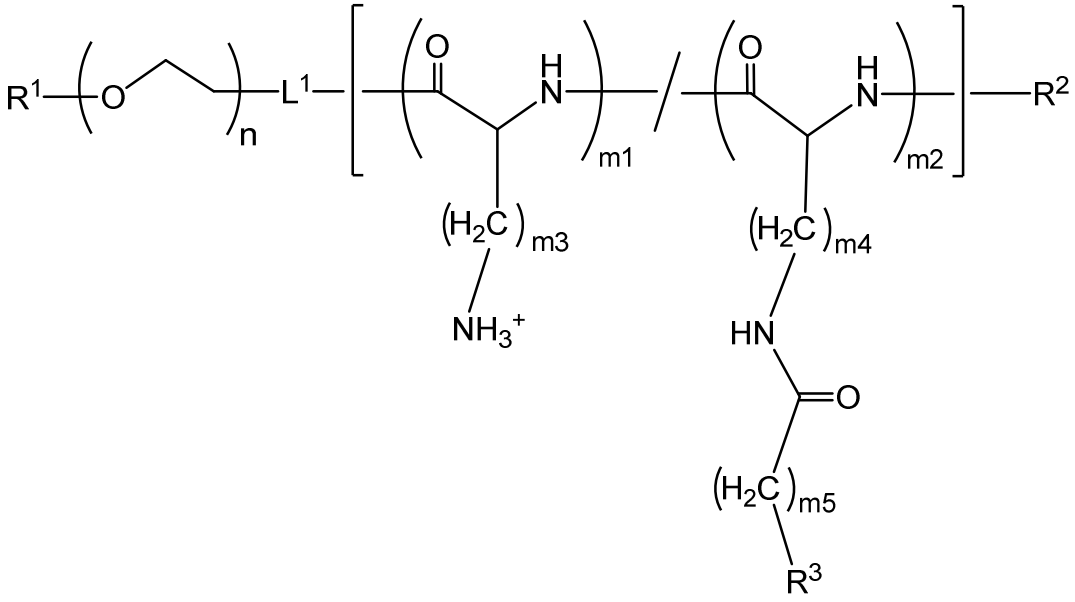
CLAIMS

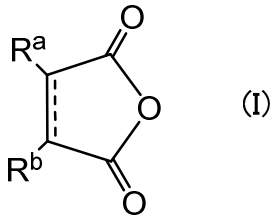
1. A polymeric complex comprising a protein and a block copolymer represented by the following formula (1):



(1)

[wherein R^1 and R^2 each independently represent a hydrogen atom, or an optionally substituted linear or branched alkyl group containing 1 to 12 carbon atoms, or an azide, an amine, maleimide, a ligand or a labeling agent,

R^3 represents a compound represented by the following formula (I):



(I)

(wherein R^a and R^b each independently represent a hydrogen atom, or an optionally substituted alkyl group, an alkenyl group, a cycloalkyl group, an aryl group, an aralkyl group, an acyl group, a heterocyclic group, a heterocyclic alkyl group, a hydroxy group, an alkoxy group or an aryloxy group. Alternatively, R^a and R^b may be joined with each other to form an aromatic ring or a cycloalkyl ring together with the carbon atoms to which they are attached respectively. The bond between the carbon atoms to which R^a and R^b are attached respectively may be a single bond or a double bond),

L^1 represents NH, CO, or a group represented by the following formula (11):

$$-(CH_2)_{p1}-NH- \qquad (11)$$

(wherein p1 represents an integer of 1 to 6), or

a group represented by the following formula (12):

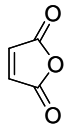
$$-L^{2a}-(CH_2)_{q1}-L^{3a}- \qquad (12)$$

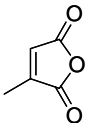
(wherein L^{2a} represents OCO, OCONH, NHCO, NHCOO, NHCONH, CONH or COO, L^{3a} represents NH or CO, and q1 represents an integer of 1 to 6),

