CLAIMS

1. A quaternized chitosan derivative having polymerizable organic moieties.

2. The quaternized chitosan derivative of claim 1, having an ammonium group represented by the following formula:

$-N^+(R^1)_3$

where each R^1 is independently selected from the group consisting of hydrogen and a substituted or unsubstituted alkyl group, two or three of (R^1)s may combine to form a substituted or unsubstituted aliphatic cyclic group.

3. The quaternized chitosan derivative of claim 2, wherein at least one of (R^1)s is a substituted or unsubstituted alkyl group having 1 to 18 carbon atoms.

4. The quaternized chitosan derivative of any one of claims 1 to 3, wherein the polymerizable organic moiety is represented by the following formula:

–Y-P

(where P is a polymerizable group, Y is a spacer group).

5. The quaternized chitosan derivative of claim 2, wherein said $-N^+(R^1)_3$ group is $-N^+R'R''_2$ where R' and R" are independently selected from the group consisting of hydrogen and a substituted or unsubstituted alkyl group, provided that R' has more carbon atoms than R".

6. A method of producing a quaternized chitosan derivative having polymerizable organic moieties, comprising a step of reacting a quaternized chitosan derivative and a halide having a polymerizable organic moiety.

7. The method of claim 6, wherein said halide is represented by the following formula:

$X-P^1$

where P^1 is a polymerizable organic moiety; X is a halogen atom.

8. A method of producing a chitosan hydrogel, comprising a step of polymerizing a polymerizable composition comprising said quaternized chitosan

derivative of any one of claims 1 to 5, initiator, and water.

9. A method of producing a chitosan hydrogel of claim 8, wherein said polymerizing step comprises a step of irradiating ultraviolet (UV) to a photopolymerizable composition comprising said quaternized chitosan derivative of any one of claims 1 to 5, photoinitiator, and water.

10. A hydrogel produced by the method of claim 8 or 9.

11. A medical device having a coating comprising the hydrogel of claim 10.

12. A contact lens having a coating comprising the hydrogel of claim 10.

13. A medical device containing the hydrogel of claim 10.

14. A cosmetic containing the hydrogel of claim 10.

CLAIMS

1. A quaternized chitosan derivative having polymerizable organic moieties, having an ammonium group represented by the following formula:

$-N^{+}(R^{1})_{3}$

where each R^{1} is independently selected from the group consisting of hydrogen and a substituted or unsubstituted alkyl group, two or three of (R^{1})s may combine to form a substituted or unsubstituted aliphatic cyclic group,

wherein said polymerizable organic moieties are represented by the following formula:

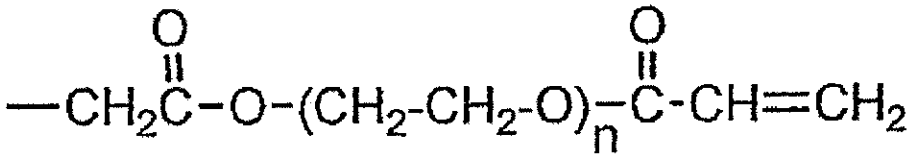
$-Z-COOCR^{4}=CH_{2}$

where R^{4} is –H or $-CH_{3}$; Z is a chemical bond or a polyethylene glycol chain-containing group.

2. The quaternized chitosan derivative of claim 1, wherein at least one of (R^{1})s is a substituted or unsubstituted alkyl group having 1 to 18 carbon atoms.

3. The quaternized chitosan derivative of claim 1, wherein said $-N^{+}(R^{1})_{3}$ group is $–N^{+}R'R''_{2}$ where R' and R" are independently selected from the group consisting of hydrogen and a substituted or unsubstituted alkyl group, provided that R' has more carbon atoms than R".

4. The quaternized chitosan derivative of any one of claims 1 to 3, wherein said polymerizable organic moieties are



5. A method of producing a quaternized chitosan derivative having polymerizable organic moieties according to claim 1, comprising a step of reacting a quaternized chitosan derivative having an ammonium group represented by the following formula:

$-N^{+}(R^{1})_{3}$

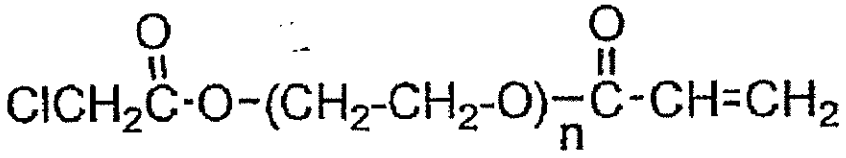
where each R^{1} is independently selected from the group consisting of hydrogen and a substituted or unsubstituted alkyl group, two or three of (R^{1})s may combine to form a substituted or unsubstituted aliphatic cyclic group,

and a halide represented by the following formula:

$X\text{-}Z\text{-}COOCR^{4}=CH_{2}$

where X is a halogen atom; R^{4} is –H or $-CH_{3}$; Z is a chemical bond or a polyethylene glycol chain-containing group.

6. The method of claim 5, wherein said halide is



7. A method of producing a chitosan hydrogel, comprising a step of polymerizing a polymerizable composition comprising said quaternized chitosan derivative of any one of claims 1 to 4, initiator, and water.

8. A method of producing a chitosan hydrogel of claim 7, wherein said polymerizing step comprises a step of irradiating ultraviolet (UV) to a photopolymerizable composition comprising said quaternized chitosan derivative of any one of claims 1 to 4, photoinitiator, and water.

9. A hydrogel produced by the method of claim 7 or 8.

10. A medical device having a coating comprising the hydrogel of claim 9.

11. A contact lens having a coating comprising the hydrogel of claim 9.

12. A medical device containing the hydrogel of claim 9.

13. A cosmetic containing the hydrogel of claim 9.