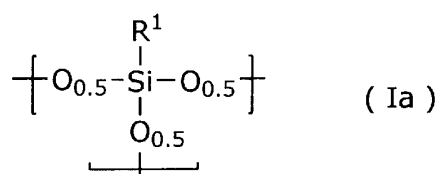


CLAIMS

[1] A low dielectric constant siliceous film manufacturing composition, comprising:
 (I) a polysiloxane
 which comprises a repeating unit represented by the following formula (Ia):



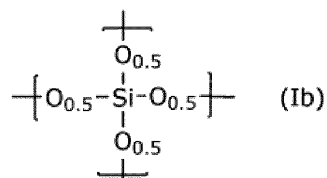
wherein

R¹ is hydrogen, a monovalent to trivalent, linear, branched or cyclic, saturated or unsaturated C₁₋₃₀ aliphatic hydrocarbon group, or a monovalent to trivalent C₆₋₃₀ aromatic hydrocarbon group,

in said aliphatic hydrocarbon group and said aromatic hydrocarbon group, one or more methylene is unsubstituted or substituted with oxy, imide or carbonyl, one or more hydrogens are unsubstituted or substituted with fluorine, hydroxy or alkoxy, or one or more carbons are unsubstituted or substituted with silicon,

when R¹ is divalent or trivalent, R¹ connects Si atoms contained in a plurality of repeating units; and

a repeating unit represented by the following formula (Ib):



and further

which shows a spectrum in which the area intensities S1 and S2

of the peaks in the ranges of $1100\pm 100\text{ cm}^{-1}$ and $900\pm 100\text{ cm}^{-1}$ assigned to Si-O and SiOH, respectively, are in a S2/S1 ratio of 0.05 to 0.15 when measured and analyzed by FT-IR,

(II) a pore-generating material,

(III) a condensation catalyst generator, and

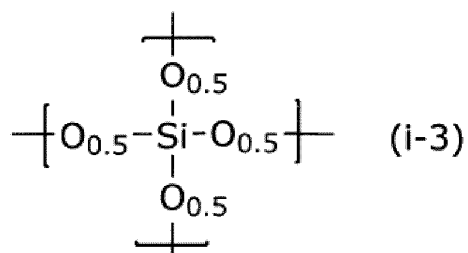
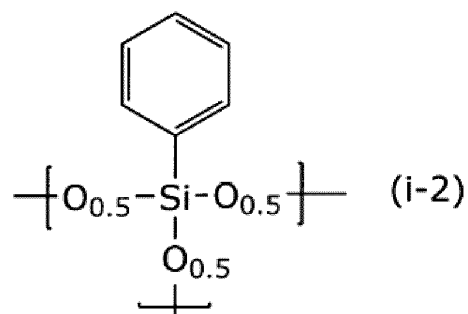
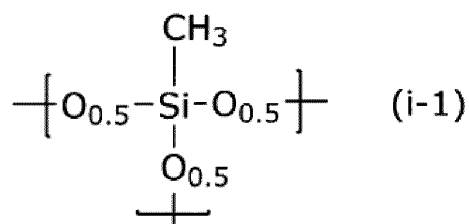
(IV) a solvent,

wherein said pore-generating material is a polycyclic hydrocarbon and the polycyclic hydrocarbon is from 50 to 200 mass% based on the mass of the (I) polysiloxane.

[2] The composition according to claim 1, wherein said polysiloxane has silanol at the terminal or in the side chain.

[3] The composition according to claim 1 or 2, wherein said R^1 is hydrogen, a linear, branched or cyclic C_{1-6} alkyl or a C_{6-10} aryl.

[4] The composition according to any one of claims 1 to 3, wherein said polysiloxane comprises repeating units selected from the group consisting of (i-1), (i-2) and (i-3) in combination:



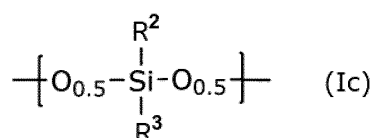
provided that the mixing molar ratios p_1 , p_2 and p_3 of (i-1), (i-2) and (i-3), respectively, satisfy the conditions of:

$$\begin{aligned} 0.4 &\leq p_1/(p_1+p_2+p_3) \leq 0.8, \\ 0 &\leq p_2/(p_1+p_2+p_3) \leq 0.4, \text{ and} \\ 0.2 &\leq p_3/(p_1+p_2+p_3) \leq 0.6. \end{aligned}$$

[5] The composition according to any one of claims 1 to 4, wherein said polysiloxane has a mass average molecular weight of 1,000 to 10,000 measured by gel permeation chromatography in terms of polystyrene.

