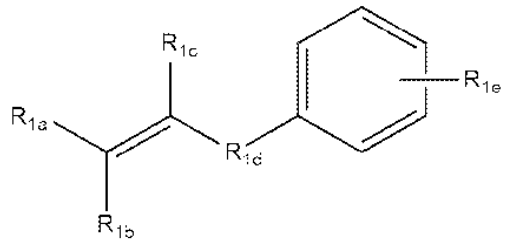
CLAIMS

1. A modified conjugated diene-based polymer comprising:

a first chain comprising a repeating unit derived from a conjugated diene-based monomer; a second chain comprising a repeating unit derived from a compound represented by the following Formula 1; and a derived unit from an alkoxysilane-based modifier,

wherein the first chain and the second chain are coupled by the derived unit of the modifier, wherein a terminal of the first chain is bonded to the derived unit of the modifier, and the second chain is bonded to an alkoxy group which is a residual group derived from the modifier:

[Formula 1]



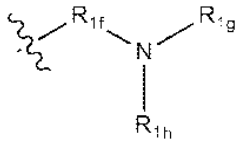
in Formula 1,

R_{1a} to R_{1c} are each independently a hydrogen atom; an alkyl group of 1 to 20 carbon atoms; an alkenyl group of 2 to 20 carbon atoms; an alkynyl group of 2 to 20 carbon atoms; a heteroalkyl group of 1 to 20 carbon atoms, a heteroalkenyl group of 2 to 20 carbon atoms; a heteroalkynyl group of 2 to 20 carbon atoms; a cycloalkyl group of 5 to 20 carbon atoms; an aryl group of 6 to 20 carbon atoms; or a heterocyclic group of 3 to 20 carbon atoms,

R_{1d} is a single bond, a substituted with a substituent or unsubstituted alkylene group of 1 to 20 carbon atoms; a substituted with a substituent or unsubstituted cycloalkylene group of 5 to 20 carbon atoms; or a substituted with a substituent or unsubstituted arylene group of 6 to 20 carbon atoms, wherein the substituent is an alkyl group of 1 to 10 carbon atoms, a cycloalkyl group of 5 to 10 carbon atoms, or an aryl group of 6 to 20 carbon atoms, and

R_{1e} is an alkyl group of 1 to 20 carbon atoms; an alkenyl group of 2 to 20 carbon atoms; an alkynyl group of 2 to 20 carbon atoms; a heteroalkyl group of 1 to 20 carbon atoms; a heteroalkenyl group of 2 to 20 carbon atoms; a heteroalkynyl group of 2 to 20 carbon atoms; a cycloalkyl group of 5 to 20 carbon atoms; an aryl group of 6 to 20 carbon atoms; a heterocyclic group of 3 to 20 carbon atoms; or a substituent represented by the following Formula 1a:

[Formula 1a]



in Formula 1a,

R_{1f} is a single bond, a substituted with a substituent or unsubstituted alkylene group of 1 to 20 carbon atoms; a substituted with a substituent or unsubstituted cycloalkylene group of 5 to 20 carbon atoms; or a substituted with a substituent or unsubstituted arylene group of 6 to 20 carbon atoms, wherein the substituent is an alkyl group of 1 to 10 carbon atoms, a cycloalkyl group of 5 to 10 carbon atoms, or an aryl group of 6 to 20 carbon atoms, and

R_{1g} and R_{1h} are each independently an alkyl group of 1 to 20 carbon atoms; an alkenyl group of 2 to 20 carbon atoms; an alkynyl group of 2 to 20 carbon atoms; a heteroalkyl group of 1 to 20 carbon atoms; a heteroalkenyl group of 2 to 20 carbon atoms; a heteroalkynyl group of 2 to 20 carbon atoms; a cycloalkyl group of 5 to 20 carbon atoms; an aryl group of 6 to 20 carbon atoms; or a heterocyclic group of 3 to 20 carbon atoms, or R_{1g} and R_{1h} are connected with each other to form a heterocyclic group of 2 to 10 carbon atoms together with N.

