CLAIMS

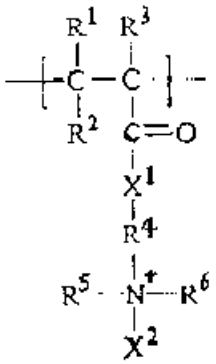
[1] A polishing liquid composition for a silicon oxide film, comprising:

cerium oxide particles;

a water-soluble macromolecular compound; and

an aqueous medium,

wherein the water-soluble macromolecular compound is a water-soluble macromolecular compound ~~including a betaine structure, excluding carbobetaine homopolymers and sulfobetaine homopolymers~~ containing a constitutional unit *a* represented by Formula (1):



(1)

where

R^1 to R^3 are the same as or different from each other and represent a hydrogen atom, a methyl group, or an ethyl group,

R^4 represents $-Y^1-OPO_3^--Y^2-$,

Y^1 and Y^2 are the same as or different from each other and represent an alkylene group having 1 to 4 carbon atoms,

R^5 and R^6 are the same as or different from each other and represent a hydrocarbon group having 1 to 4 carbon atoms,

X^1 represents O or NR^7,

R^7 represents a hydrogen atom or a hydrocarbon group having 1 to 4 carbon atoms,

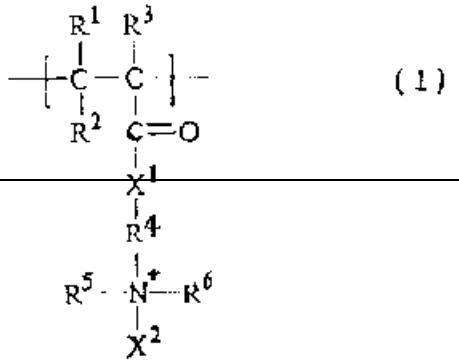
X^2 represents a hydrocarbon group having 1 to 4 carbon atoms.

~~[2] The polishing liquid composition for a silicon oxide film according to claim 1,~~

~~wherein the water-soluble macromolecular compound is a water-soluble macromolecular compound containing a constitutional unit A including a betaine structure, and a constitutional unit B that is a constitutional unit other than the constitutional unit A and contains at least one group of a primary amino group, a secondary amino group, a tertiary amino group, a quaternary ammonium group, and salts thereof.~~

~~[3] The polishing liquid composition for a silicon oxide film according to claim 1 or 2, wherein the water-soluble macromolecular compound is a water-soluble macromolecular compound containing a constitutional unit a represented by Formula (1):~~

~~Chemical Formula 1~~



(1)

~~where~~

~~R^1 to R^3 are the same as or different from each other and represent a hydrogen atom, a methyl group, or an ethyl group,~~

~~R^4 represents an alkylene group having 1 to 4 carbon atoms or $-Y^1-OPO_3^=-Y^2-$,~~

~~Y^1 and Y^2 are the same as or different from each other and represent an alkylene group having 1 to 4 carbon atoms,~~

~~R^5 and R^6 are the same as or different from each other and represent a hydrocarbon group having 1 to 4 carbon atoms,~~

~~X^1 represents O or NR^7,~~

~~R^7 represents a hydrogen atom or a hydrocarbon group having 1 to 4 carbon atoms,~~

~~X^2 represents a hydrocarbon group having 1 to 4 carbon atoms, $-R^{17}SO_3^=$, or~~

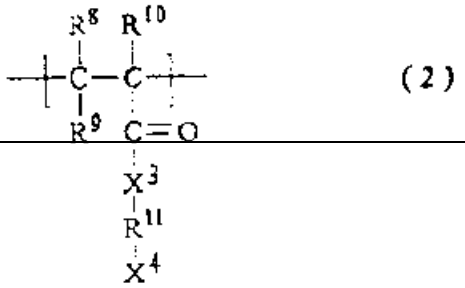
~~$-R^{18}COO^-$, and~~

~~R^{17} and R^{18} are the same as or different from each other and represent an alkylene group having 1 to 4 carbon atoms, and~~

~~when R^4 is an alkylene group having 1 to 4 carbon atoms, X^2 is $-R^{17}SO_3^-$ or $-R^{18}COO^-$, and when R^4 is $-Y^1-OPO_3^--Y^2-$, X^2 is a hydrocarbon group having 1 to 4 carbon atoms.~~

~~[4] The polishing liquid composition for a silicon oxide film according to claim 2 or 3, wherein the water-soluble macromolecular compound is a water-soluble macromolecular compound containing a constitutional unit *b* represented by Formula (2):~~

~~Chemical Formula 2~~



(2)

~~where~~

~~R^8 to R^{10} are the same as or different from each other and represent a hydrogen atom, a methyl group, or an ethyl group,~~

~~X^3 represents O or NR^{19},~~

~~R^{19} represents a hydrogen atom or a hydrocarbon group having 1 to 4 carbon atoms,~~

