CLAIMS

1. An isolated antibody or antigen binding fragment thereof that specifically binds to an epitope of the human HER2 receptor, wherein the antibody or antigen binding fragment thereof comprises a variable heavy chain complementarity determining region 1 (CDRH1) comprising the amino acid sequence FTFSSYSMN (SEQ ID NO: 25); a variable heavy chain complementarity determining region 2 (CDRH2) comprising the amino acid sequence YISSSSSTIYYADSVKG (SEQ ID NO: 26); a variable heavy chain complementarity determining region 3 (CDRH3) comprising the amino acid sequence GGHGYFDL (SEQ ID NO: 27); a variable light chain complementarity determining region 1 (CDRL1) comprising the amino acid sequence RASQSVSSSYLA (SEQ ID NO: 28); a variable light chain complementarity determining region 2 (CDRL2) comprising the amino acid sequence GASSRAT (SEQ ID NO: 21); and a variable light chain complementarity determining region 3 (CDRL3) comprising the amino acid sequence QQYHHSPLT (SEQ ID NO: 29).

2. The isolated antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises a variable heavy chain comprising the amino acid sequence of SEQ ID NO: 13 and a variable light chain comprising the amino acid sequence of SEQ ID NO: 14.

3. The isolated antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 5 and a light chain comprising the amino acid sequence of SEQ ID NO: 6.

4. The isolated antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof is a monoclonal antibody, a domain antibody, a single chain antibody, a Fab fragment, a F(ab′)2 fragment, a single chain variable fragment (scFv), a scFv-Fc fragment, a single chain antibody (scAb), a domain antibody (dAb), a single domain heavy chain antibody, or a single domain light chain antibody.

5. The isolated antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof is a rabbit, mouse, chimeric, humanized or fully human monoclonal antibody.

6. The isolated antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof is an IgG isotype.

7. The isolated antibody or antigen binding fragment thereof of claim 1, wherein the antibody or antigen binding fragment thereof is an IgG1 isotype.

8. A conjugate comprising the isolated antibody or antigen binding fragment thereof of claim 1 and one or more therapeutic or diagnostic agents (D), wherein each D is independently connected directly or indirectly to the antibody or antigen binding fragment thereof.

9. The conjugate of claim 8, wherein the antibody or antigen binding fragment thereof comprises a variable heavy chain comprising the amino acid sequence of SEQ ID NO: 13 and a variable light chain comprising the amino acid sequence of SEQ ID NO: 14.

10. The conjugate of claim 8, wherein the antibody or antigen binding fragment thereof comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 5 and a light chain comprising the amino acid sequence of SEQ ID NO: 6.

11. The conjugate of claim 8, wherein the antibody or antigen binding fragment thereof is a monoclonal antibody, a domain antibody, a single chain antibody, a Fab fragment, a F(ab')2 fragment, a scFv, a scFv-Fc, a scAb, a dAb, a single domain heavy chain antibody, or a single domain light chain antibody.

12. The conjugate of claim 8, wherein the antibody or antigen binding fragment thereof is a rabbit, mouse, chimeric, humanized or fully human monoclonal antibody.

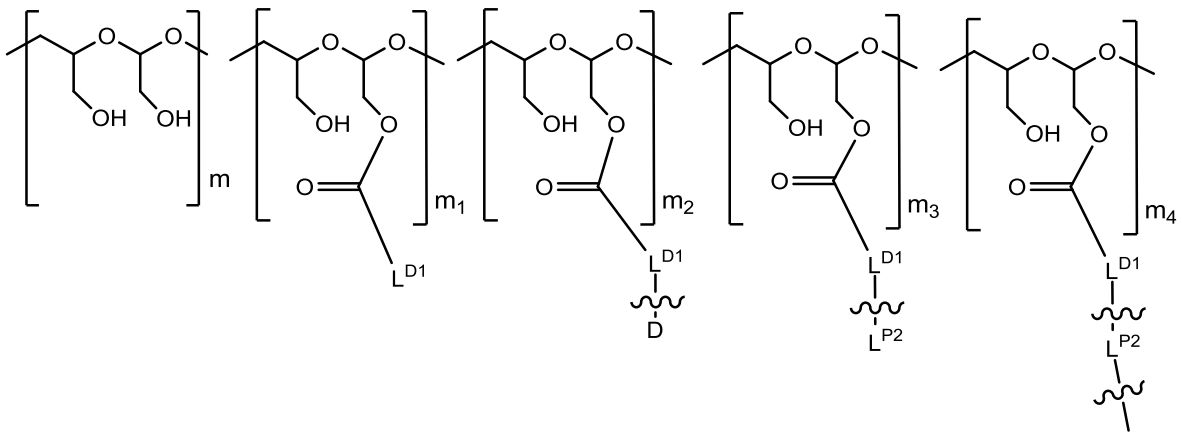
13. The conjugate of claim 8, wherein the antibody or antigen binding fragment thereof is an IgG isotype.

