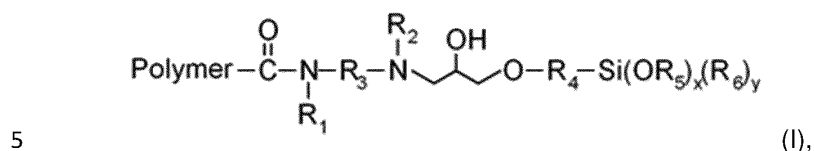


Patent claims:

1. An 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to general formula (I),



wherein

the "polymer" contains at least one carbon-carbon double bond;

R₁, R₂ are identical or different and represent saturated or unsaturated organic radicals which may contain one or more heteroatoms,

- 10 R₃, R₄ are identical or different and represent saturated or unsaturated divalent organic radicals which, in addition to C and H, may contain one or more heteroatoms,

R₅, R₆ are identical or different and represent saturated or unsaturated organic radicals, and

x+y = 3 with 1 ≤ x ≤ 3 and 0 ≤ y ≤ 2.

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2. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to claim 1, wherein the "polymer" is obtainable by

- homo- or copolymerization of conjugated dienes; or
- copolymerization of conjugated dienes with vinylaromatic monomers.

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3. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to claim 2, wherein the "polymer" is obtainable by

- homo- or copolymerization of 1,3-butadiene, isoprene, 1,3-pentadiene, 2,3-dimethylbutadiene, 1-phenyl-1,3-butadiene or 1,3-hexadiene; or

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- copolymerization of
 - (i) 1,3-butadiene, isoprene, 1,3-pentadiene, 2,3-dimethylbutadiene, 1-phenyl-1,3-butadiene and/or 1,3-hexadiene with
 - (ii) styrene, o-, m- and/or p-methylstyrene, p-tert-butylstyrene, methylstyrene, vinylnaphthalene, divinylbenzene, trivinylbenzene and/or divinyl-naphthalene.

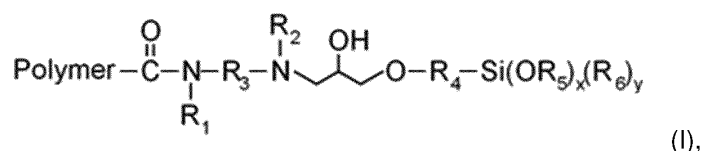
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4. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to claim 3, wherein the "polymer" is obtainable by copolymerization of 1,3-butadiene with styrene; or isoprene with styrene; preferably of 1,3-butadiene with styrene.
5. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to any of the preceding claims, wherein
- R₁, R₂ are identical or different and represent saturated or unsaturated organic radicals which may contain one or more heteroatoms selected from the group consisting of O, N, S or Si; preferably R₁ is -C₁-C₄-alkyl; more preferably R₁ is -CH₃;
preferably R₂ is -C₁-C₄-alkyl; more preferably R₂ is -CH₃;
- R₃, R₄ are identical or different and represent saturated or unsaturated divalent organic radicals which, in addition to C and H, may contain one or more heteroatoms selected from the group consisting of O, N, S or Si; preferably R₃ is -(CH₂)₁₋₃-; more preferably R₃ is -CH₂CH₂-; preferably R₄ is -(CH₂)₂₋₄-; more preferably R₄ is -CH₂CH₂CH₂-;and
- R₅, R₆ are identical or different and represent saturated or unsaturated organic radicals; preferably R₅ and R₆ independently of one another are -C₁-C₄-alkyl; more preferably R₅ and R₆ independently of one another are -CH₃ or -CH₂CH₃.
6. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to any of claims 1 to 4, wherein
- R₁ is selected from the group consisting of
 - (i) -C₁-C₂₄-alkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
 - (ii) -C₁-C₂₄-heteroalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
 - (iii) 6-24-membered aryl, unsubstituted, mono- or polysubstituted, wherein said 6-24-membered aryl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted;
 - (iv) 5-24-membered heteroaryl, unsubstituted, mono- or polysubstituted; wherein said 5-24-membered heteroaryl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted;

