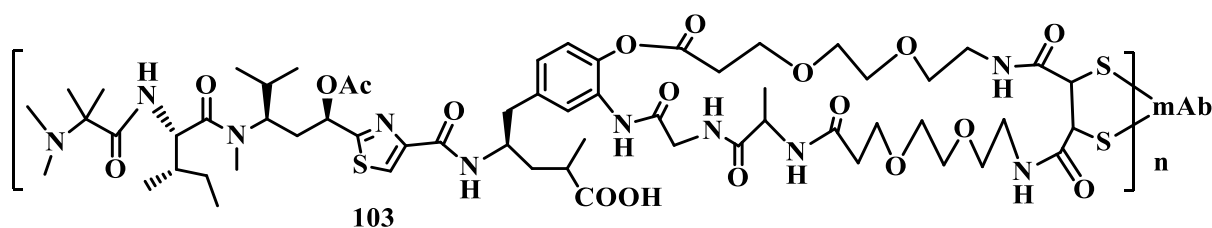


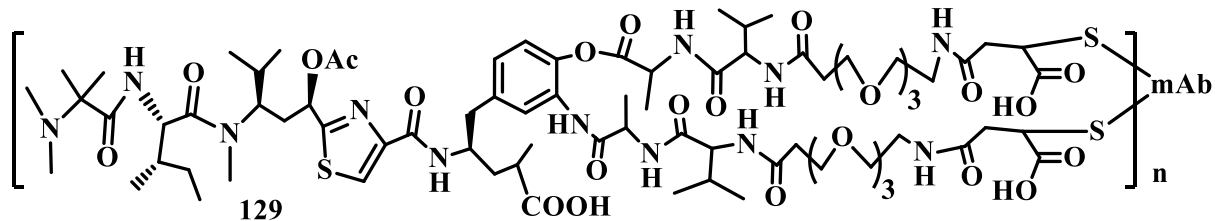
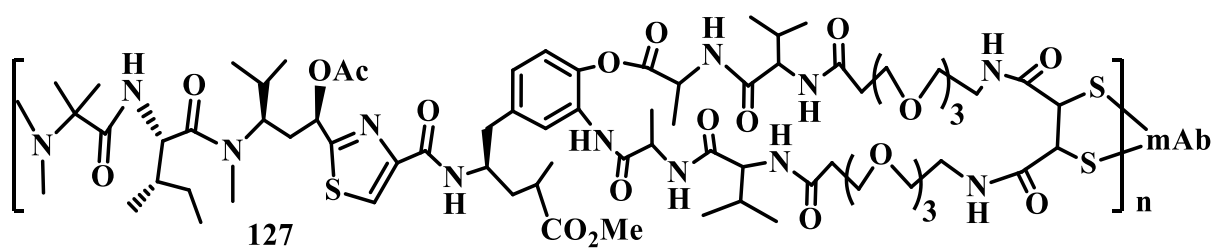
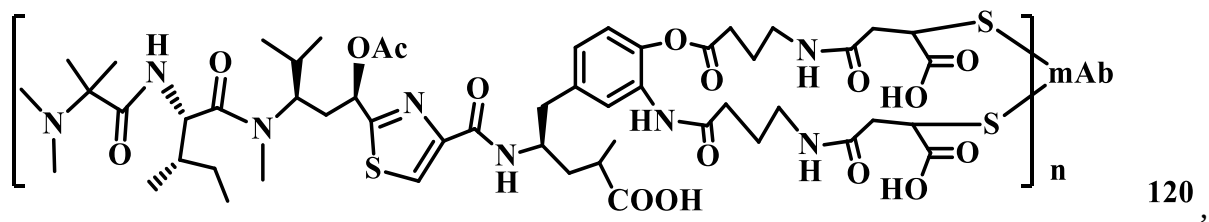
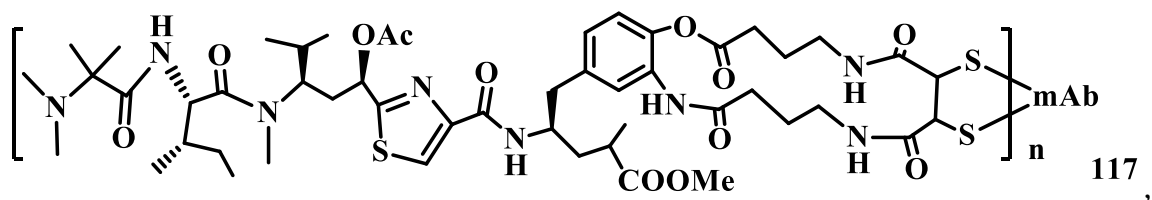
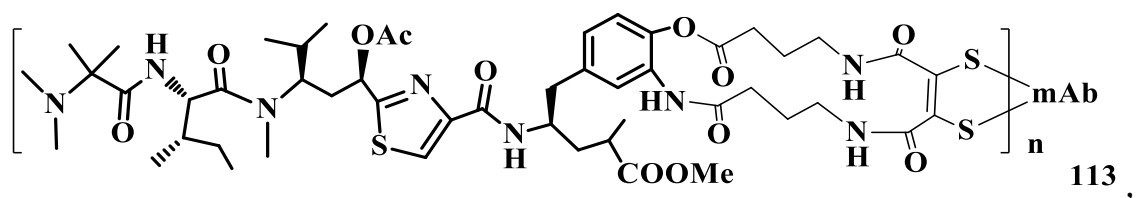
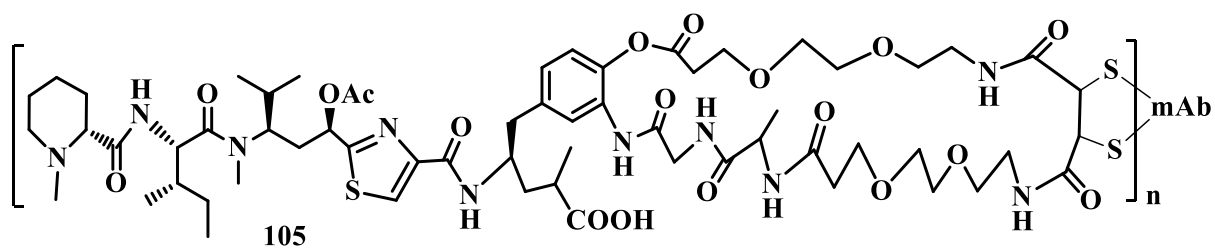


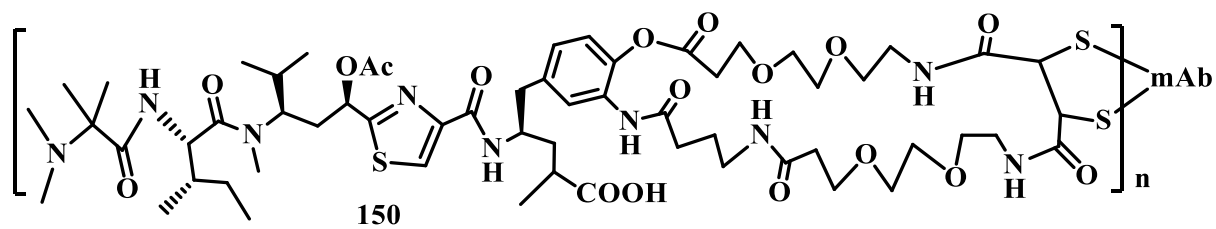
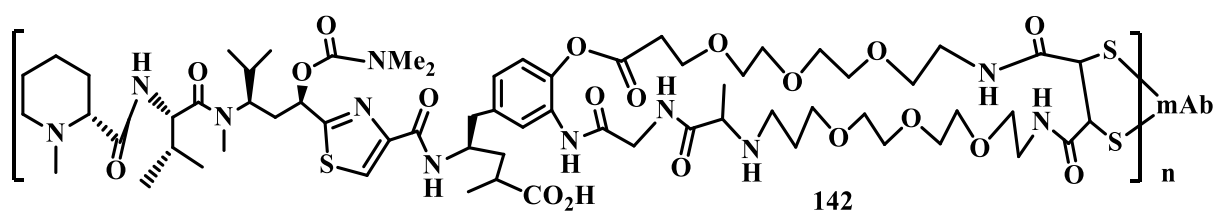
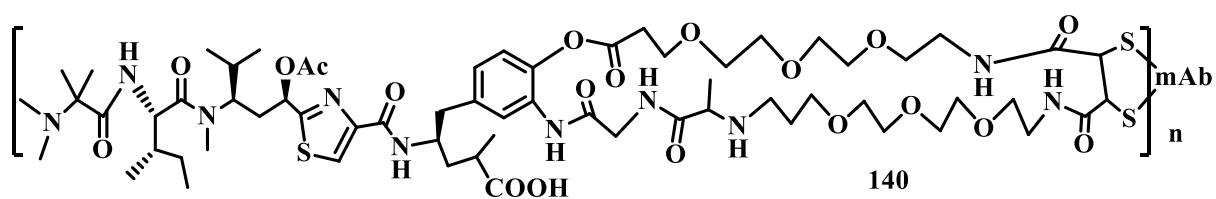
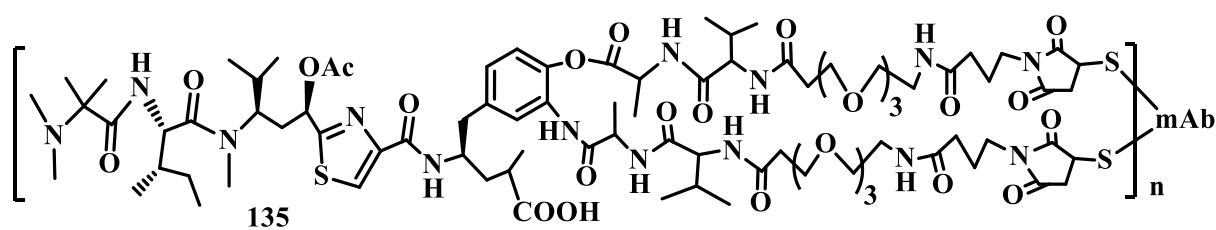
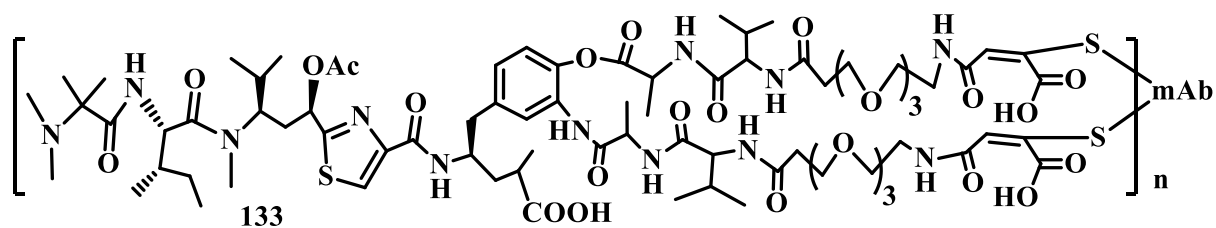
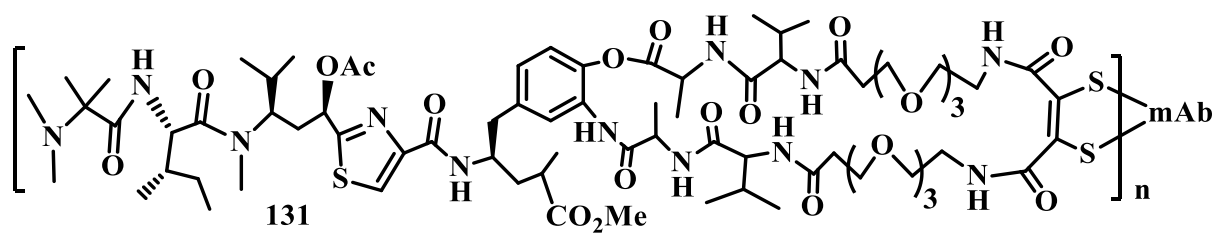


