[0007] This polishing composition A is used in a polishing process performed after the polishing of a silicon wafer with a polishing composition B that contains abrasives. In other words, in the two-stage polishing with respect to a silicon wafer, the polishing composition A is used in the latter stage thereof. Therefore, the polishing with a substantially abrasive-free polishing composition has not been realized yet. Further, as a high polishing pressure of about 300 gf/cm^2, which is used generally, is required in order to achieve a higher polishing rate, problems arise such as an increase in scratches, and wafer deformation such as edge roll-off. Still further, the polishing under a high polishing pressure involves an increase in the polishing temperature, which causes the reaction of chemical components to increase locally. This leads to problems in the flatness, such as irregularities in the wafer inplane thickness.

[0008] In addition, in the multi-stage polishing of a silicon wafer, major challenges in the polishing in latter stages are the elimination and reduction of roughness on the smaller levels, scratches, nanometer-order defects, and LPDs.

Patent Document 1: JP9(1997)-306881A

Disclosure of Invention

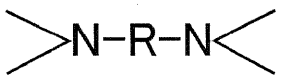
[0009] In the primary polishing of a silicon wafer, however, if the polishing is carried out with a composition without abrasives, mechanical polishing effects degrade generally, which leads to a problem of a decrease in the polishing rate. Besides, there is a problem that Haze and LPDs vary significantly in polished wafers.

[0010] The present ~~invention~~disclosure, therefore, was made in order to address such problems, and an object of the present ~~invention~~ disclosure is to provide a polishing composition that does not contain abrasives and that allows a polishing rate applicable to the primary polishing of a silicon wafer.

[0011] Another object of the present ~~invention~~ disclosure is to provide a polishing method using a polishing composition that does not contain abrasives and that allows a polishing rate applicable to the primary polishing of a silicon wafer.

[0012] According to the present ~~invention~~disclosure, the polishing composition is a polishing composition that does not contain abrasives and that is used for polishing a silicon wafer, and the polishing composition contains a polishing accelerator, a water-soluble polymer, and a block-type compound in which an oxyethylene group and an

oxypropylene group are included in a block-type polyether. The polishing accelerator includes an amine compound or an inorganic alkaline compound. In an aspect, there is provided a polishing composition that does not contain abrasives and that is used for polishing a silicon wafer, the polishing composition comprising: a polishing accelerator including an amine compound having 1 to 6 carbon atoms; a water-soluble polymer; and a compound that includes an alkyl amine structure having two nitrogen atoms, the alkyl amine structure being expressed as the general formula (1) shown below, and that includes at least one block-type polyether bonded either of the two nitrogen atoms of the alkyl amine structure, wherein an oxyethylene group and an oxypropylene group are included in the block-type polyether, wherein the content of the compound is 0.1 to 10 ppm



... formula (1).

[0013] In a fFurther aspect, according to the present ~~invention~~disclosure, the polishing method is a polishing method for polishing a silicon wafer using the polishing composition disclosed above~~according to claim 1 or 2~~.

[0014] According to an embodiment of the present ~~invention~~disclosure, the polishing composition is a polishing composition that does not contain abrasives and that is used for polishing a silicon wafer, and the polishing composition contains a polishing accelerator, a water-soluble polymer, and a block-type compound. As a result, when a silicon wafer is polished with the polishing composition, a polishing speed of greater than 0.1 μm/min can be achieved.

[0015] Further, the effects of the water-soluble polymer and the block-type compound can reduce Haze and LPDs. Particularly, the block-type compound has a hydrophilic group and a hydrophobic group in one polymer chain, and has a smaller molecular weight as compared with coexistent water-soluble polymers, thereby having a smaller steric size in a molecular chain and in a solution. The block-type compound, therefore, adsorbs to a surface of a silicon wafer at a higher adsorption rate and is unlikely to cause steric hindrance, thereby being able to bond to a surface of a silicon wafer at a high density. Further, regarding a block copolymer having a hydrophilic group and a hydrophobic group, a surface of a silicon wafer immediately after polishing, that is,

highly reactive silicon, quickly forms a bond with a hydrophilic group of the block copolymer; and in contrast, the hydrophobic portion thereof can be positioned on the surface of the silicon wafer after the molecule chain adsorbs thereto, so as to prevent foreign materials present under the polishing environments from adsorbing thereto. Still further, a water-soluble polymer forms a steric polymer chain that includes a water molecule via a hydrogen bond, thereby being able to keep the surface of the silicon wafer hydrophilic. As the water-soluble polymer and the block-type compound both are included, better effects can be achieved as compared with the case where either of the foregoing two is used alone.

[0016] Therefore, the polishing composition according to the embodiment of the present disclosure ~~invention~~ can be applied to the primary polishing of a silicon wafer.

CLAIMS

1. A polishing composition that does not contain abrasives and that is used for polishing a silicon wafer, the polishing composition comprising:

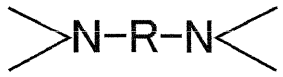
a polishing accelerator including an amine compound having 1 to 6 carbon atoms ~~or an inorganic alkaline compound~~;

a water-soluble polymer; and

a ~~block-type~~ compound ~~in which~~ that includes an alkyl amine structure having two nitrogen atoms, the alkyl amine structure being expressed as the general formula (1) shown below, and that includes at least one block-type polyether bonded either of the two nitrogen atoms of the alkyl amine structure, wherein an oxyethylene group and an oxypropylene group are included in ~~a~~ the block-type polyether,

wherein the content of the compound is 0.1 to 10 ppm

[Chemical Formula 2]



... formula (1).

2. The polishing composition according to claim 1, further comprising:

a pH buffer including a carbonate and a hydrogencarbonate.

3. A polishing method for polishing a silicon wafer using the polishing composition according to claim 1 or 2.