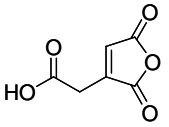
m1 and m2 each independently represent an integer greater than ~~of~~ 0 and up to 500 ~~(~~provided that the sum of m1 and m2 represents an integer of 10 to 500~~)~~, m3, m4 and m5 each independently represent an integer of 1 to 5, and n represents an integer greater than ~~of~~ 0 and up to 500, and

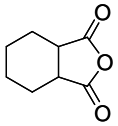
the symbol "/" means that (m1 + m2) units of the respective monomer units shown on the left and right sides of this symbol may be in any sequence].

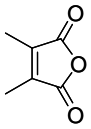
~~2. The complex according to claim 1,~~ wherein the compound represented by formula (I) is at least one of compounds represented by the following formulae (Ia) to (Ig).

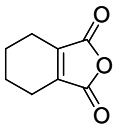

(Ia)

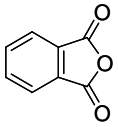

(Ib)


(Ic)

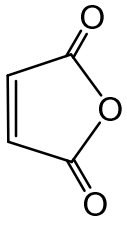

(Id)

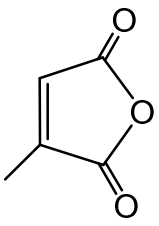

(Ie)


(If)


(Ig)

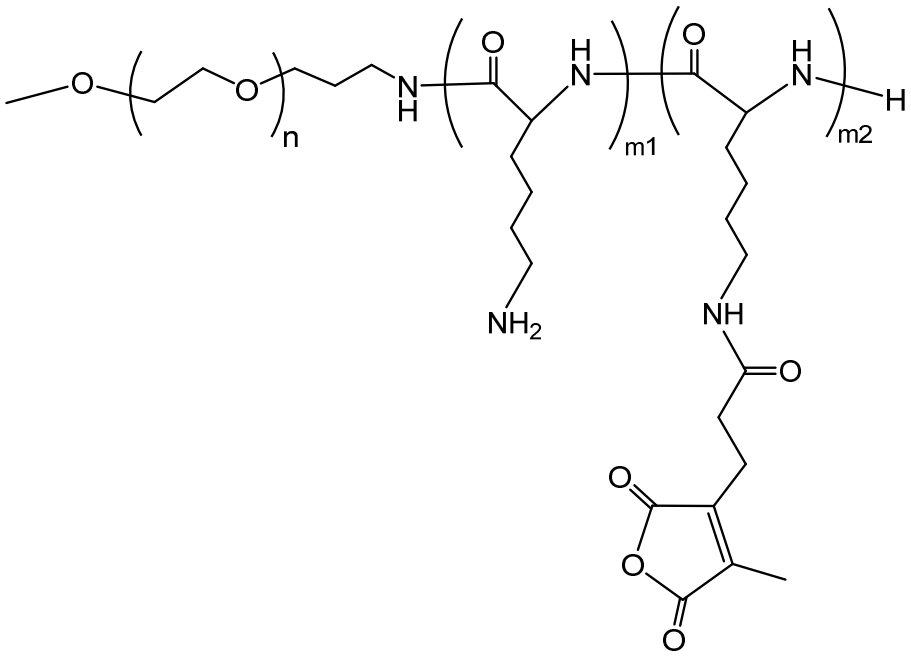
~~3~~2. The complex according to claim ~~2~~1, wherein the compound represented by formula (I) is a compound represented by the following formula (Ia) or (Ib).


(Ia)


(Ib)

~~4~~3. The complex according to claim 1, wherein the block copolymer represented by

formula 1 is a block copolymer represented by the following formula (2).