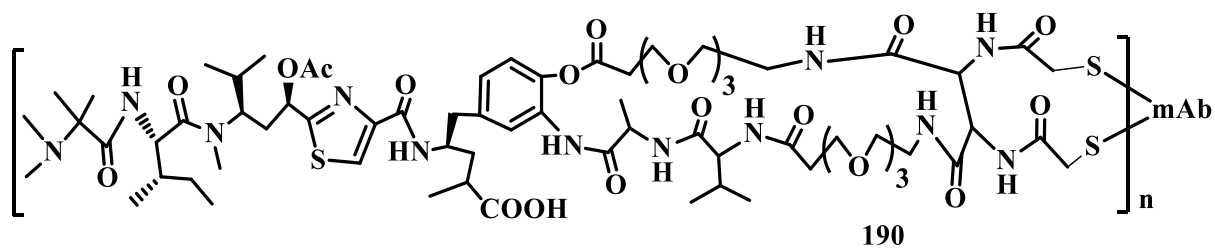
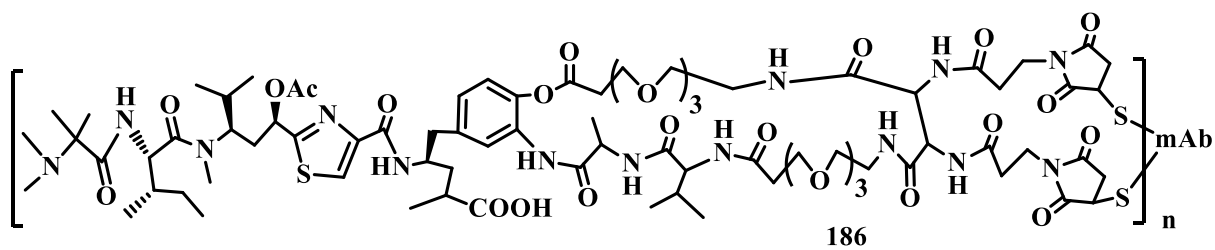
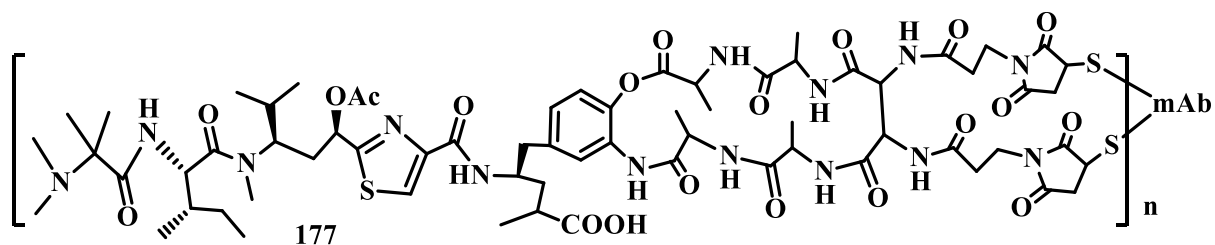
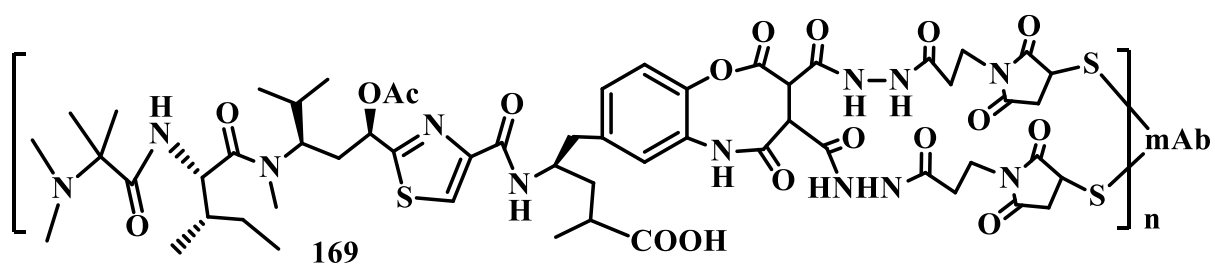
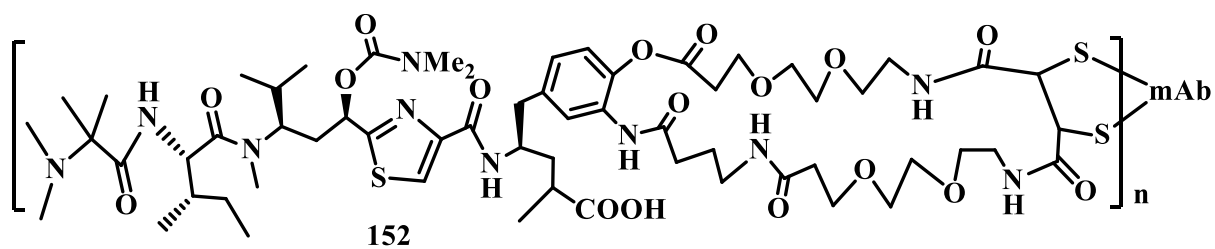


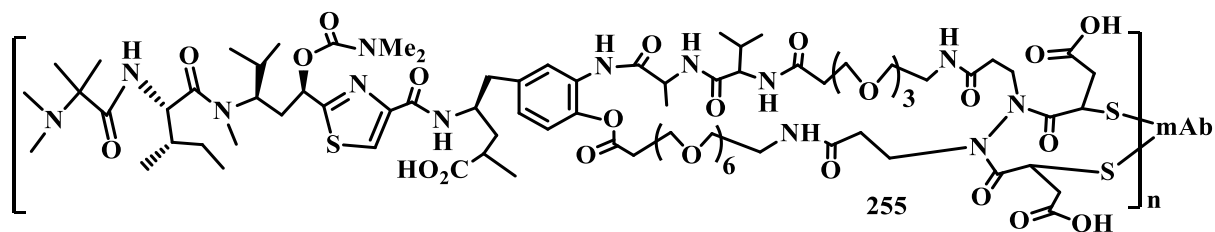
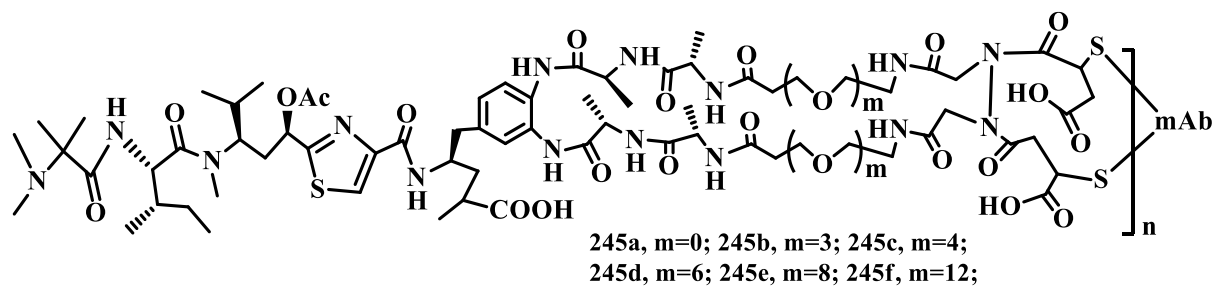
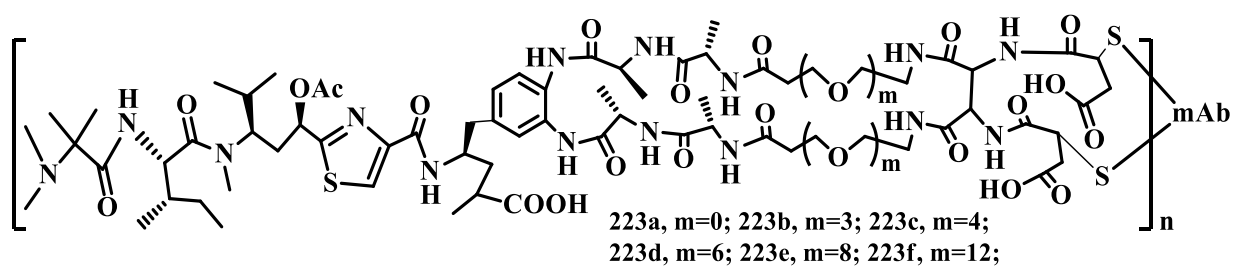
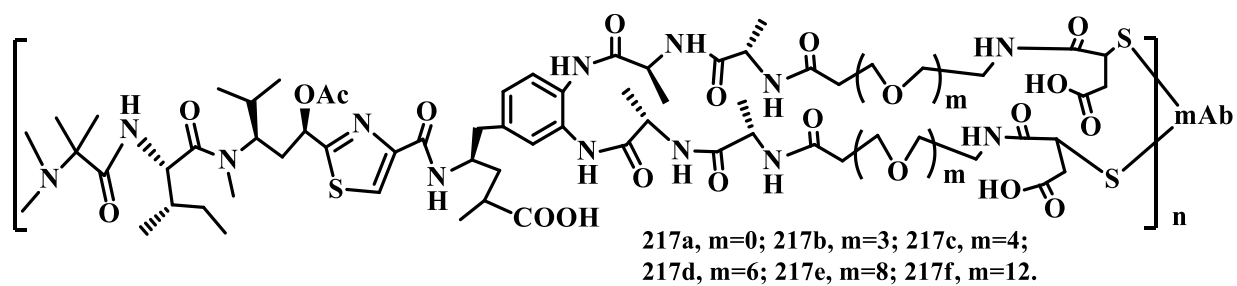
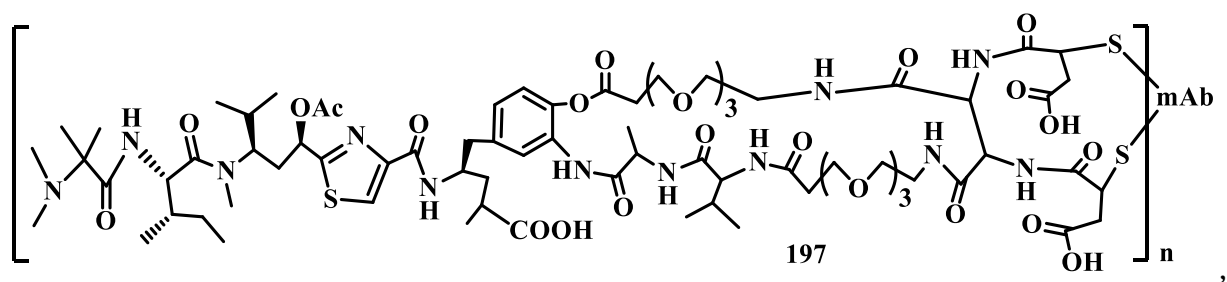
36. The compound according to Claim 1, having the Formula of 103, 105, 113, 117, 120, 127, 129, 131, 133, 135, 140, 142, 150, 152, 169, 177, 186, 190, 197, 217a, 217b, 217c, 217d, 217e, 217f, 223a, 223b, 223c, 223d, 223e, 223f, 245a, 245b, 245c, 245d, 245e, 245f, 255, 303a, 303b, 303c, 303d, 303e, 303f, 312a, 312b, 312c, 316a, 316b, 316c, 316d, 316e, 316f, 320a, 320b, 320c, 325a, 325b, 325c, 340a, 340b, 340c, 342a, 342b, 342c, 356, 384, 386, 393, 395a, 395b, 397, 399a, 399b, 399c, 401, 404, 407, 411, 413, 416, 419, 421, 424, 441, 449, 452, 457, 461, 465, A-3a, A-4a, A-5a, B-3a, B-6a, B-9a, B-12a, B-15a, B-18a, B-19a, B-20a, B-21a, B-22a, B-23a, B-24a, B-25a, B-26a, B-28a, C-3a, C-4a, D-1a or D-2a:

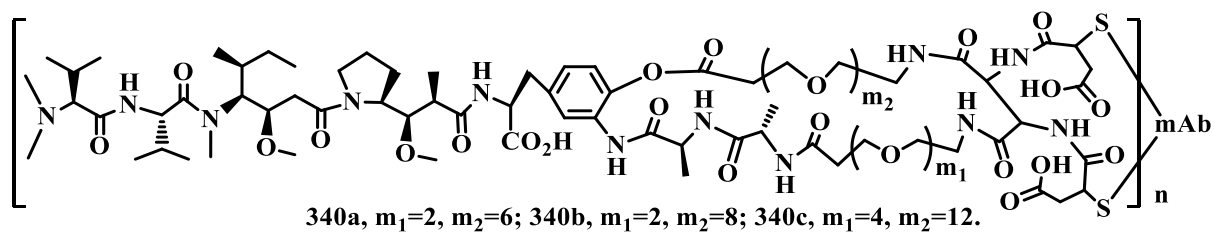
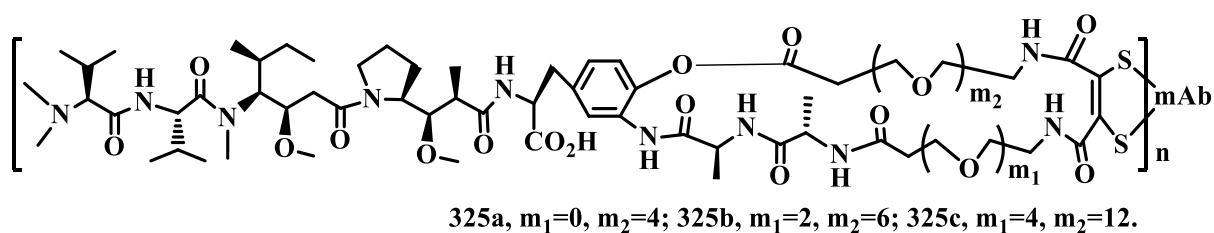
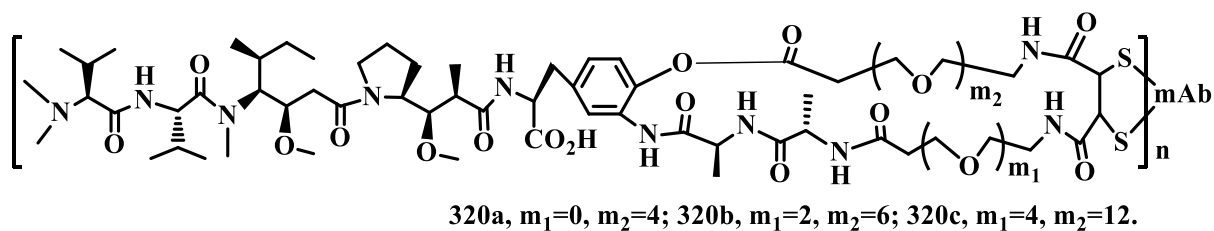
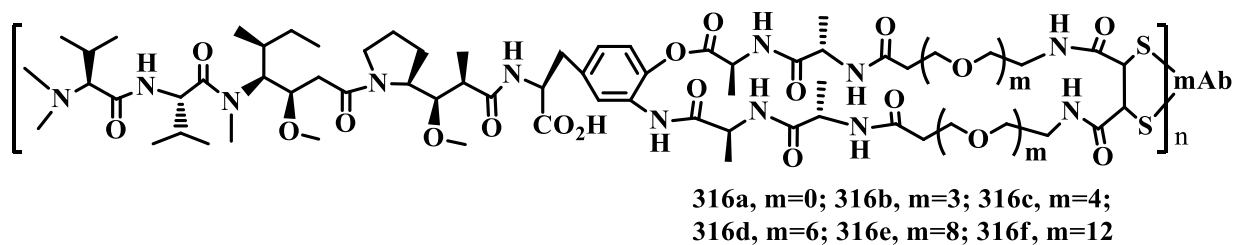
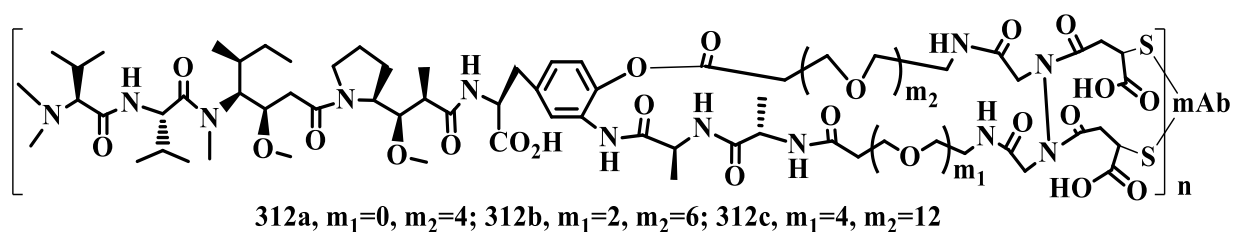
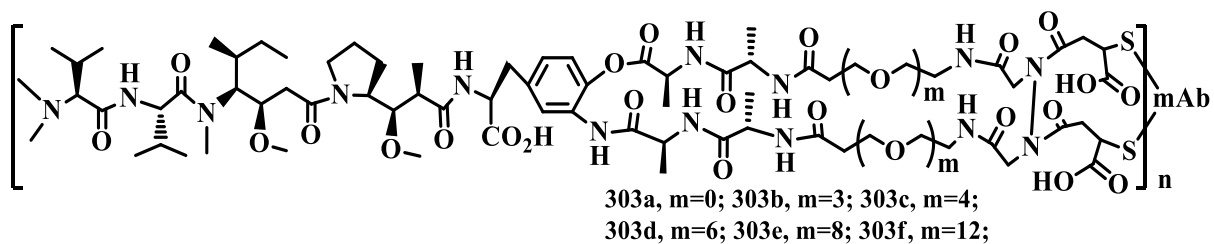