14. The conjugate of claim 8, wherein the antibody or antigen binding fragment thereof is an IgG1 isotype.

15. The conjugate of claim 8, further comprising one or more polymeric scaffolds connected both to the antibody or antigen binding fragment thereof and to one or more D, wherein each of the one or more D is independently connected to the antibody or antigen binding fragment thereof via the one or more polymeric scaffolds.

16. The conjugate of claim 15, wherein each of the one or more polymeric scaffolds independently comprises poly(l-hydroxymethylethylene hydroxymethyl-formal) (PHF) having a molecular weight ranging from about 2 kDa to about 40 kDa.

17. The conjugate of claim 16, wherein each of the one or more polymeric scaffolds independently is of Formula (Ic):

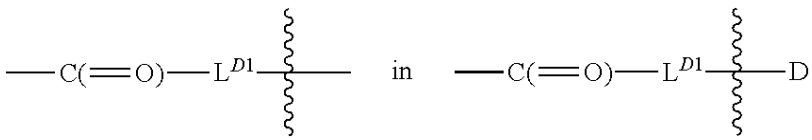


(Ic)

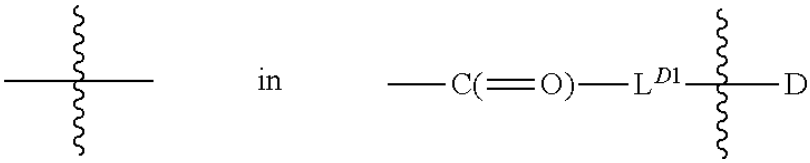
wherein:

L^{D1} is a carbonyl-containing moiety;

each occurrence of

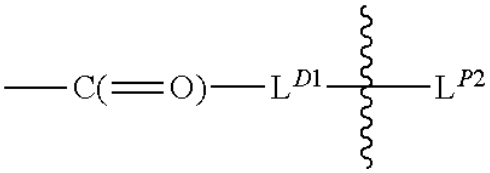


is independently a first linker that contains a biodegradable bond so that when the bond is broken, D is released in an active form for its intended therapeutic effect; and the

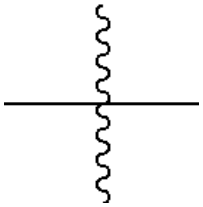


between L^{D1} and D denotes direct or indirect attachment of D to L^{D1};

each occurrence of

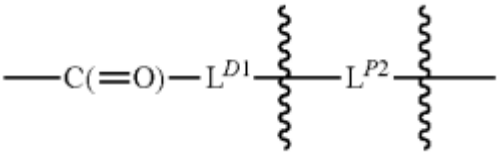


is independently a second linker not yet connected to the isolated antibody or antigen binding fragment thereof, in which L^{P2} is a moiety containing a functional group that is yet to form a covalent bond with a functional group of the isolated antibody or antigen binding fragment thereof, and the



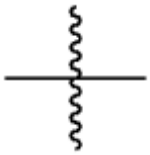
between L^{D1} and L^{P2} denotes direct or indirect attachment of L^{P2} to L^{D1}, and each occurrence of the second linker is distinct from each occurrence of the first linker;

each occurrence of



is independently a third linker that connects each D-carrying polymeric scaffold to the isolated

antibody or antigen binding fragment thereof, in which the terminal



attached to L^{P2} denotes direct or indirect attachment of L^{P2} to the isolated antibody or antigen binding fragment thereof upon formation of a covalent bond between a functional group of L^{P2} and a functional group of the isolated antibody or antigen binding fragment thereof; and each occurrence of the third linker is distinct from each occurrence of the first linker;

m is an integer from 1 to about 300,

m_1 is an integer from 1 to about 140,

m_2 is an integer from 1 to about 40,

m_3 is an integer from 0 to about 18,

m_4 is an integer from 1 to about 10;

the sum of m, m_1, m_2, m_3, and m_4 ranges from 15 to 300; and

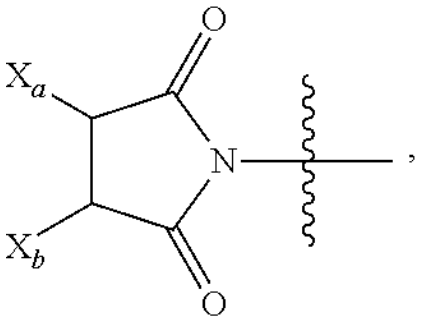
the total number of L^{P2} connected to the isolated antibody or antigen binding fragment thereof is 10 or less.