- (v) 3-24-membered cycloalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted; wherein said 3-24-membered cycloalkyl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted; and
- 5 (vi) 3-24-membered heterocycloalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted; wherein said 3-24-membered heterocycloalkyl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted; and/or
- 10 - R₂ is selected from the group consisting of
- (i) -C₁-C₂₄-alkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- (ii) -C₁-C₂₄-heteroalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- 15 (iii) 6-24-membered aryl, unsubstituted, mono- or polysubstituted, wherein said 6-24-membered aryl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- (iv) 5-24-membered heteroaryl, unsubstituted, mono- or polysubstituted; wherein said 5-24-membered heteroaryl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- 20 (v) 3-24-membered cycloalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted; wherein said 3-24-membered cycloalkyl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted; and
- 25 (vi) 3-24-membered heterocycloalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted; wherein said 3-24-membered heterocycloalkyl is optionally connected through -C₁-C₆-alkylene- or -C₁-C₆-heteroalkylene-, in each case saturated or unsaturated, unsubstituted, mono- or polysubstituted; and/or
- 30 - R₃ is selected from the group consisting of
- (i) -C₁-C₆-alkylene-, saturated or unsaturated, unsubstituted, mono- or polysubstituted;

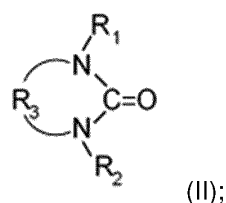
- (ii) -C₁-C₆-heteroalkylene-, saturated or unsaturated, unsubstituted, mono- or polysubstituted; and
- (iii) 6-14-membered arylene, unsubstituted, mono- or polysubstituted; and/or
- R₄ is selected from the group consisting of
- 5 (i) -C₁-C₆-alkylene-, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- (ii) -C₁-C₆-heteroalkylene-, saturated or unsaturated, unsubstituted, mono- or polysubstituted; and
- (iii) 6-14-membered arylene, unsubstituted, mono- or polysubstituted; and/or
- 10 - R₅ is selected from the group consisting of
- (i) -C₁-C₆-alkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- (ii) -C₁-C₆-heteroalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted; and
- (iii) 6-14-membered aryl, unsubstituted, mono- or polysubstituted; and/or
- 15 - R₆ is selected from the group consisting of
- (i) -C₁-C₆-alkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted;
- (ii) -C₁-C₆-heteroalkyl, saturated or unsaturated, unsubstituted, mono- or polysubstituted; and
- (iii) 6-14-membered aryl, unsubstituted, mono- or polysubstituted;
- 20 wherein "*mono- or polysubstituted*" in each case independently means substituted with one or more substituents independently of one another selected from -F, -Cl, -Br, -I, -CN, =O, -CF₃, -CF₂H, -CFH₂, -CF₂Cl, -CFCl₂, -C₁-C₁₈-alkyl, saturated or unsaturated, unsubstituted and -C₁-C₁₈-heteroalkyl, saturated or unsaturated, unsubstituted.
- 25 7. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to claim 6, wherein "*mono- or polysubstituted*" means substituted with one or more substituents independently of one another selected from
- F, -Cl, -Br, -I, -CN, -CF₃, -CF₂H, -CFH₂, -CF₂Cl, -CFCl₂;
- C₁-C₁₈-alkyl, saturated or unsaturated, unsubstituted; and
- 30 -C₁-C₁₈-heteroalkyl, saturated or unsaturated, unsubstituted.

8. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to claim 6, wherein
- R_1 is (i) $-C_1-C_6$ -alkyl, saturated or unsaturated, unsubstituted; or (ii) $-C_1-C_2$ -alkyl, saturated or unsaturated, unsubstituted; and/or
 - 5 - R_2 is (i) $-C_1-C_6$ -alkyl, saturated or unsaturated, unsubstituted; or (ii) $-C_1-C_2$ -alkyl, saturated or unsaturated, unsubstituted; and/or
 - R_3 is (i) $-C_1-C_6$ -alkylene-, saturated or unsaturated, unsubstituted; or (ii) $-C_1-C_3$ -alkylene-, saturated or unsaturated, unsubstituted; and/or
 - R_4 is $-C_1-C_6$ -alkylene-, saturated or unsaturated, unsubstituted; and/or
 - 10 - either (i) R_5 is $-C_1-C_6$ -alkyl, saturated or unsaturated, unsubstituted and R_6 is $-C_1-C_6$ -alkyl, saturated or unsaturated, unsubstituted; or (ii) R_5 is $-C_1-C_6$ -alkyl, saturated or unsaturated, unsubstituted, x is 3 and y is 0.
9. The 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to any of the preceding claims, wherein
- 15
- the "polymer" is obtainable by copolymerization of 1,3-butadiene with styrene;
 - R_1 is $-C_1-C_2$ -alkyl, saturated or unsaturated, unsubstituted; preferably $-CH_3$;
 - R_2 is $-C_1-C_2$ -alkyl, saturated or unsaturated, unsubstituted; preferably $-CH_3$;
 - R_3 is $-C_1-C_2$ -alkylene-, saturated or unsaturated, unsubstituted; preferably $-CH_2CH_2-$;
 - 20 - R_4 is $-C_3$ -alkylene-, saturated or unsaturated, unsubstituted; preferably $-CH_2CH_2CH_2-$;
 - R_5 and R_6 independently of one another are $-C_1-C_2$ -alkyl, saturated or unsaturated, unsubstituted; preferably independently of one another $-CH_3$ or $-CH_2CH_3$; and
 - $x+y = 3$ with $1 \leq x \leq 3$ and $0 \leq y \leq 2$; preferably $x = 3$ and $y = 0$.
- 25 10. A method for manufacturing an 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to general formula (I),