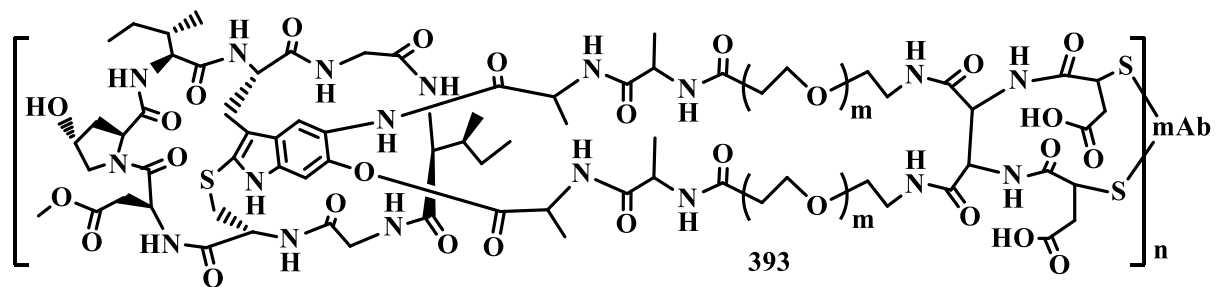
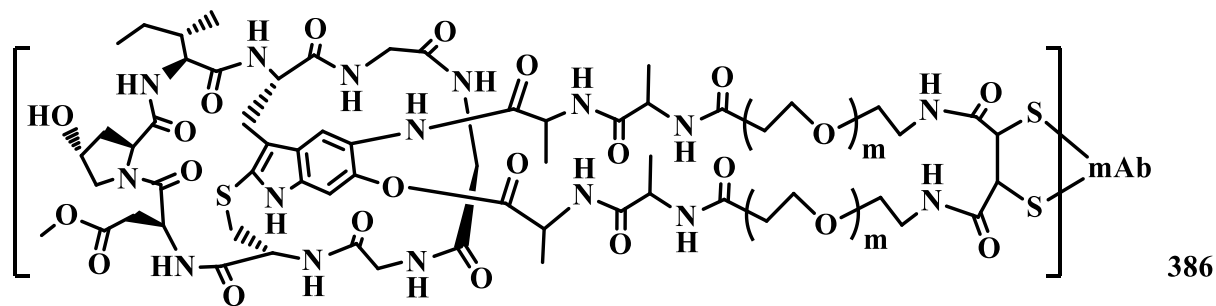
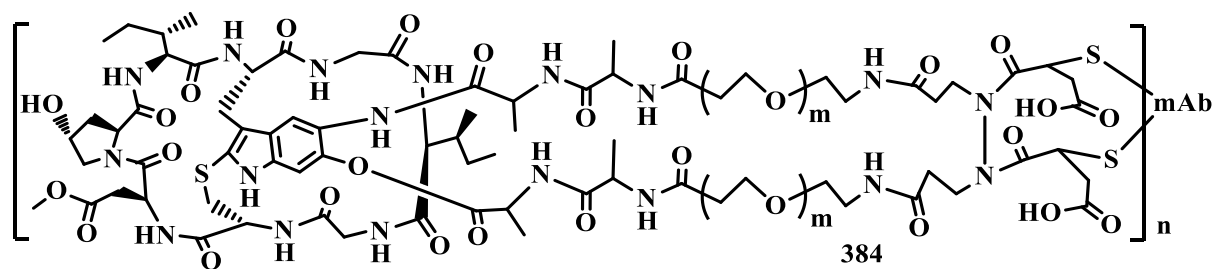
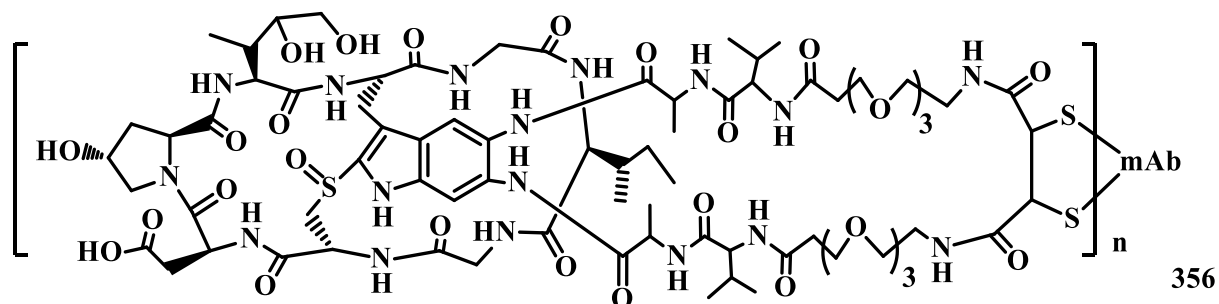
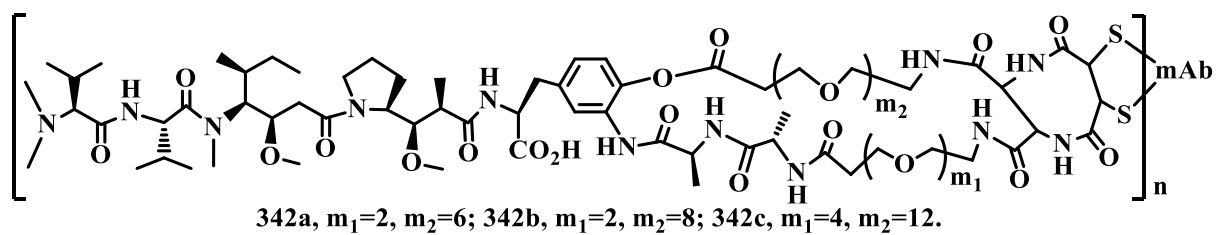


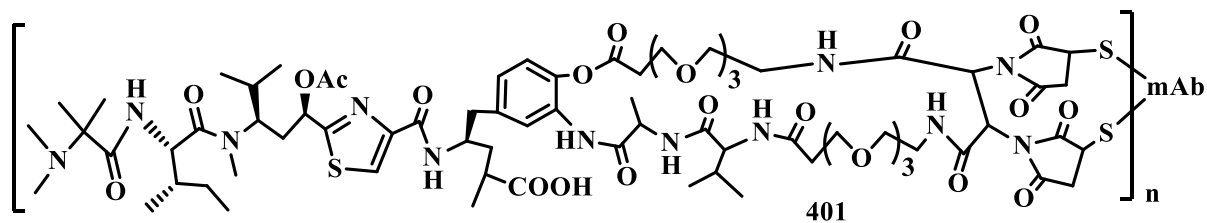
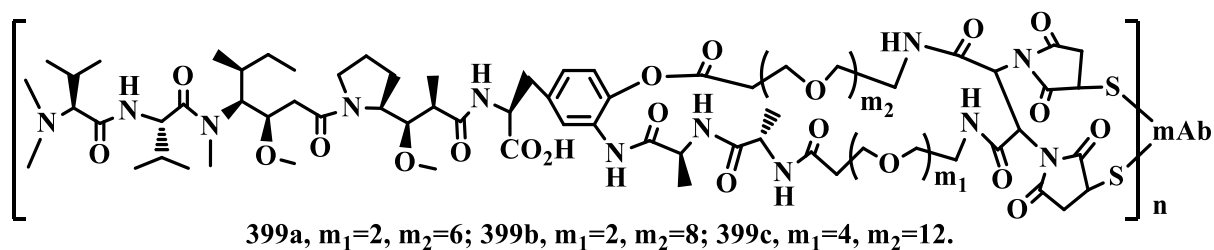
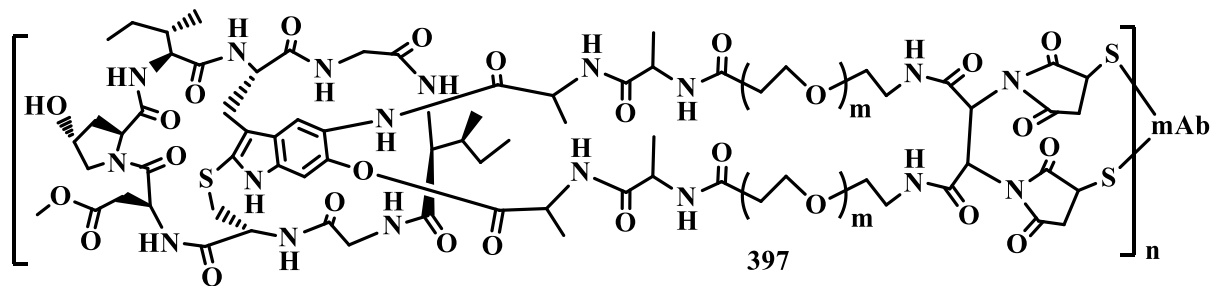
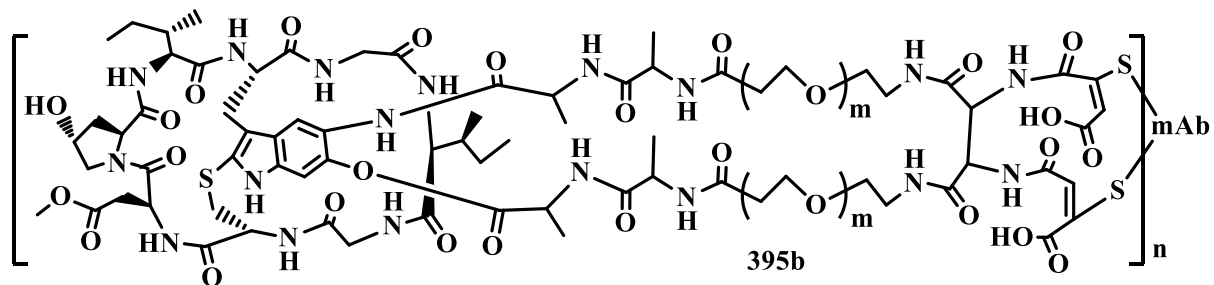
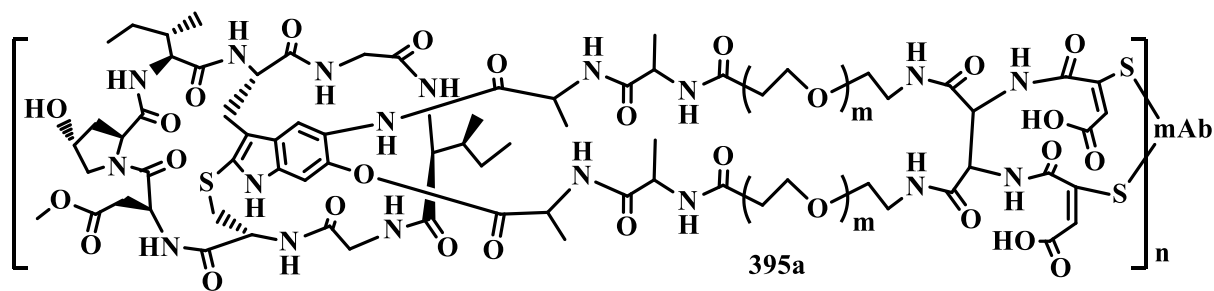