18. The conjugate of claim 17, wherein the sum of m, m_1, m_2, m_3 and m_4 ranges from 15 to 150, m_1 is an integer from 1 to 70, m_2 is an integer from 1 to 20, m_3 is an integer from 0 to 10, and PHF has a molecular weight ranging from about 2 kDa to about 20 kDa.

19. The conjugate of claim 17, wherein the sum of m, m_1, m_2, m_3 and m_4 ranges from 20 to 110, m_1 is an integer from 2 to 50, m_2 is an integer from 2 to 15, m_3 is an integer from 0 to 8; and PHF has a molecular weight ranging from about 3 kDa to about 15 kDa.

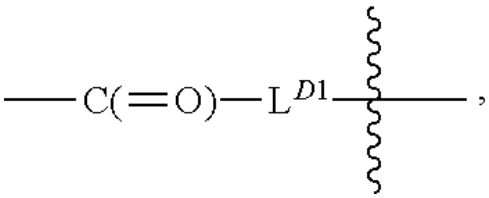
20. The conjugate of claim 17, wherein the sum of m, m_1, m_2, m_3 and m_4 ranges from 40 to 75, m_1 is an integer from 2 to 35, m_2 is an integer from 2 to 10, m_3 is an integer from 0 to 5; and PHF has a molecular weight ranging from about 5 kDa to about 10 kDa.

21. The conjugate of claim 17, wherein the functional group of L^2 is selected from SR^p, —S—S-LG,



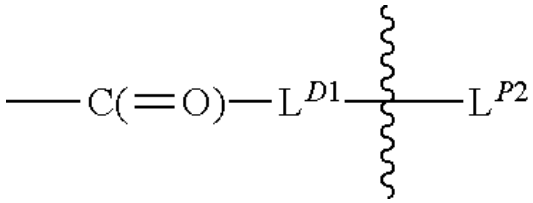
and halo, in which LG is a leaving group, R^p is H or a sulfur protecting group, and one of X_a and X_b is H and the other is a water-soluble maleimido blocking moiety, or X_a and X_b, together with the carbon atoms to which they are attached for a carbon-carbon double bond.

22. The conjugate of claim 17, wherein L^{D1} comprises X—$(CH_2)_v$—C(=O)— with X directly connected to the carbonyl group



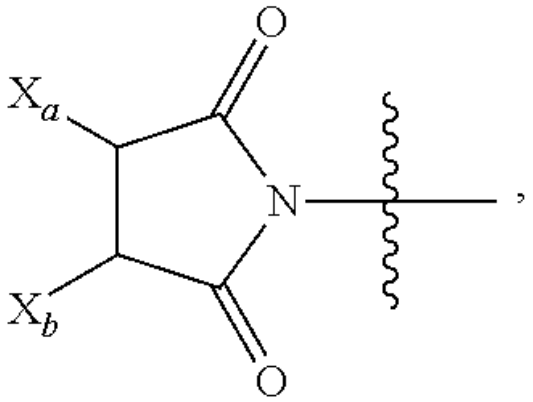
in which X is CH_2, O, or NH, and v is an integer from 1 to 6.

23. The conjugate of claim 17, wherein each occurrence of



is independently

—C(=O)—X—$(CH_2)_v$—C(=O)—NH—$(CH_2)_u$—NHC(=O)—$(CH_2)_w$—$(OCH_2)_x$—NHC(=O)—($CH_2)_y$-M, in which X is CH_2, O, or NH, each of v, u, w, x and y independently is an integer from 1 to 6, and M is