2. The modified conjugated diene-based polymer of claim 1, wherein

in Formula 1,

R_{1a} to R_{1c} are each independently a hydrogen atom; an alkyl group of 1 to 10 carbon atoms; an alkenyl group of 2 to 10 carbon atoms; an alkynyl group of 2 to 10 carbon atoms; a heteroalkyl group of 1 to 10 carbon atoms, a heteroalkenyl group of 2 to 10 carbon atoms; a heteroalkynyl group of 2 to 10 carbon atoms; a cycloalkyl group of 5 to 10 carbon atoms; an aryl group of 6 to 10 carbon atoms; or a heterocyclic group of 3 to 10 carbon atoms,

R_{1d} is a single bond or an unsubstituted alkylene group of 1 to 10 carbon atoms, and

R_{1e} is an alkyl group of 1 to 10 carbon atoms; an alkenyl group of 2 to 10 carbon atoms; an alkynyl group of 2 to 10 carbon atoms; a heteroalkyl group of 1 to 10 carbon atoms; a heteroalkenyl group of 2 to 10 carbon atoms; a heteroalkynyl group of 2 to 10 carbon atoms; a cycloalkyl group of 5 to 10 carbon atoms; an aryl group of 6 to 10 carbon atoms; a heterocyclic group of 3 to 10 carbon atoms; or a substituent represented by Formula 1a, and

in Formula 1a,

R_{1f} is a single bond or an unsubstituted alkylene group of 1 to 10 carbon atoms, and

R_{1g} and R_{1h} are each independently an alkyl group of 1 to 10 carbon atoms; an alkenyl group of 2 to 10 carbon atoms; an alkynyl group of 2 to 10 carbon atoms; a heteroalkyl group of 1 to 10 carbon atoms; a heteroalkenyl group of 2 to 10 carbon atoms; a heteroalkynyl group of

2 to 10 carbon atoms; a cycloalkyl group of 5 to 10 carbon atoms; an aryl group of 6 to 10 carbon atoms; or a heterocyclic group of 3 to 10 carbon atoms, or R_{1g} and R_{1h} are connected with each other to form a heterocyclic group of 2 to 10 carbon atoms together with N.

3. The modified conjugated diene-based polymer of claim 1, wherein
in Formula 1,
R_{1a} to R_{1c} are each independently a hydrogen atom; or an alkyl group of 1 to 6 carbon atoms,
R_{1d} is a single bond or an unsubstituted alkylene group of 1 to 6 carbon atoms, and
R_{1e} is an alkyl group of 1 to 10 carbon atoms or a substituent represented by Formula 1a, and
in Formula 1a,
R_{1f} is a single bond or an unsubstituted alkylene group of 1 to 6 carbon atoms, and
R_{1g} and R_{1h} are each independently an alkyl group of 1 to 10 carbon atoms; or R_{1g} and R_{1h} are connected with each other to form a heterocyclic group of 2 to 6 carbon atoms together with N.

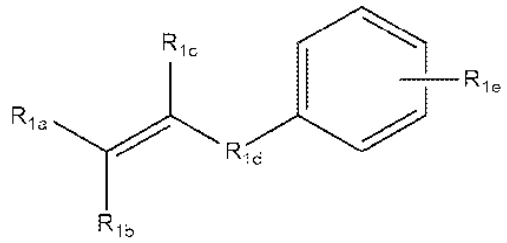
4. The modified conjugated diene-based polymer of claim 1, wherein the first chain further comprises a repeating unit derived from an aromatic vinyl-based monomer.

5. The modified conjugated diene-based polymer of claim 1, wherein the second chain further comprises a derived unit from a conjugated diene-based monomer.

6. The modified conjugated diene-based polymer of claim 1, wherein the modified conjugated diene-based polymer has a number average molecular weight (Mn) of 1,000 g/mol to 2,000,000 g/mol, a weight average molecular weight (Mw) of 1,000 g/mol to 3,000,000 g/mol, and a peak average molecular weight (Mp) of 1,000 g/mol to 3,000,000 g/mol.