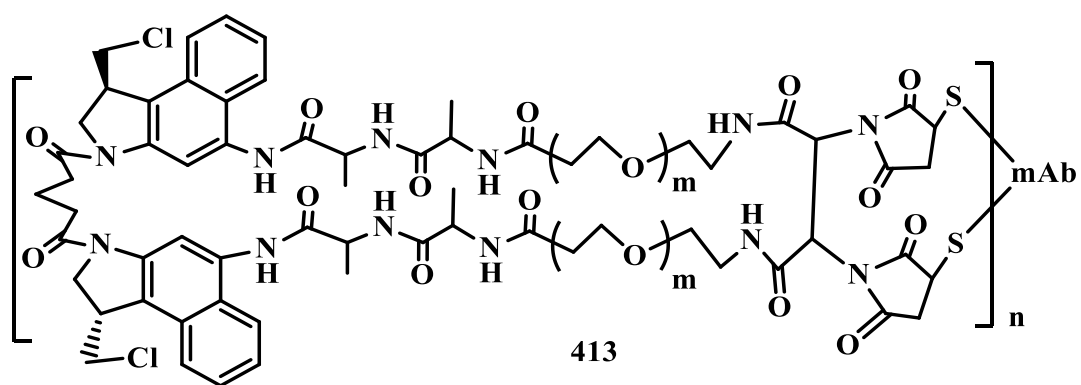
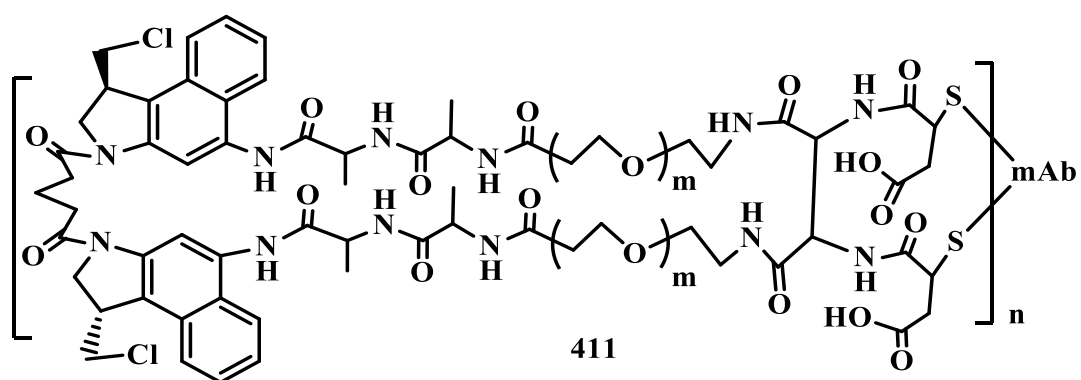
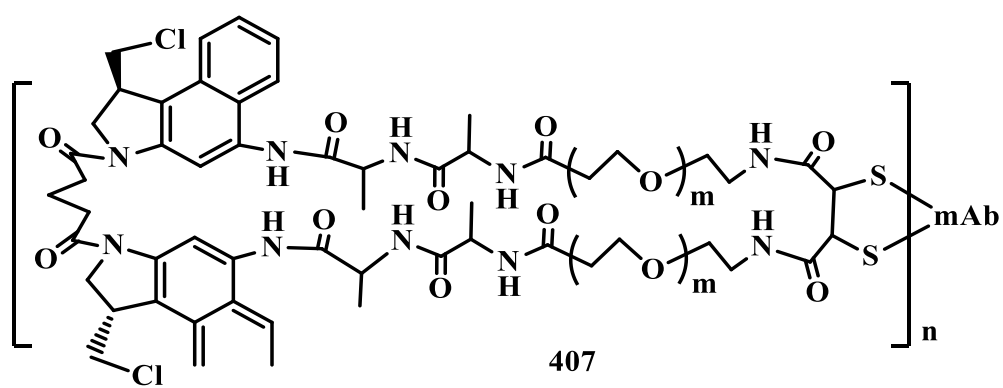
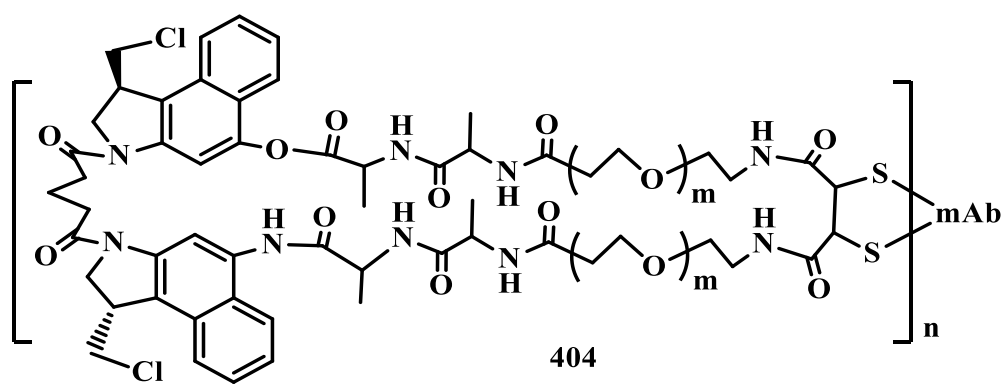


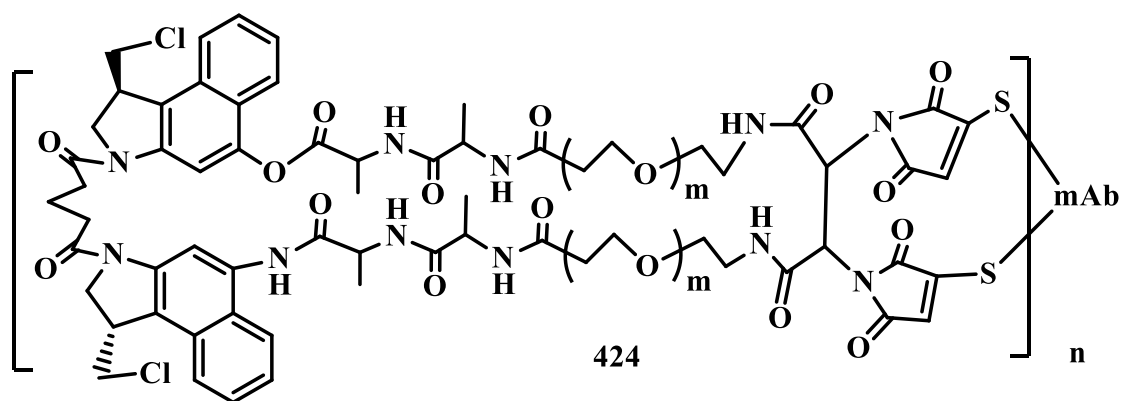
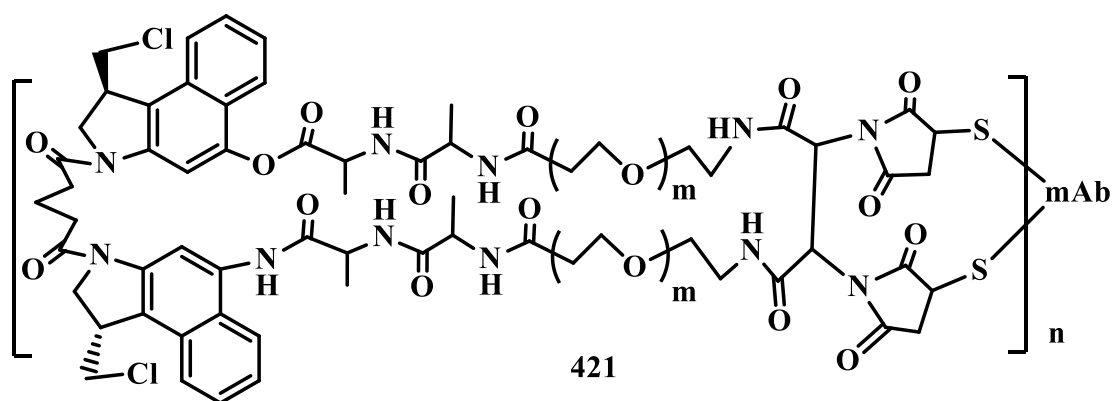
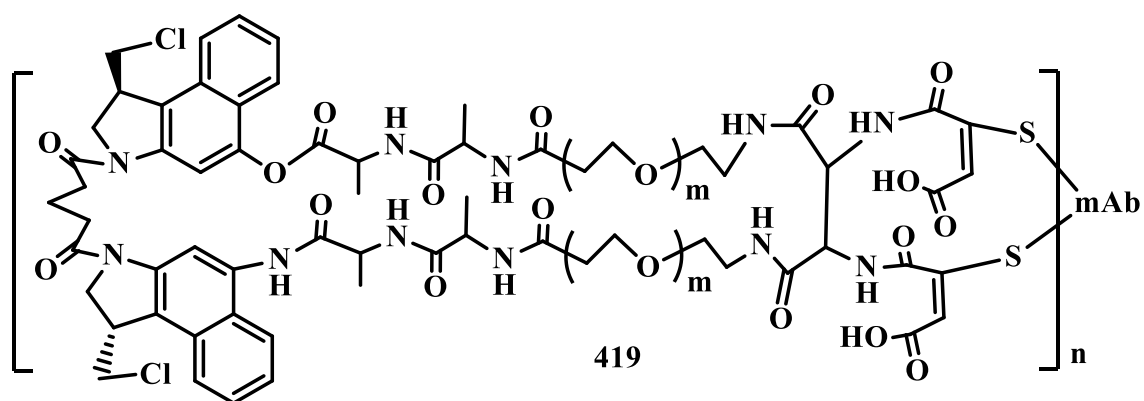
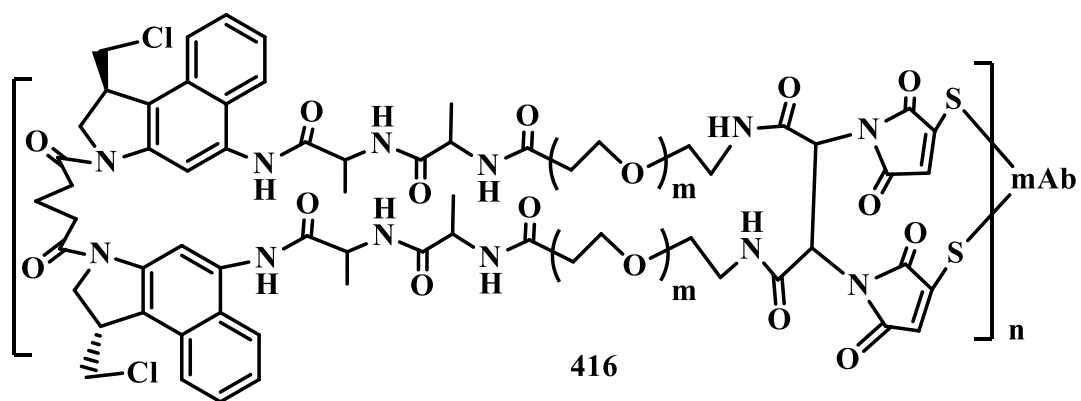