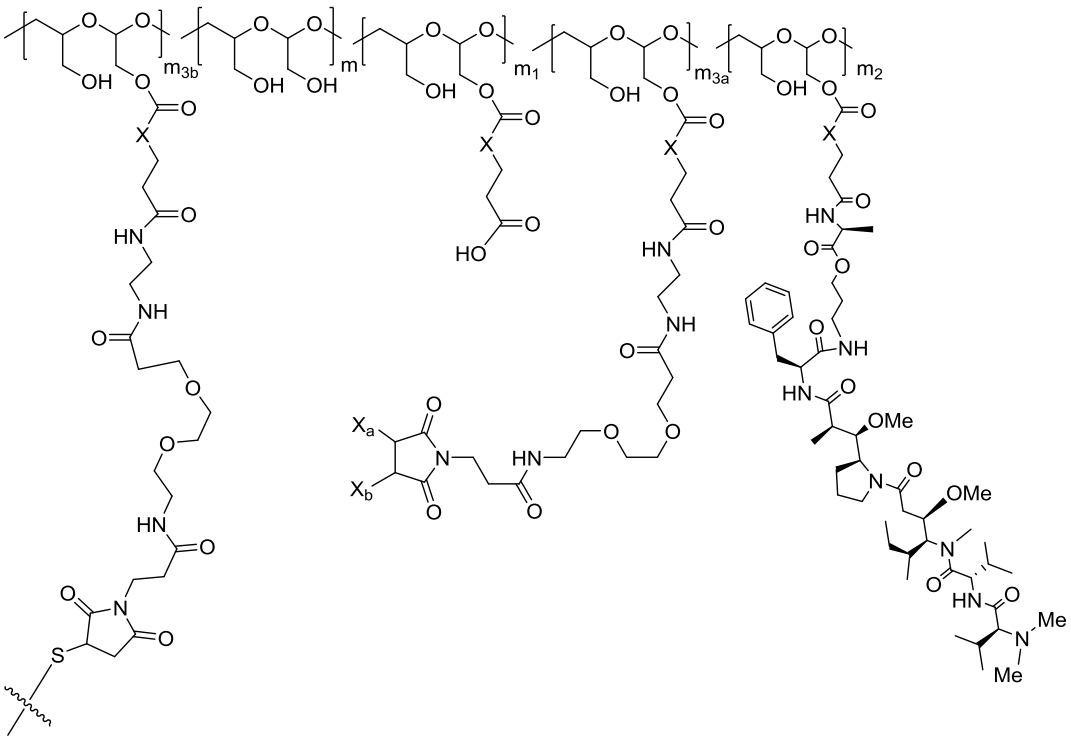


wherein one of X_a and X_b is H and the other is a water-soluble maleimido blocking moiety, or X_a and X_b, together with the carbon atoms to which they are attached for a carbon-carbon double bond.

24. The conjugate of claim 23, wherein each of v, u, w, x and y is 2.

25. The conjugate of claim 8, wherein each of the one or more D is a therapeutic agent having a molecular weight of ≦5 kDa, or at least one of the one or more D is a diagnostic agent.

26. The conjugate of claim 24, wherein each of the one or more polymeric scaffolds independently is of Formula (Id):



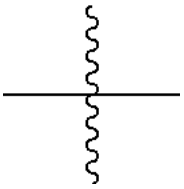
(Id)

wherein:

m_{3a} is an integer from 0 to about 17,

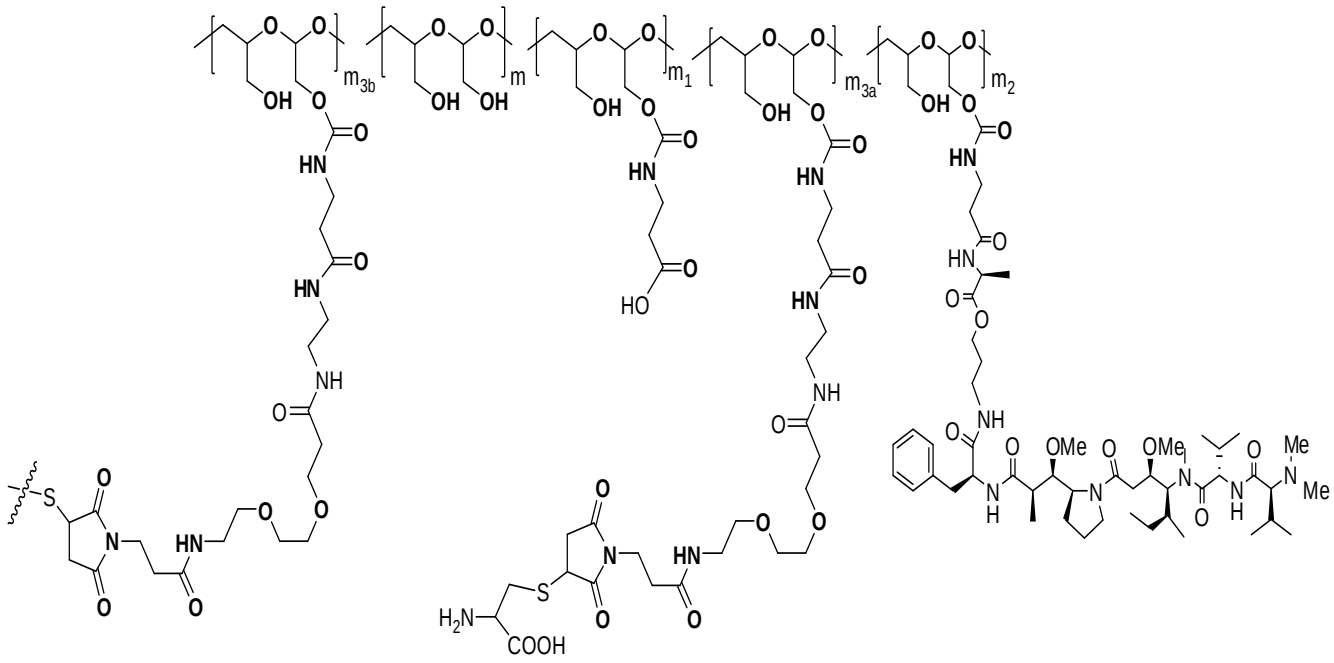
m_{3b} is an integer from 1 to about 8, and

the terminal



denotes the direct attachment of the one or more polymeric scaffolds to the isolated antibody or antigen binding fragment thereof.

27. The conjugate of claim 16, wherein each of the one or more polymeric scaffolds independently is of Formula (If):



(If)

wherein:

m is an integer from 1 to about 300,

m_1 is an integer from 1 to about 140,

m_2 is an integer from 1 to about 40,

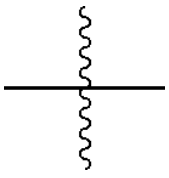
m_{3a} is an integer from 0 to about 17,

m_{3b} is an integer from 1 to about 8;

the sum of m_{3a} and m_{3b} ranges from 1 and about 18; and

the sum of m, m_1, m_2, m_{3a}, and m_{3b} ranges from 15 to about 300;

the terminal



denotes the attachment of one or more polymeric scaffolds to the isolated antibody or antigen binding fragment thereof that specifically binds to an epitope of the human HER2 receptor, wherein the isolated antibody or antigen binding fragment thereof is an isolated

anti-HER2 antibody that comprises a variable heavy chain complementarity determining region 1 (CDRH1) comprising the amino acid sequence FTFSSYSMN (SEQ ID NO: 25); a variable heavy chain complementarity determining region 2 (CDRH2) comprising the amino acid sequence YISSSSSTIYYADSVKG (SEQ ID NO: 26); a variable heavy chain complementarity determining region 3 (CDRH3) comprising the amino acid sequence GGHGYFDL (SEQ ID NO: 27); a variable light chain complementarity determining region 1 (CDRL1) comprising the amino acid sequence RASQSVSSSYLA (SEQ ID NO: 28); a variable light chain complementarity determining region 2 (CDRL2) comprising the amino acid sequence GASSRAT (SEQ ID NO: 21); and a variable light chain complementarity determining region 3 (CDRL3) comprising the amino acid sequence QQYHHSPLT (SEQ ID NO: 29); and

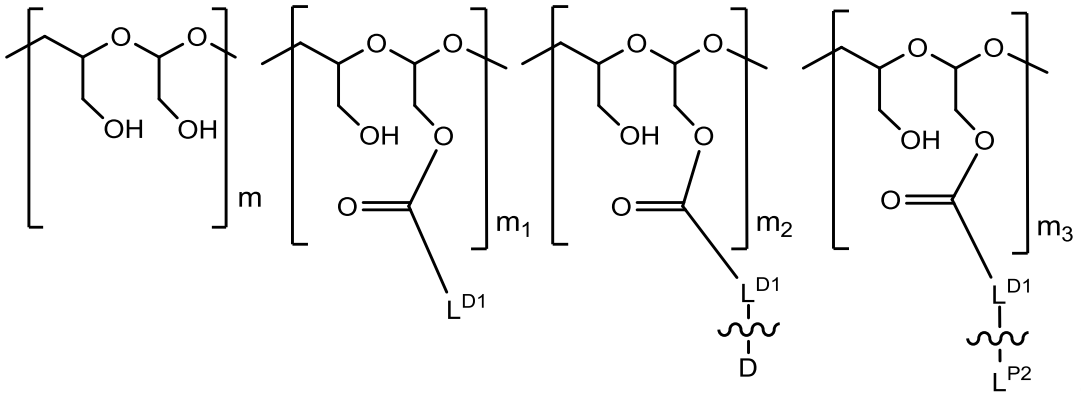
the ratio between the PHF and the antibody is 10 or less.

