Claims

[Claim 1]

A surface-modified nanodiamond comprising a nanodiamond particle and a surface-modifying group having a polyoxyalkylene chain and a silicon atom in the form of a silane coupling agent, wherein the nanodiamond particle is surface-modified by the surface-modifying group, wherein the silicon atom is present as a Si-O bond in the surface-modifying group, and wherein the silicon atom takes a structure in which the silicon atom bonds to the nanodiamond particle with an oxygen atom interposed therebetween.

[Claim 2]

The surface-modified nanodiamond according to claim 1, wherein the surface-modifying group contains a urethane bond.

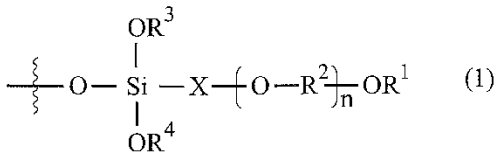
[Claim 3]

The surface-modified nanodiamond according to claim 1 or 2, wherein the polyoxyalkylene chain in the surface-modifying group has a number average molecular weight of 500 or greater as a polyoxyalkylene.

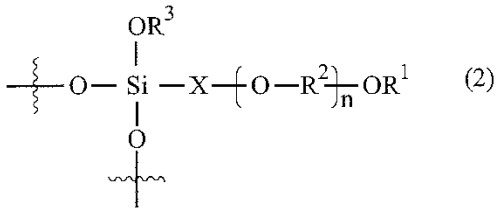
[Claim 4]

The surface-modified nanodiamond according to any one of claims 1 to 3, wherein the surface-modifying group is one or more groups selected from the group consisting of groups represented by Formula (1), groups represented by Formula (2), and groups represented by Formula (3):

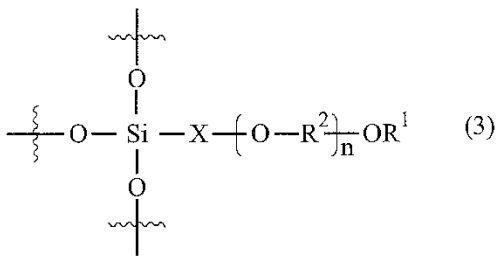
[Chem. 1]



(1)



(2)



(3)

where in Formulas (1) to (3), R^1 represents a hydrogen atom or an aliphatic hydrocarbon group,

R^2 represents an alkylene group, and when in plural, R^2 may each be identical or different,

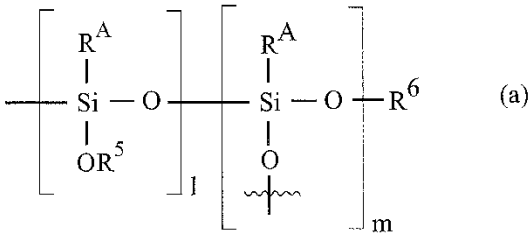
R^3 and R^4, which may be identical or different, each represent a hydrogen atom, an aliphatic hydrocarbon group having from 1 to 3 carbon atoms, or a group represented by Formula (a),

X represents a single bond or a linking group,

n represents an integer of 2 or greater, and

bonds indicated by a wavy line in Formulas (1) to (3) bond to a surface of the nanodiamond particle:

[Chem. 2]



(a)

where in Formula (a), R^A represents [-X-(O-R^2)n-OR^1] of Formulas (1) to (3),

R^5 and R^6, which may be identical or different, each represent a hydrogen atom or an aliphatic hydrocarbon group having from 1 to 3 carbon atoms,

l and m, which may be identical or different, each represent an integer of 0 or greater,

a bond extending left from a silicon atom bonds to an oxygen atom,

a bond indicated by a wavy line in Formula (a) bonds to a surface of the nanodiamond particle,

an order of bonding of a constituent unit indicated by l and a constituent unit indicated by m is not limited, and

in a case where one of l and m is an integer of 1 or greater while the other is an integer of 2 or greater, a method of bonding for the constituent unit indicated by l and the constituent unit indicated by m may be any of random, alternating, and block)].

[Claim 5]

The surface-modified nanodiamond according to claim 4, wherein X contains a urethane bond.

[Claim 6]

A surface-modified nanodiamond composite comprising the surface-modified nanodiamond described in any one of claims 1 to 5 and zirconia attached to the surface-modified nanodiamond.

[Claim 7]

A nanodiamond dispersion composition comprising a dispersion medium and the surface-modified nanodiamond described in any one of claims 1 to 5, the surface-modified nanodiamond being dispersed in the dispersion medium.

[Claim 8]

The nanodiamond dispersion composition according to claim 7, further comprising zirconia.

[Claim 9]

A method of producing the surface-modified nanodiamond described in any one of claims 1 to 5, the method comprising modifying by subjecting a nanodiamond particle to a reaction with a polyoxyalkylene chain-containing silane coupling agent.