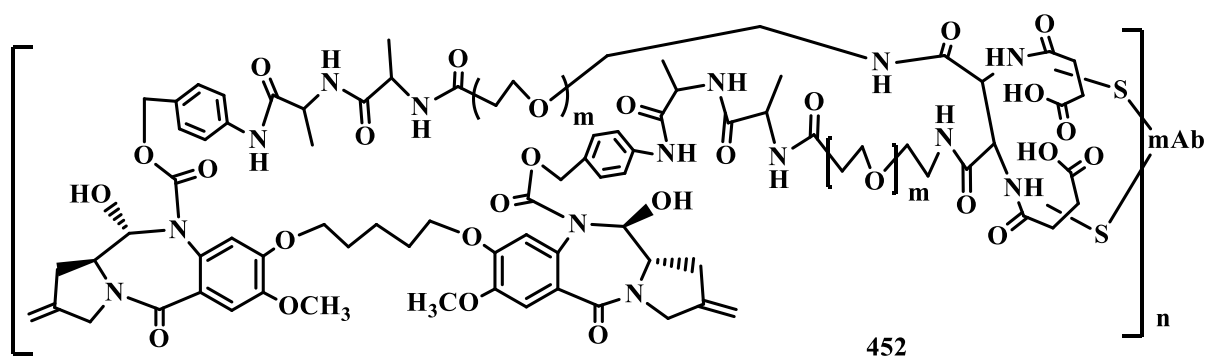
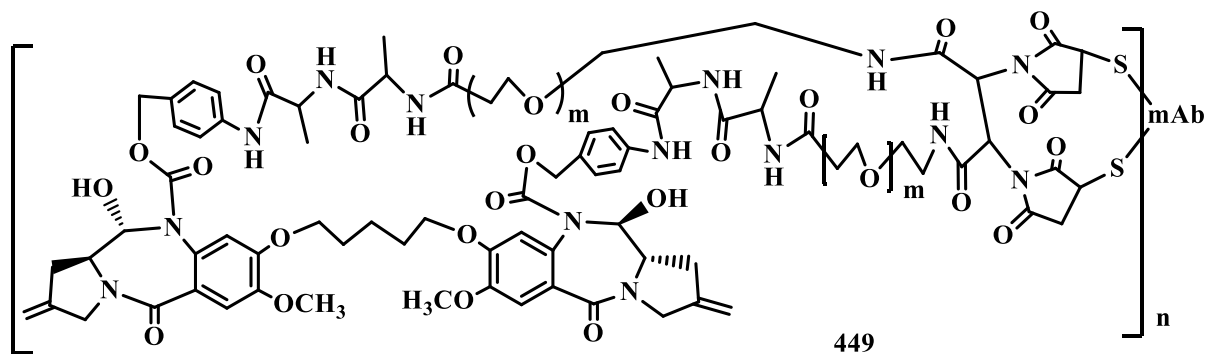
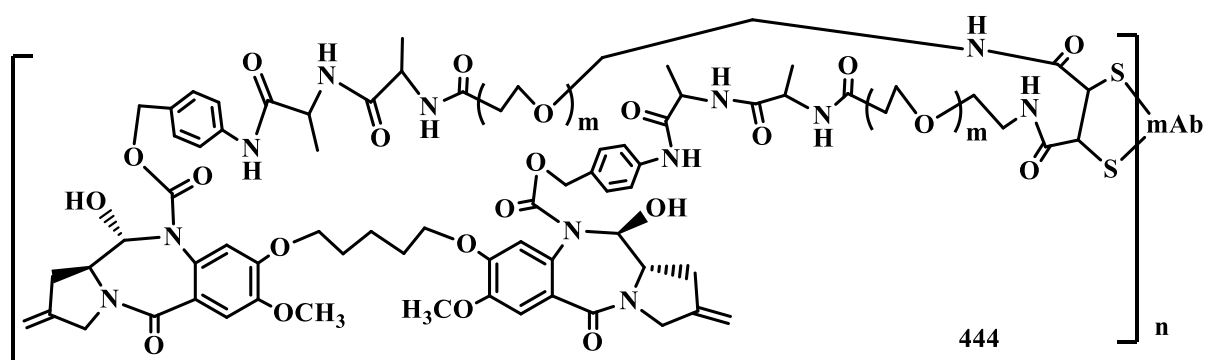


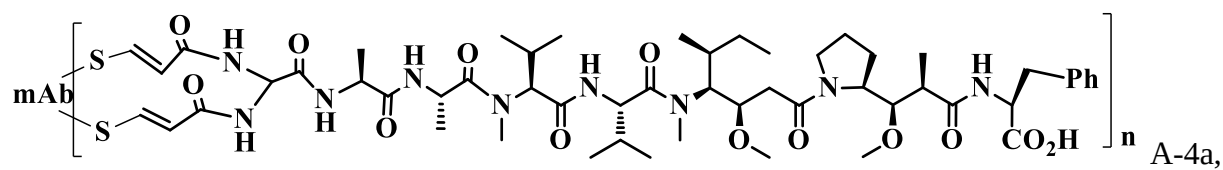
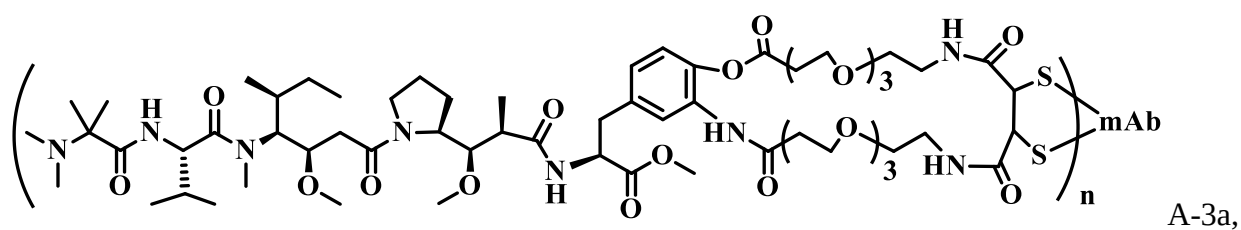
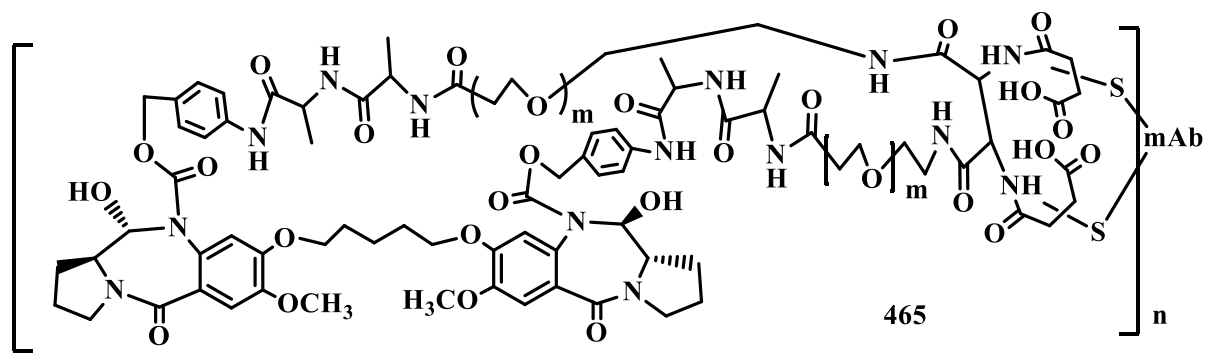
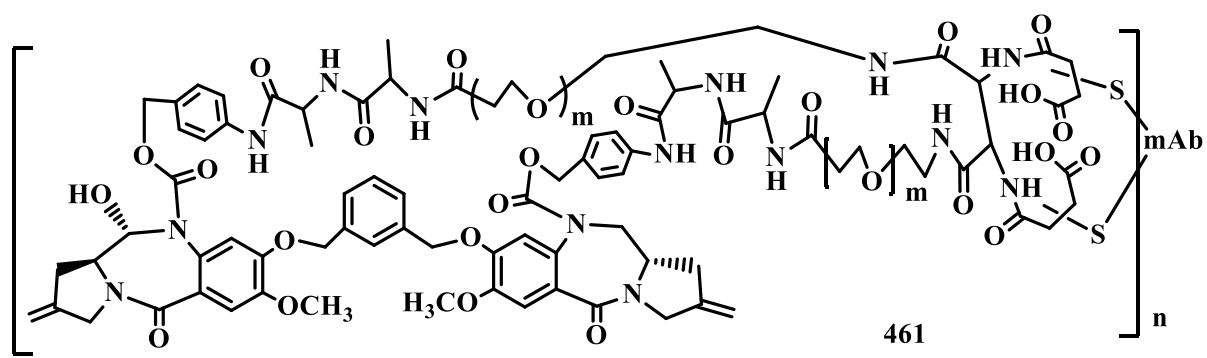
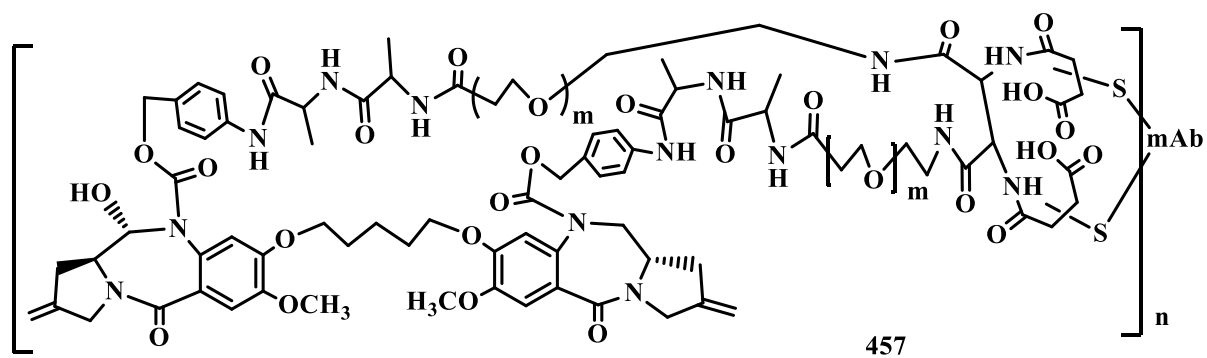


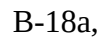
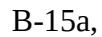
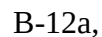