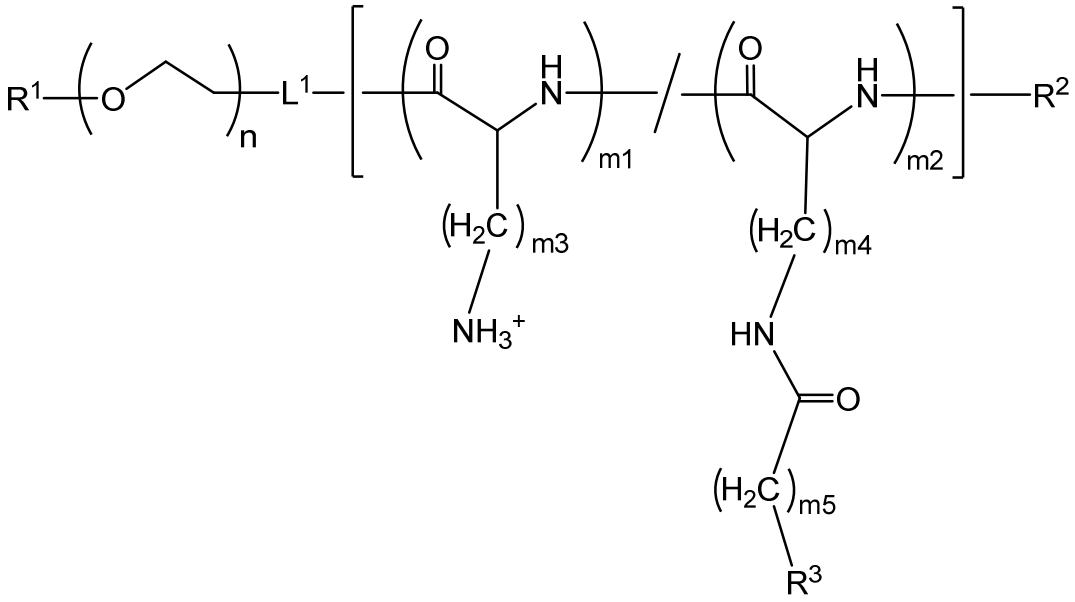
(2)

~~5~~4. The complex according to claim 1, wherein the protein is covalently bonded to the block copolymer represented by formula 1.

~~6~~5. The complex according to claim ~~5~~4, wherein the covalent bond is cleaved in a pH-dependent manner.

~~7~~6. A protein delivery device comprising the polymeric complex according to any one of claims 1 to ~~6~~ 5 for use in protein delivery to any site selected from a cell surface site, an intracellular site and an extracellular site.

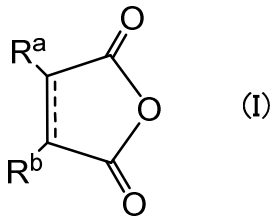
~~8~~7. A protein delivery kit comprising a block copolymer represented by the following formula (1) for use in protein delivery to any site selected from a cell surface site, an intracellular site and an extracellular site:



(1)

[wherein R^1 and R^2 each independently represent a hydrogen atom, or an optionally substituted linear or branched alkyl group containing 1 to 12 carbon atoms, or an azide, an amine, maleimide, a ligand or a labeling agent,

R^3 represents a compound represented by the following formula (I):



(I)

(wherein R^a and R^b each independently represent a hydrogen atom, or an optionally substituted alkyl group, an alkenyl group, a cycloalkyl group, an aryl group, an aralkyl group, an acyl group, a heterocyclic group, a heterocyclic alkyl group, a hydroxy group, an alkoxy group or an aryloxy group. Alternatively, R^a and R^b may be joined with each other to form an aromatic ring or a cycloalkyl ring together with the carbon atoms to which they are attached respectively. The bond between the carbon atoms to which R^a and R^b are attached respectively may be a single bond or a double bond),

L^1 represents NH, CO, or a group represented by the following formula (11):

$$-(CH_2)_{p1}-NH- \qquad (11)$$

(wherein p1 represents an integer of 1 to 6), or
a group represented by the following formula (12):

$$-L^{2a}-(CH_2)_{q1}-L^{3a}- \qquad (12)$$

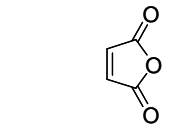
(wherein L^{2a} represents OCO, OCONH, NHCO, NHCOO, NHCONH, CONH or COO, L^{3a} represents NH or CO, and q1 represents an integer of 1 to 6),