~~R^{11} represents an alkylene group having 1 to 22 carbon atoms, where a hydrogen atom of the alkylene group is optionally substituted by a hydroxy group,~~

~~X^4 represents $N^+R^{12}R^{13}R^{14}$ or $NR^{15}R^{16}$,~~

~~R^{12} to R^{14} are the same as or different from each other and represent a hydrocarbon group having 1 to 4 carbon atoms, and~~

~~R^{15} and R^{16} are the same as or different from each other and represent a hydrogen atom or a hydrocarbon group having 1 to 4 carbon atoms.~~

[~~5~~2] The polishing liquid composition for a silicon oxide film according to ~~any one of~~ claim~~s~~ 1 ~~to 4~~, wherein the water-soluble macromolecular compound is a water-soluble macromolecular compound including a phosphobetaine structure.

[~~6~~3] The polishing liquid composition for a silicon oxide film according to ~~any one of~~ claim~~s~~ 1 or 2~~to 5~~, further comprising an anionic macromolecular compound.

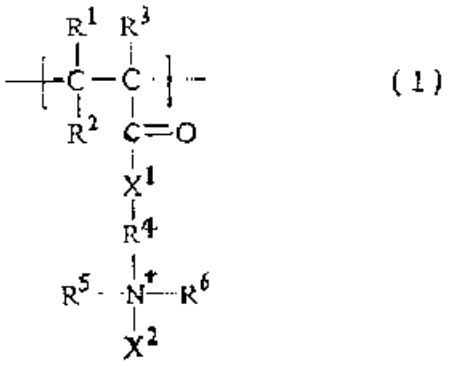
[~~7~~4] A polishing liquid kit for preparing a polishing liquid composition for a silicon oxide film, comprising:

a first liquid obtained by dispersing cerium oxide particles in an aqueous medium; and

a second liquid that is contained in a container separate from a container containing the first liquid and contains an aqueous medium,

wherein one or both of the first liquid and the second liquid further contains a water-soluble macromolecular compound, and

the water-soluble macromolecular compound is a water-soluble macromolecular compound ~~including a betaine structure, excluding other than carbobetaine homopolymers and sulfobetaine homopolymers~~ containing a constitutional unit *a* represented by Formula (1):



(1)

where

R^1 to R^3 are the same as or different from each other and represent a hydrogen atom, a methyl group, or an ethyl group,

R^4 represents $-Y^1-OPO_3^--Y^2-$,

Y^1 and Y^2 are the same as or different from each other and represent an alkylene group having 1 to 4 carbon atoms,

R^5 and R^6 are the same as or different from each other and represent a hydrocarbon group having 1 to 4 carbon atoms,

X^1 represents O or NR^7,

R^7 represents a hydrogen atom or a hydrocarbon group having 1 to 4 carbon atoms,

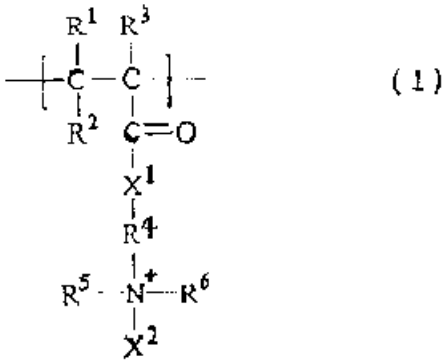
X^2 represents a hydrocarbon group having 1 to 4 carbon atoms.

[85] An additive composition for silicon oxide film polishing to be used together with a dispersion liquid obtained by dispersing cerium oxide particles in an aqueous medium, comprising:

an aqueous medium; and

a water-soluble macromolecular compound dissolved in the aqueous medium,

wherein the water-soluble macromolecular compound is a water-soluble macromolecular compound ~~including a betaine structure, excluding other than carbobetaine homopolymers and sulfobetaine homopolymers~~ containing a constitutional unit *a* represented by Formula (1):



(1)

where

R^1 to R^3 are the same as or different from each other and represent a hydrogen atom, a methyl group, or an ethyl group,

R^4 represents $-Y^1-OPO_3^--Y^2-$,

Y^1 and Y^2 are the same as or different from each other and represent an alkylene group having 1 to 4 carbon atoms,

R^5 and R^6 are the same as or different from each other and represent a hydrocarbon group having 1 to 4 carbon atoms,

X^1 represents O or NR^7,

R^7 represents a hydrogen atom or a hydrocarbon group having 1 to 4 carbon atoms,

X^2 represents a hydrocarbon group having 1 to 4 carbon atoms.

[~~9~~6] A method for manufacturing a semiconductor device, comprising a step of polishing a silicon oxide film using the polishing liquid composition for a silicon oxide film according to any one of claims 1 to ~~6~~3.

[~~10~~7] A method for polishing a silicon oxide film, comprising a step of polishing a silicon oxide film using the polishing liquid composition for a silicon oxide film according to any one of claims 1 to ~~6~~3,

wherein the silicon oxide film is an insulating film formed in a process for manufacturing a semiconductor device.