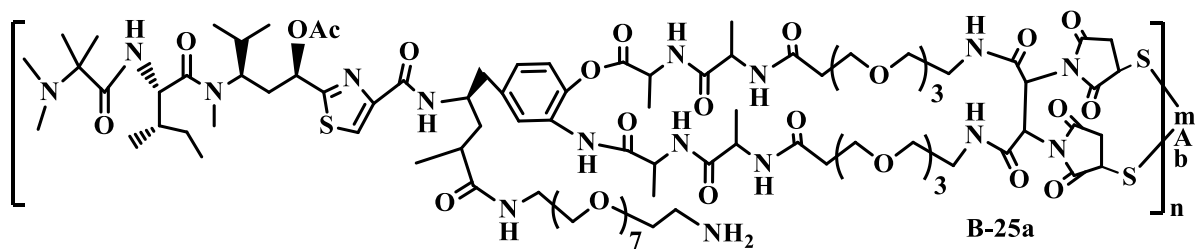
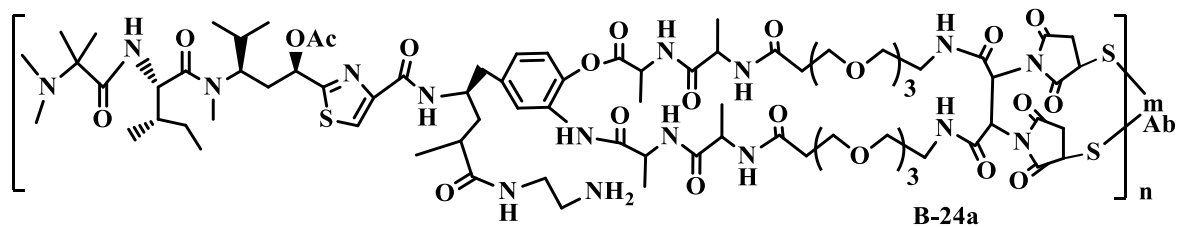
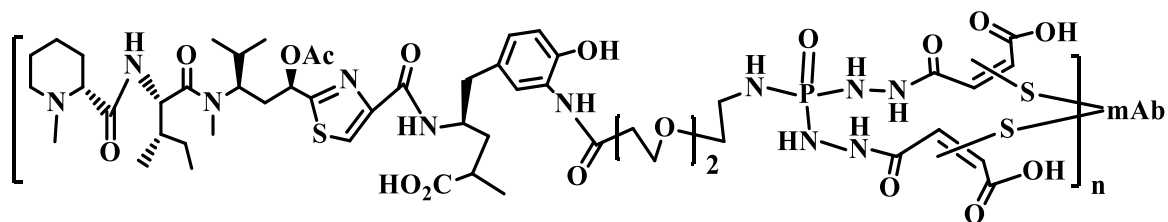
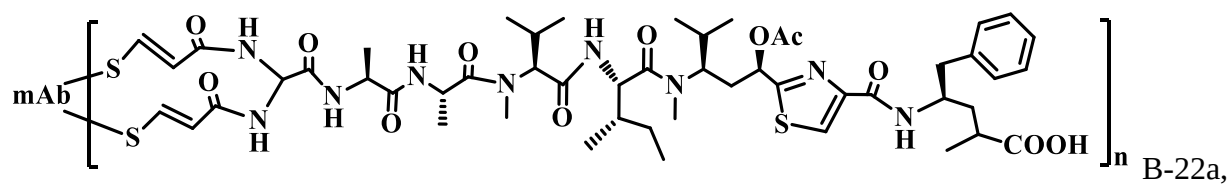
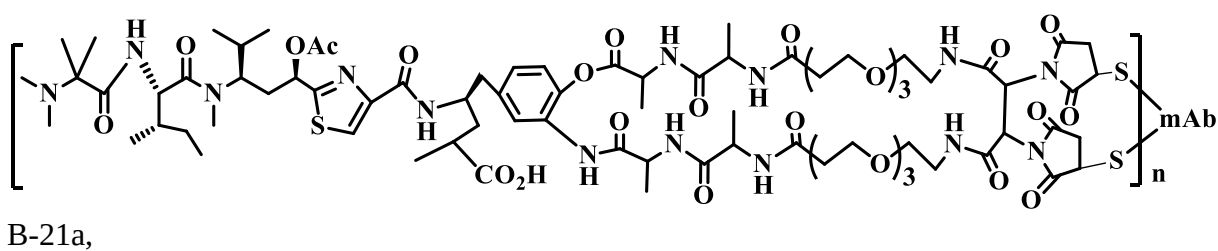
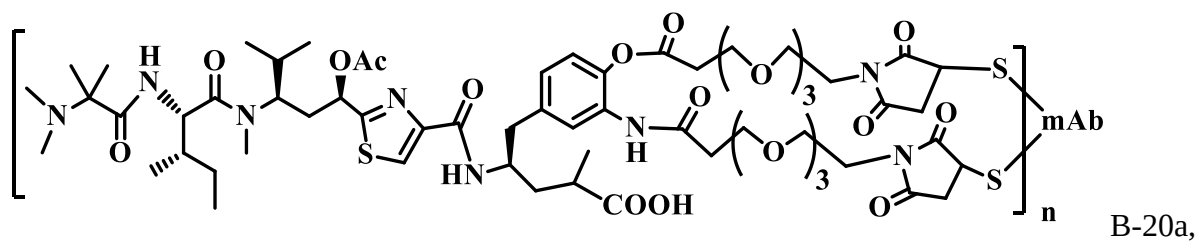
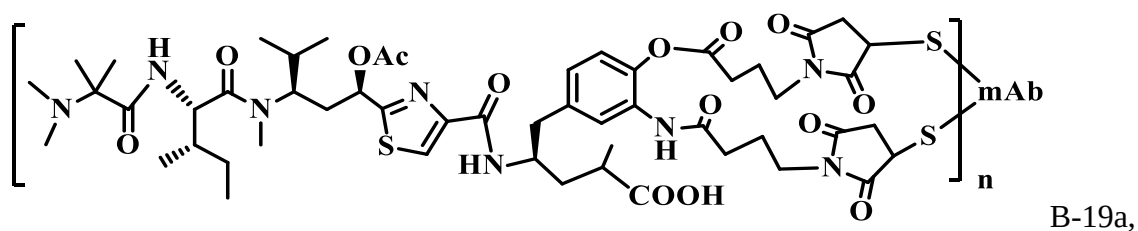




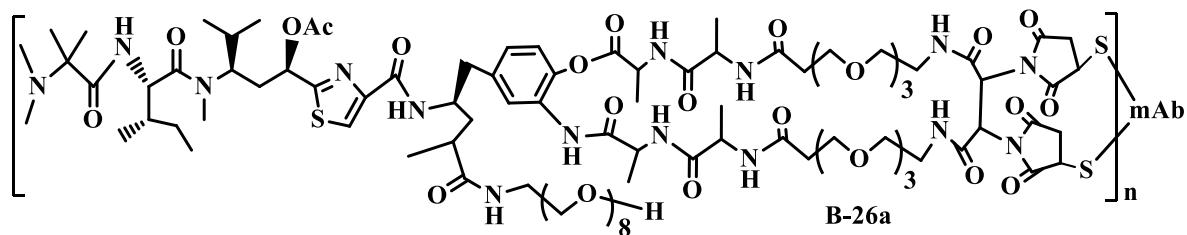




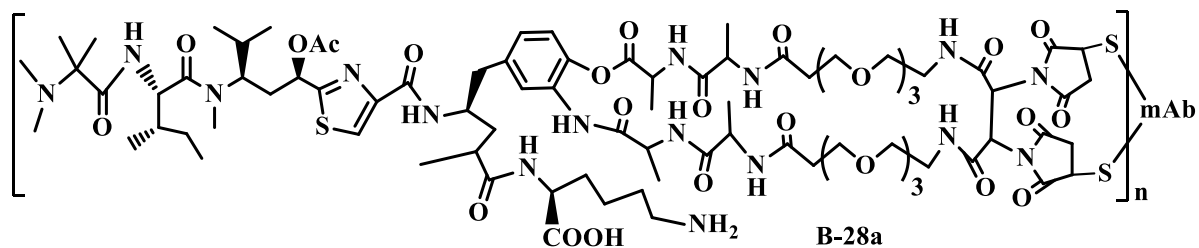




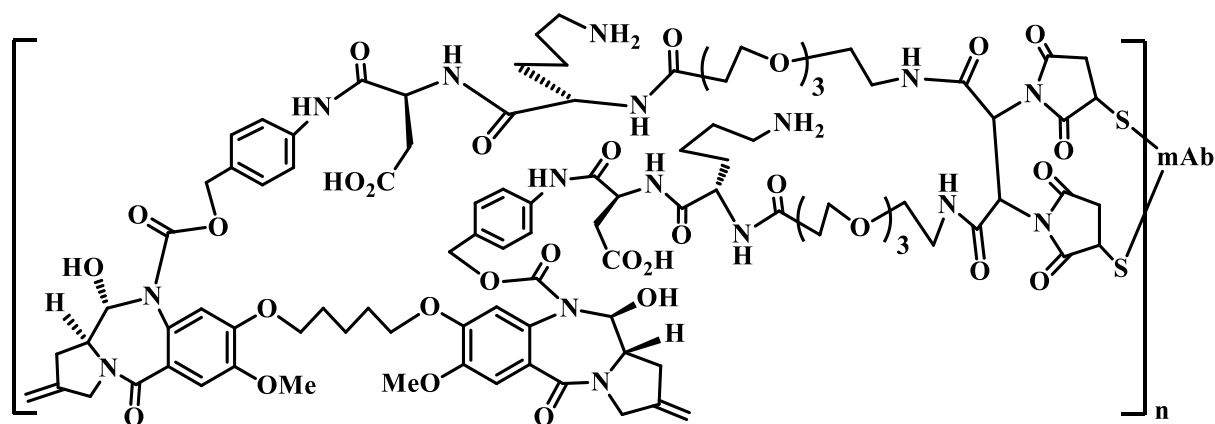
B-25a,



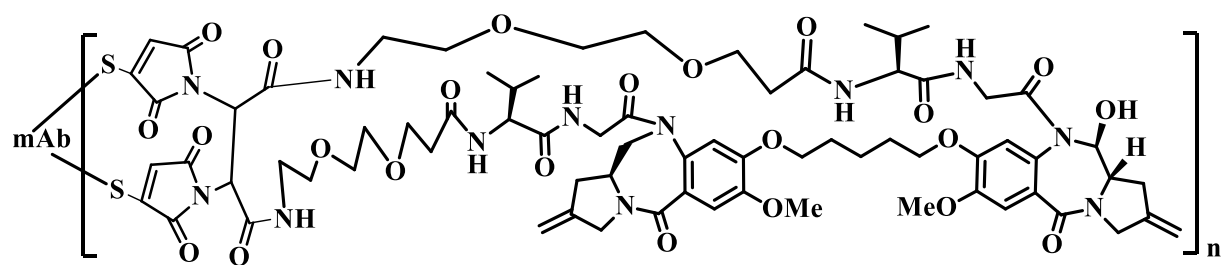
B-26a,



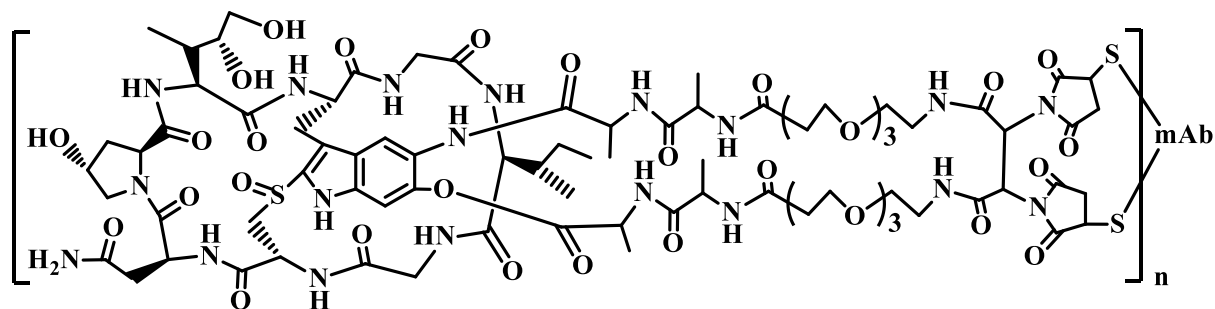
B-28a,



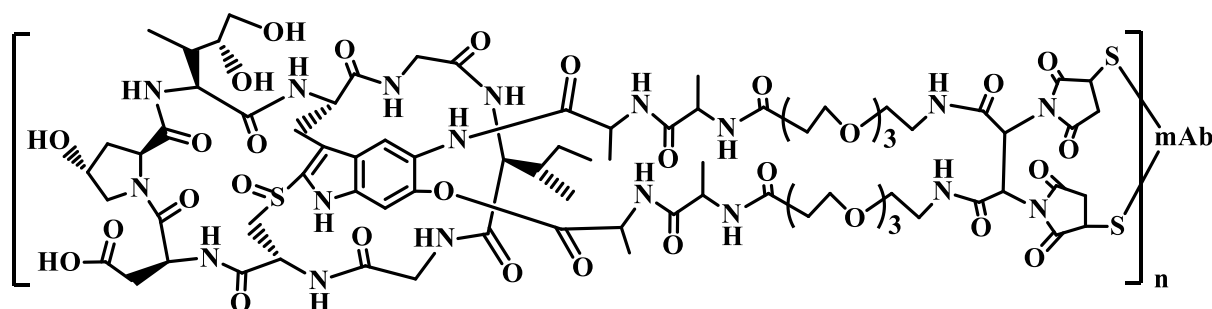
C-3a,



C-4a,



D-1a,



D-2a;

wherein m is 0-20 if not indicated in the formula; mAb, m_1 , and n are defined the same as in Claim 1.