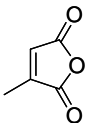
m1 and m2 each independently represent an integer <u>greater than</u> ~~of~~ 0 <u>and up</u> to 500 (provided that the sum of m1 and m2 represents an integer of 10 to 500), m3, m4 and m5 each independently represent an integer of 1 to 5, and n represents an integer <u>greater</u>

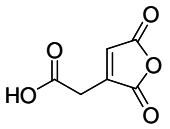
than ~~of~~ 0 and up to 500, and

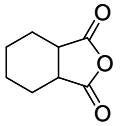
the symbol "/" means that (m1 + m2) units of the respective monomer units shown on the left and right sides of this symbol may be in any sequence] .~~,~~

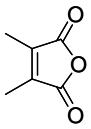
~~9. The kit according to claim 8,~~ wherein the compound represented by formula (I) is at least one of compounds represented by the following formulae (Ia) to (Ig).

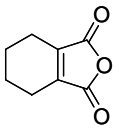

(Ia)


(Ib)


(Ic)


(Id)


(Ie)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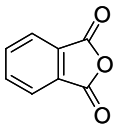
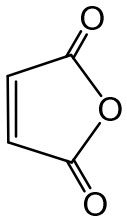
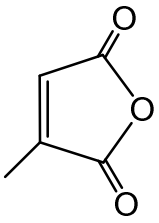
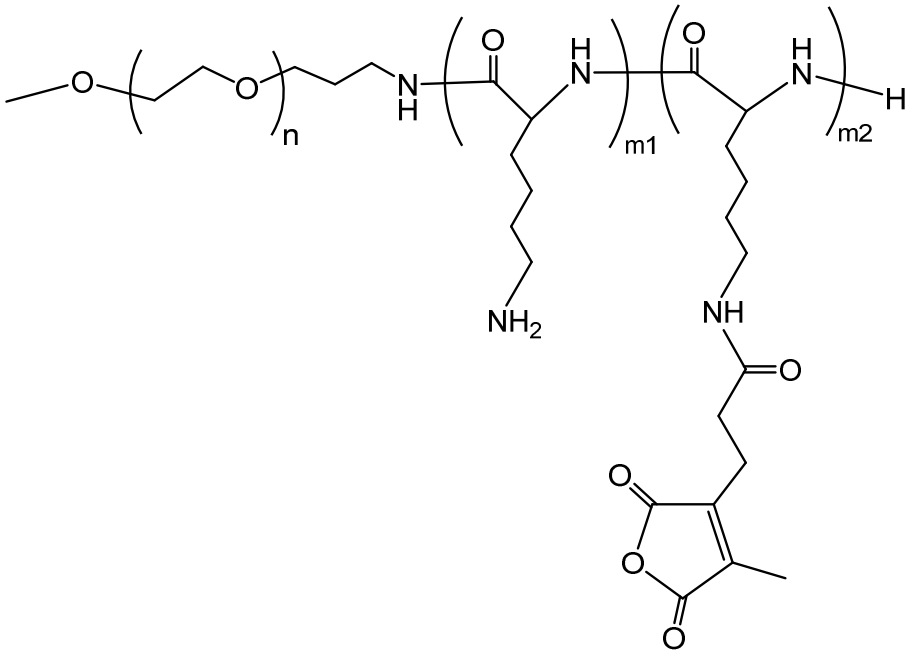

(Ig)

~~10~~8. The kit according to claim ~~9~~7, wherein the compound represented by formula (I) is a compound represented by the following formula (Ia) or (Ib).


(Ia)


(Ib)

~~11~~9. The kit according to claim ~~8~~7, wherein the block copolymer represented by formula 1 is a block copolymer represented by the following formula (2).



(2)