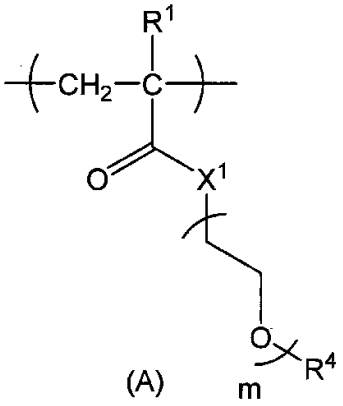
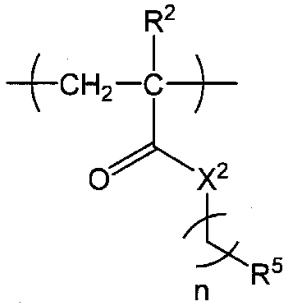
CLAIMS

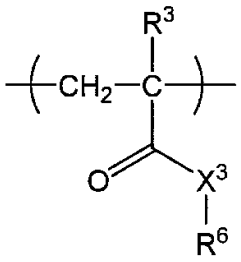
1. A copolymer in which a target recognition molecule is bonded to a copolymer X comprising structural units represented by the following formulas (A), (B), and (C),



(A)



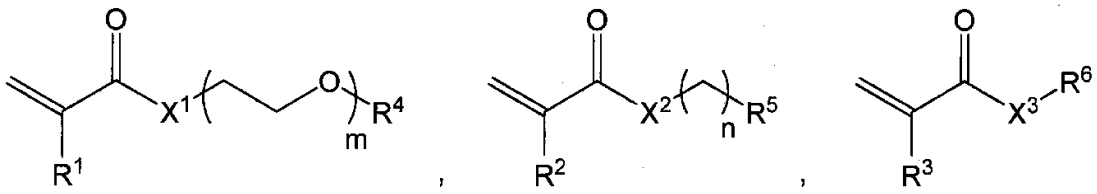
(B)



(C)

wherein, R^1, R^2, and R^3 are the same or different and represent a hydrogen atom or a C_{1-3} alkyl group, R^4 represents a C_{1-3} alkyl group, R^5 represents a hydrogen atom, a C_{1-18} alkyl group, a 3- to 8- membered cycloalkyl group optionally having a substituent, an adamantyl group, a C_{6-18} aryl group optionally having a substituent, or a 5- to 10- membered heteroaryl group optionally having a substituent, X^1, X^2, and X^3 are the same or different and represent an oxygen atom, a sulfur atom, or N-R^7, R^6 represents a hydrogen atom, a leaving group, or a linker, R^7 represents a hydrogen atom or a C_{1-3} alkyl group, m represents an integer of 1 to 100, and n represents an integer of 0 to 3.

2. The copolymer according to claim 1, wherein the polymer X is a copolymer formed by polymerization of three types of monomers represented by the following general formulas (1) to (3),



(1) (2) (3)

wherein, R^1, R^2, and R^3 are the same or different and represent a hydrogen atom or a C_{1-3} alkyl group, R^4 represents a C_{1-3} alkyl group, R^5 represents a hydrogen atom, a C_{1-18} alkyl group, a 3- to 8-membered cycloalkyl group optionally having a substituent, an adamantyl group, a C_{6-18} aryl group optionally having a substituent, or a 5- to 10-membered heteroaryl group optionally having a substituent, X^1, X^2, and X^3 are the same or different and represent an oxygen atom, a sulfur atom, or N-R^7, R^6 represents a hydrogen atom, a leaving group, or a linker, R^7 represents a hydrogen atom or a C_{1-3} alkyl group, m represents an integer of 1 to 100, and n represents an integer of 0 to 3.

3. The copolymer according to claim 1 or 2, wherein the copolymer has a number average molecular weight of 5 000 to

150 000.

4. The copolymer according to claim 1 or 2, wherein the target recognition molecule is an antibody.

5. The copolymer according to claim 4, wherein the antibody is an anti-EGFR antibody, an anti-Her2 antibody, an anti-CD20 antibody, an anti-CD276 antibody, an anti-MUC1 antibody, an anti-PD-L1 antibody, or an anti-TROP-2 antibody.

6. The copolymer according to claim 4, wherein the antibody is cetuximab, panitumumab, necitumumab, amivantamab, panitumumab, trastuzumab, pertuzumab, margetuximab, rituximab, ibritumomab, tositumomab, ofatumumab, obinutuzumab, clivatuzumab, gatipotuzumab, ifinatamab, mirzotamab, vobramitamab, atezolizumab, avelumab, durvalumab, sacituzumab, or functional fragments thereof.

7. A drug complex comprising the copolymer according to claim 1 or 2, and a drug.

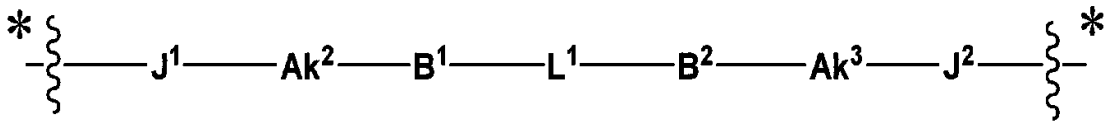
8. The drug complex according to claim 7, wherein the drug is an antimetabolite, an alkylating agent, an

anthracycline, an antibiotic, a mitotic inhibitor, a topoisomerase inhibitor, a proteasome inhibitor, or an anti-hormone agent.

9. The drug complex according to claim 7, wherein the drug is DM0, DM1, DM2, DM3, DM4, emtansine, auristatin E, auristatin phenylalanine phenylenediamine (AFP), monomethyl auristatin E, monomethyl auristatin D, monomethyl auristatin F, paclitaxel, docetaxel, irinotecan, topotecan, nogitecan, amsacrine, etoposide, teniposide, mizantrone, SN-38, exatecan, or deruxtecan.

10. The drug complex according to any one of claims 7 to 9, wherein the bond of the target recognition molecule or the drug to the copolymer X is a covalent bond or a non-covalent bond.

11. The drug complex according to any one of claims 7 to 10, wherein the bond of the target recognition molecule or the drug to the copolymer X is represented by the following formula (a):



(a)

wherein, J^1 is a bond to the target recognition molecule or the drug, J^2 is a bond to the copolymer X, Ak^2 and Ak^3 each independently represent a single bond or a C_{1-7} alkylene bond, B^1 and B^2 each independently represent a single bond, an amide bond, or an ester bond, L^1 represents a single bond, $-(CH_2CH_2O)_oCH_2CH_2-$, phenylene, cyclohexylene, -NH-peptide-CO-, or phenylene-NH-peptide-CO-, and o represents an integer of 0 to 100.

12. A single chain nanoparticle comprising the copolymer according to claim 1 or 2.

13. A single chain nanoparticle comprising the drug complex according to claim 7 or 8.

14. A pharmaceutical composition comprising the copolymer according to claim 1 or 2.

15. A pharmaceutical composition comprising the drug complex according to claim 7 or 8.