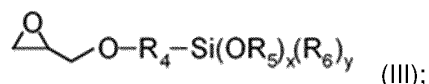


comprising the following steps:

- (a) providing a "polymer" containing at least one carbon-carbon double bond;
- 30 (b) providing a cyclic urea derivative of the general formula (II)



(c) providing a glycidoxyalkylsilane of the general formula (III)



- 5 (d) adding the cyclic urea derivative of the general formula (II) to the "polymer" as a first functionalization reagent to form a functionalized polymer intermediate; and
- (e) subsequently adding the glycidoxyalkylsilane of the general formula (III) to the functionalized polymer intermediate as a second functionalization reagent to form the 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to general formula (I);
- 10 wherein "polymer", x, y, R₁, R₂, R₃, R₄, R₅ and R₆ are as defined in any of claims 1 to 9.

11. The method according to claim 10, wherein step (a) is performed by

- an anionic solution polymerization, or
 - a polymerization using a coordination catalyst, wherein the coordination catalyst is preferably a Ziegler-Natta catalyst or a monometallic catalyst system.
- 15

12. The method according to claim 10 or 11, wherein step (a) is performed in the presence of

- a solvent, wherein the solvent is preferably selected from the group consisting of cyclohexane, methylcyclopentane, n-hexane and mixtures thereof; and/or
 - an initiator, which is preferably n-butyllithium or sec-butyllithium.
- 20

13. The method according to any of claims 10 to 12, wherein step (a) is performed within a period of 10 minutes to 8 hours, preferably 20 minutes to 4 hours.

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14. The method according to any of claims 10 to 13, which comprises the additional step(s) of adding

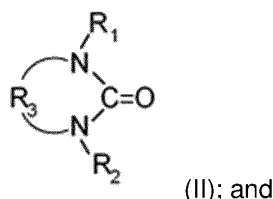
- (f) a coupling reagent before, together with or after addition of the cyclic urea derivative of the general formula (II), wherein the coupling reagent is preferably

selected from the group consisting of silicon tetrachloride, methyltrichlorosilane, dimethyldichlorosilane, tin tetrachloride, dibutyltin dichloride, tetraalkoxysilanes, ethylene glycol diglycidyl ether and 1,2,4-tris(chloromethyl)benzene; and/or

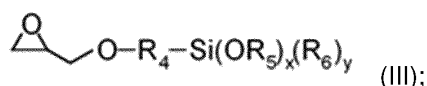
- (g) an antioxidant after the cyclic urea derivative of the general formula (III) and the cyclic carboxylic anhydride of the general formula (IV) have been added, wherein the antioxidant is preferably selected from the group consisting of sterically hindered phenols, aromatic amines, phosphites and thioethers; and/or
- (h) an extender oil, wherein the extender oil is preferably selected from the group consisting of a TDAE (Treated Distillate Aromatic Extract)-, a MES (Mild Extraction Solvates)-, a RAE (Residual Aromatic Extract)-, a TRAE (Treated Residual Aromatic Extract)-, a naphthenic and a heavy naphthenic oil; and/or
- (i) a filler, which is preferably carbon black or silica; and/or
- (j) rubbers and/or rubber additives.

15. Successive use of

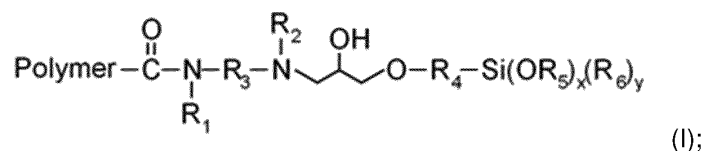
- a cyclic urea derivative of the general formula (II) as a first functionalization reagent



- a glycidoxyalkylsilane of the general formula (III) as a subsequent second functionalization reagent



for the preparation of an 1-amino-3-(oxyalkylalkoxysilyl)-2-propanol-terminated polymer according to general formula (I),



wherein "polymer", x, y, R₁, R₂, R₃, R₄, R₅ and R₆ are as defined in any of claims 1 to 9.