28. The conjugate of claim 27, wherein the PHF in Formula (If) has a molecular weight ranging from about 2 kDa to about 20 kDa, the sum of m, m_1, m_2, m_{3a} and m_{3b} ranges from about 15 to about 150, m_1 is an integer from 1 to about 70, m_2 is an integer from 1 to about 20, m_{3a} is an integer from 0 to about 9, m_{3b} is an integer from 1 to about 8, the sum of m_{3a} and m_{3b} ranges from 1 and about 10, and the ratio between the PHF and the isolated anti-HER2 antibody is an integer from 2 to about 8.

29. The conjugate of claim 27, wherein the PHF in Formula (If) has a molecular weight ranging from about 3 kDa to about 15 kDa, the sum of m, m_1, m_2, m_{3a} and m_{3b} ranges from about 20 to about 110, m_1 is an integer from 2 to about 50, m_2 is an integer from 2 to about 15, m_{3a} is an integer from 0 to about 7, m_{3b} is an integer from 1 to about 8, the sum of m_{3a} and m_{3b} ranges from 1 and about 8, and the ratio between the PHF and the isolated anti-HER2

antibody or antigen-binding fragment thereof is an integer from 2 to about 8.

30. A method of preparing a conjugate according to claim 8, comprising reacting the isolated antibody or antigen binding fragment thereof that specifically binds to an epitope of the human HER2 receptor with a polymeric scaffold of Formula (Ia) such that the conjugate is formed:

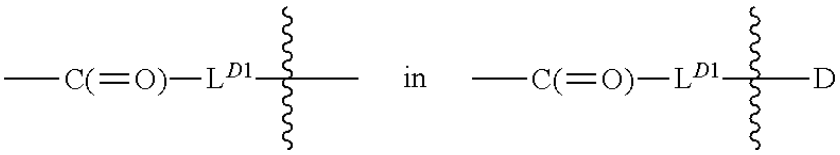


(Ia)

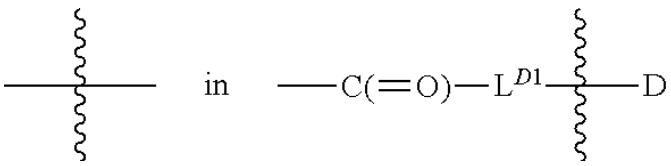
wherein:

L^{D1} is a carbonyl-containing moiety;

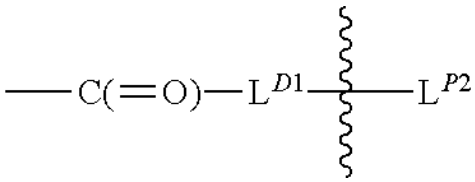
each occurrence of



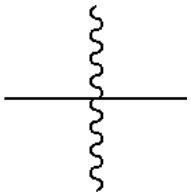
is independently a first linker that contains a biodegradable bond so that when the bond is broken, D is released in an active form for its intended therapeutic effect; and the



between L^{D1} and D denotes direct or indirect attachment of D to L^{D1};
each occurrence of



is independently a second linker not yet connected to the isolated antibody or antigen binding fragment thereof, in which L^{P2} is a moiety containing a functional group that is yet to form a covalent bond with a functional group of the isolated antibody or antigen binding fragment thereof, and the



between L^{D1} and L^{P2} denotes direct or indirect attachment of L^{P2} to L^{D1}, and each occurrence of the second linker is distinct from each occurrence of the first linker;
m is an integer from 1 to about 300,
m_1 is an integer from 1 to about 140,
m_2 is an integer from 1 to about 40,
m_3 is an integer from 1 to about 18, and
the sum of m, m_1, m_2 and m_3 ranges from 15 to about 300.