

34 ORIGINAL

ABSTRACT

511912

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TITLE:

OPTICAL ARTICLE COMPRISING A TEMPORARY ANTI-FOGGING COATING WITH
IMPROVED DURABILITY

APPLICANT:

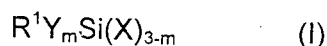
ESSILOR INTERNATIONAL (COMPAGNIE GENERALE D'OPTIQUE)

The present invention relates to an optical article comprising a substrate provided with a coating comprising silanol groups on the surface thereof and, directly contacting this coating, an anti-fog coating precursor coating, said precursor coating having a static contact angle with water of more than 10° and of less than 50° , a thickness lower than or equal to 5 nm, and being obtained through the grafting of at least one organosilane compound having a polyoxyalkylene group comprising less than 80 carbon atoms and at least one silicon atom bearing at least one hydrolyzable group. The anti-fog coating precursor is converted into an actual anti-fog coating by applying on the surface thereof a film of a liquid solution comprising at least one surfactant. The anti-fog coating is immediately operational and provides long-lasting effects.

No figure.

Claims

1. A lens for spectacles comprising a substrate coated with a coating comprising silanol groups on its surface and, directly contacting this coating, a precursor coating of an antifog coating, characterized in that the precursor coating of the antifog coating:
 - is obtained through the grafting of at least one organosilane compound having:
 - a polyoxyalkylene group comprising less than 80 carbon atoms, and
 - at least one silicon atom bearing at least one hydrolyzable group,
 - has a thickness lower than or equal to 5 nm,
 - has a static contact angle with water of more than 10° and of less than 50°.
2. A lens for spectacles according to claim 1, characterized in that the anti-fog coating precursor coating is coated with a film of a liquid solution comprising at least one surfactant and/or hydrophilic compound with no surface active properties, preferably a surfactant comprising poly(oxyalkylene) groups.
3. A lens for spectacles according to claim 2, characterized in that it has a static contact angle with water lower than or equal to 10°, more preferably lower than or equal to 5°.
4. A lens for spectacles according to any one of claims 1 to 3, characterized in that the coating comprising silanol groups on its surface is an antireflective coating or a layer based on silica deposited onto an abrasion-resistant coating.
5. A lens for spectacles according to any one of claims 1 to 4, characterized in that the organosilane compound is a compound of formula:



wherein the Y groups, being the same or different, are monovalent organic groups bound to the silicon through a carbon atom, the X groups, being the same or different, are hydrolyzable groups, R¹ is a group comprising a polyoxyalkylene function, m is an integer equal to 0, 1 or 2.

6. A lens for spectacles according to claim 5, characterized in that the organosilane compound is a compound of formula:



wherein R' is a hydrogen atom, an acyl group or an alkyl group, linear or branched, optionally substituted by one or more functional groups, and comprising optionally one or more double bonds, (OR)_n is a polyoxyalkylene group such that R is a linear or branched alkylene group, preferably linear, L' and L'' are divalent groups, X, Y and m are such as defined in claim 5, n' is an integer ranging from 1 to 10, n is an integer ranging from 2 to 30, m' is 0 or 1, preferably 0, m'' is 0 or 1.

7. A lens for spectacles according to claim 6, characterized in that R' is an alkyl group.
8. A lens for spectacles according to claim 6 or 7, characterized in that m'' = 0.
9. A lens for spectacles according to any one of claims 6 to 8, characterized in that the organosilane compound is a compound of formula (II) wherein n = 5-30, preferably n = 5-15, more preferably n = 6-9.

10 A lens for spectacles according to any one of the preceding claims, characterized in that the organosilane compound is an [alkoxy(polyalkylenoxy)alkyl]trialkoxysilane, preferably a 2-[methoxy(polyethyleneoxy)propyl]trimethoxysilane, more preferably a compound of formula $\text{CH}_3\text{O}-(\text{CH}_2\text{CH}_2\text{O})_{6-9}-(\text{CH}_2)_3\text{Si}(\text{OCH}_3)_3$ or $\text{CH}_3\text{O}-(\text{CH}_2\text{CH}_2\text{O})_{9-12}-(\text{CH}_2)_3\text{Si}(\text{OCH}_3)_3$.

5 11. A lens for spectacles according to any one of preceding claims, characterized in that the organosilane compound has no fluorine atom.

12. A lens for spectacles according to any one of preceding claims, characterized in that the polyoxyalkylene group of the organosilane compound comprises less than 60 carbon atoms, preferably less than 50 carbon atoms.

10 13. A method for preparing a lens for spectacles according to any one of the preceding claims, comprising the steps of:

- providing a substrate coated with a coating comprising silanol groups on the surface thereof,
- depositing onto said coating at least one organosilane compound having a polyoxyalkylene group comprising less than 80 carbon atoms and at least one silicon atom bearing at least one hydrolyzable group, so as to obtain a layer of grafted organosilane compound having a thickness lower than or equal to 5 nm, the surface of which has a static contact angle with water of more than 10° and of less than 50° .

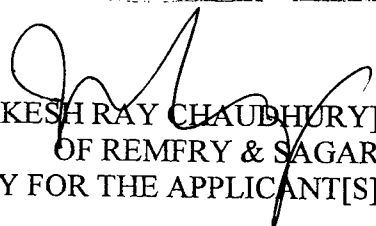
15 14. A method according to claim 13, characterized in that a layer of grafted organosilane compound having a thickness lower than or equal to 5 nm is obtained by removing the deposited but not grafted organosilane compound in excess on the surface of the coating comprising silanol groups.

20 15. A method according to claim 13 or 14, characterized in that said organosilane compound is deposited by evaporation under vacuum onto said coating comprising silanol groups on the surface thereof.

25 16. An optical article comprising a substrate coated with a coating comprising silanol groups on its surface, a part of the surface of said coating comprising silanol groups on its surface being in direct contact with, and adhering to, a hydrophobic and/or oleophobic coating, characterized in that another part of the surface of said coating comprising silanol groups on its surface is in direct contact with a coating precursor of an antifog coating such as defined in any one of claims 1 to

30 12.

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[HRISHIKESH RAY CHAUDHURY]
OF REMFRY & SAGAR
ATTORNEY FOR THE APPLICANT[S]