7. A method for preparing the modified conjugated diene-based polymer of claim 1, the method comprising:
polymerizing a conjugated diene-based monomer, or a conjugated diene-based monomer and an aromatic vinyl-based monomer in the presence of a polymerization initiator in a carbon solvent to prepare an active first chain (S1);
reacting the active first chain with an alkoxysilane-based modifier to prepare a modified active first chain (S2); and
reacting the modified active first chain and a macromonomer comprising a repeating unit derived from a compound represented by the following Formula 1 (S3):

[Formula 1]



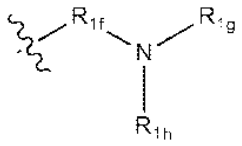
in Formula 1,

R_{1a} to R_{1c} are each independently a hydrogen atom; an alkyl group of 1 to 20 carbon atoms; an alkenyl group of 2 to 20 carbon atoms; an alkynyl group of 2 to 20 carbon atoms; a heteroalkyl group of 1 to 20 carbon atoms, a heteroalkenyl group of 2 to 20 carbon atoms; a heteroalkynyl group of 2 to 20 carbon atoms; a cycloalkyl group of 5 to 20 carbon atoms; an aryl group of 6 to 20 carbon atoms; or a heterocyclic group of 3 to 20 carbon atoms,

R_{1d} is a single bond, a substituted with a substituent or unsubstituted alkylene group of 1 to 20 carbon atoms; a substituted with a substituent or unsubstituted cycloalkylene group of 5 to 20 carbon atoms; or a substituted with a substituent or unsubstituted arylene group of 6 to 20 carbon atoms, wherein the substituent is an alkyl group of 1 to 10 carbon atoms, a cycloalkyl group of 5 to 10 carbon atoms, or an aryl group of 6 to 20 carbon atoms, and

R_{1e} is an alkyl group of 1 to 20 carbon atoms; an alkenyl group of 2 to 20 carbon atoms; an alkynyl group of 2 to 20 carbon atoms; a heteroalkyl group of 1 to 20 carbon atoms; a heteroalkenyl group of 2 to 20 carbon atoms; a heteroalkynyl group of 2 to 20 carbon atoms; a cycloalkyl group of 5 to 20 carbon atoms; an aryl group of 6 to 20 carbon atoms; a heterocyclic group of 3 to 20 carbon atoms; or a substituent represented by the following Formula 1a:

[Formula 1a]



in Formula 1a,

R_{1f} is a single bond, a substituted with a substituent or unsubstituted alkylene group of 1 to 20 carbon atoms; a substituted with a substituent or unsubstituted cycloalkylene group of 5 to 20 carbon atoms; or a substituted with a substituent or unsubstituted arylene group of 6 to 20 carbon atoms, wherein the substituent is an alkyl group of 1 to 10 carbon atoms, a cycloalkyl group of 5 to 10 carbon atoms, or an aryl group of 6 to 20 carbon atoms, and

R_{1g} and R_{1h} are each independently an alkyl group of 1 to 20 carbon atoms; an alkenyl group

of 2 to 20 carbon atoms; an alkynyl group of 2 to 20 carbon atoms; a heteroalkyl group of 1 to 20 carbon atoms; a heteroalkenyl group of 2 to 20 carbon atoms; a heteroalkynyl group of 2 to 20 carbon atoms; a cycloalkyl group of 5 to 20 carbon atoms; an aryl group of 6 to 20 carbon atoms; or a heterocyclic group of 3 to 20 carbon atoms, or R_{1g} and R_{1h} are connected with each other to form a heterocyclic group of 2 to 10 carbon atoms together with N.

8. The method for preparing the modified conjugated diene-based polymer of claim 7, wherein the macromonomer further comprises a derived unit from a conjugated diene-based monomer.

9. The method for preparing the modified conjugated diene-based polymer of claim 7, wherein the macromonomer is prepared by low-degree polymerization reacting of the compound represented by Formula 1, or the compound represented by Formula 1 and a conjugated diene-based monomer in the presence of an organolithium compound in a hydrocarbon solvent.

10. The method for preparing the modified conjugated diene-based polymer of claim 7, wherein the modifier is used in 0.1 mol to 10 mol based on 1 mol of the polymerization initiator.

11. The method for preparing the modified conjugated diene-based polymer of claim 7, wherein the macromonomer is used in 0.1 to 2.0 mol based on 1 mol of the polymerization initiator.

12. A rubber composition comprising the modified conjugated diene-based polymer of claim 1, and a filler.

13. The rubber composition of claim 12, wherein the rubber composition comprises 0.1 parts by weight to 200 parts by weight of the filler based on 100 parts by weight of the modified conjugated diene-based polymer.