37. A pharmaceutical composition comprising one or more of the compound according to any one of claims 1, 5, 10, 14 to 34, or 36, or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier, diluent, or excipient.

38. The pharmaceutical composition according to Claim 37, comprising 0.1 g/L ~300 g/L of one or more of the compound according to any one of claims 1, 5, 10, 14 to 34, or 36; a buffering agent with pH 4.5 to 7.5 at concentration of 10 mM -500 nM; 0%-15% of one or more polyols (comprising fructose, mannose, maltose, lactose, arabinose, xylose, ribose, rhamnose, galactose, glucose, sucrose, trehalose, sorbose, melezitose, raffinose, mannitol, xylitol, erythritol, maltitol, lactitol, erythritol, threitol, sorbitol, glycerol, or L-gluconate and its metallic salts); 0 -1.0% of a surfactant [selected from polysorbate (comprising polysorbate 20, polysorbate 40, polysorbate 65, polysorbate 80, polysorbate 81, or polysorbate 85), poloxamer (comprising poloxamer 188, poly(ethylene oxide)-poly(propylene oxide), or poloxamer 407 or polyethylene-polypropylene glycol and the like); Triton; sodium dodecyl sulfate (SDS); sodium laurel sulfate; sodium octyl glycoside; lauryl-, myristyl-, linoleyl-, or stearyl-sulfobetaine; lauryl-, myristyl-, linoleyl- or stearyl-sarcosine; linoleyl-, myristyl-, or cetyl-betaine; lauroamidopropyl-, cocamidopropyl-, linoleamidopropyl-, myristamidopropyl-, palmidopropyl-, or isostearamidopropyl-betaine (lauroamidopropyl); myristamidopropyl-, palmidopropyl-, or isostearamidopropyl-dimethylamine; sodium methyl cocoyl-, or disodium methyl oleyl-taurate; dodecyl betaine, dodecyl dimethylamine oxide, cocamidopropyl betaine and coco amphi glycinate; or the MONAQUATTM series (isostearyl ethylimidonium ethosulfate); polyethyl glycol, polypropyl glycol, and copolymers of ethylene and propylene glycol (Pluronic, PF68)]; 0 - 5 mg/ml of an antioxidant (selected from ascorbic acid and/or methionine); 0 – 2 mM of a chelating agent (selected from EDTA or EGTA); 0 - 5% of a

preservative (selected from benzyl alcohol, octadecyldimethylbenzyl ammonium chloride, hexamethonium chloride, benzalkonium chloride, benzethonium chloride, phenol, butyl and benzyl alcohol, alkyl parabens such as methyl or propyl paraben, catechol, resorcinol, cyclohexanol, 3-pentanol, or m-cresol); 0 -15% of a free amino acid; and/or a tonicity agent (selected from mannitol, sorbitol, sodium acetate, potassium chloride, sodium phosphate, potassium phosphate, trisodium citrate, or NaCl) to control the osmotic pressure from about 250 to 350 mOsm of the final formulation.

39. The pharmaceutical composition according to claim 37 or claim 38, which is held in a vial, bottle, pre-filled syringe, or pre-filled auto-injector syringe; in a form of a liquid or lyophilized solid.

40. The pharmaceutical composition according to any one of claims 37 to 39, for use in the treatment and/or prevention of a cancer, an autoimmune disease, or an infectious disease.

41. The pharmaceutical composition for use according to Claim **40**, when used concurrently with a further agent selected from a chemotherapeutic agent, a radiation therapy, an immunotherapy agent, an autoimmune disorder agent, or an anti-infectious agent, or a combination thereof.

42. The pharmaceutical composition for use according to claim **41**, wherein the further agent is selected from one or several of the following drugs: Abatacept (Orencia), Abiraterone acetate (Zytiga®), Acetaminophen /hydrocodone, aducanumab, Adalimumab, ADXS31-142 (Advaxis'), ADXS-HER2 (Advaxis'), afatinib dimaleate (Gilotrif®), alemtuzumab (Campath®), Ali-tretinoin (Panretin®), ado-trastuzumab emtansine (Kadcyla™), Amphetamine mixed salts (Amphetamine/ dextroamphetamine, or Adderall XR), anastrozole (Arimidex®), Aripiprazole, Atazanavir, Atezolizumab (MPDL3280A), Atorvastatin, axitinib (Inlyta®), Avelumab, belinostat (Beleodaq™), Bevacizumab (Avastin®), Cabazitaxel (Jevtana®), Cabozantinib (Cometriq™), bexarotene (Targretin®), blinatumomab (Blincyto™), Bortezomib (Velcade®), bosutinib (Bosulif®), brentuximab vedotin (Adcetris®), Budesonide, Budesonide/formoterol, Buprenorphine, Capecitabine, carfilzomib (Kyprolis®), Celecoxib, ceritinib (LDK378/Zykadia), Cetuximab (Erbix®), Ciclosporin, Cinacalcet, crizotinib (Xalkori®), Cosentyx, CTL019, Dabigatran, dabrafenib (Tafinlar®), Daratumumab (Darzalex), Darbepoetin alfa, Darunavir, imatinib mesylate (Gleevec®), dasatinib (Sprycel®), denileukin diftitox (Ontak®), Denosumab

(Xgeva®), Depakote, Dexlansoprazole, Dexmethylphenidate, Dexamethasone, Dignitana DigniCap Cooling System, Dinutuximab (Unituxin™), Doxycycline, Duloxetine, Duvelisib, elotuzumab, Emtricitabine/Rilpivirine/Tenofovir disoproxil fumarate, Emtricitabine/tenofovir/efavirenz, Enoxaparin, Enzalutamide (Xtandi®), Epoetin alfa, erlotinib (Tarceva®), Esomeprazole, Eszopiclone, Etanercept, Everolimus (Afinitor®), exemestane (Aromasin®), everolimus (Afinitor®), Ezetimibe, Ezetimibe/simvastatin, Fenofibrate, Filgrastim, fingolimod, Fluticasone propionate, Fluticasone/salmeterol, fulvestrant (Faslodex®), gazyva, gefitinib (Iressa®), Glatiramer, Goserelin acetate (Zoladex), Icotinib, Imatinib (Gleevec), Ibritumomab tiuxetan (Zevalin®), ibrutinib (Imbruvica™), idelalisib (Zydelig®), Infliximab, iniparib, Insulin aspart, Insulin detemir, Insulin glargine, Insulin lispro, Interferon beta 1a, Interferon beta 1b, lapatinib (Tykerb®), Ipilimumab (Yervoy®), Ipratropium bromide/salbutamol, Ixazomi (Ninlaro®), Kanuma, Lanreotide acetate (Somatuline® Depot), lenalidomide, lenaliomide (Revlimid®), lenvatinib mesylate (Lenvima™), letrozole (Femara®), Levothyroxine, Levothyroxine, Lidocaine, Linezolid, Liraglutide, Lisdexamfetamine, LN-144 (Lion Biotech.), MEDI4736 (AstraZeneca, Celgene), Memantine, Methylphenidate, Metoprolol, Mekinist, Modafinil, Mometasone, Nilotinib (Tasigna®), niraparib, Nivolumab (Opdivo®), ofatumumab (Arzerra®), obinutuzumab (Gazyva™), olaparib (Lynparza™), Olmesartan, Olmesartan/hydrochlorothiazide, Omalizumab, Omega-3 fatty acid ethyl esters, Oseltamivir, Oxycodone, palbociclib (Ibrance®), Palivizumab, panitumumab (Vectibix®), panobinostat (Farydak®), pazopanib (Votrient®), pembrolizumab (Keytruda®), Pemetrexed (Alimta), pertuzumab (Perjeta™), Pneumococcal conjugate vaccine, pomalidomide (Pomalyst®), Pregabalin, ProscarVax, Propranolol, Quetiapine, Rabeprazole, radium 223 chloride (Xofigo®), Raloxifene, Raltegravir, ramucirumab (Cyramza®), Ranibizumab, regorafenib (Stivarga®), Rituximab (Rituxan®), Rivaroxaban, romidepsin (Istodax®), Rosuvastatin, ruxolitinib phosphate (Jakafi™), Salbutamol, Sevelamer, Sildenafil, siltuximab (Sylvant™), Sitagliptin, Sitagliptin/metformin, Solifenacin, solanezumab, Sorafenib (Nexavar®), Sunitinib (Sutent®), Tadalafil, tamoxifen, Tafenlar, talazoparib, Telaprevir, temsirolimus (Torisel®), Tenofovir/emtricitabine, Testosterone gel, Thalidomide (Immunoprin, Talidex), Tiotropium bromide, toremifene (Fareston®), trametinib (Mekinist®), Trastuzumab, Tretinoin (Vesanoid®), Ustekinumab, Valsartan, veliparib, vandetanib (Caprelsa®), vemurafenib (Zelboraf®), venetoclax, vorinostat (Zolinza®), ziv-aflibercept (Zaltrap®), Zostavax, or analogs, derivatives, pharmaceutically acceptable salts, carriers, diluents, or excipients thereof, or a combination thereof.

43. Use of the compound according to any one of claims 1, 5, 10, 14 to 34, or 36, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition according to any one of claims 37 to 39, in the manufacture of a medicament for the treatment and/or prevention of a cancer, an autoimmune disease, or an infectious disease.