[6] The composition according to any one of claims 1 to 5, wherein said polysiloxane contains the repeating unit (Ib) in a mixing ratio of 20 mol% or more based on the total amount of the repeating units.

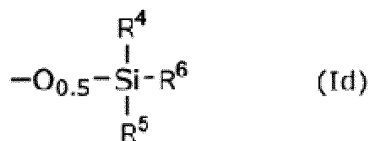
[7] The composition according to any one of claims 1 to 6, wherein said polysiloxane further contains a repeating unit represented by the following formula (1c):



wherein

R^2 and R^3 are independently hydrogen, linear, branched or cyclic C_{1-6} aliphatic hydrocarbon group or C_{6-10} aromatic hydrocarbon group.

[8] The composition according to any one of claims 1 to 7, wherein said polysiloxane further contains a terminal unit represented by the following formula (1d):



wherein

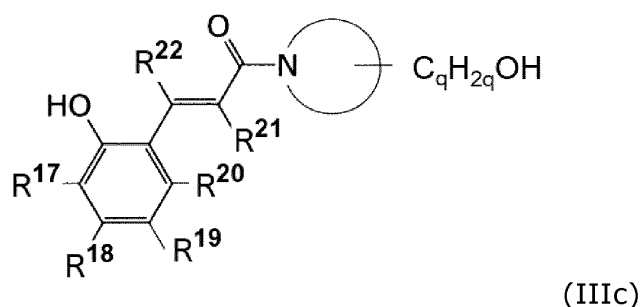
R^4 to R^6 are independently hydrogen, linear, branched or cyclic C_{1-6} aliphatic hydrocarbon group or C_{6-10} aromatic hydrocarbon group.

[9] The composition according to any one of claims 1 to 8, wherein said condensation catalyst generator is a thermal base generator or a photobase generator.

[10] The composition according to any one of claims 1 to 9, wherein said thermal base generator is at least one compound selected from the group consisting of
 1,8-diazabicyclo[5.4.0]undec-7-ene tetraphenylborate,
 1,8-diazabicyclo[5.4.0]undec-7-ene triphenylbutylborate,
 1,8-diazabicyclo[5.4.0]undec-7-ene tetrabutylborate,

1,8-diazabicyclo[5.4.0]undec-7-ene fumaric acid salt,
 1,5-diazabicyclo-[4.3.0]non-5-ene tetraphenylborate,
 1,5-diazabicyclo-[4.3.0]non-5-ene triphenylbutylborate,
 1,5-diazabicyclo-[4.3.0]non-5-ene tetrabutylborate,
 1,5-diazabicyclo-[4.3.0]non-5-ene fumaric acid salt,
 1,5-diazabicyclo [4.4.0]decene-5-ene tetraphenylborate,
 1,5-diazabicyclo [4.4.0]decene-5-ene triphenylbutylborate,
 1,5-diazabicyclo [4.4.0]decene-5-ene tetrabutylborate,
 1,5-diazabicyclo [4.4.0]decene-5-ene fumaric acid salt,
 2-Ethyl-4-methyl imidazlium tetraphenylborate,
 2-Ethyl-4-methyl imidazlium triphenylbutylborate,
 2-Ethyl-4-methyl imidazlium tetrabutylborate, 2-Ethyl-4-methyl
 imidazlium fumaric acid salt,
 N-(2-nitrobenzyloxycarbonyl)imidazlium triphenylbutylborate,
 N-(2-nitrobenzyloxycarbonyl)imidazlium tetraphenylborate,
 N-(2-nitrobenzyloxycarbonyl)imidazlium tetrabutylborate, and
 N-(2-nitrobenzyloxycarbonyl)imidazlium fumaric acid salt.

[11] The composition according to any one of claims 1 to 9,
 wherein said photobase generator is at least one compound
 represented by the following formula (IIIc):



wherein,

q is an integer of 1 to 6;

R^{17} to R^{22} are each independently hydrogen, halogen,
 hydroxyl, mercapto, sulfide, silyl, silanol, nitro, nitroso, sulfinio,
 sulfo, sulfonate, phosphino, phosphinyl, phosphono,
 phosphonate, amino, ammonium, C_{1-20} aliphatic hydrocarbyl,

which may contain a substituent, C₆₋₂₂ aromatic hydrocarbyl, which may contain a substituent, C₁₋₂₀ alkoxy, which may contain a substituent, or C₆₋₂₀ aryloxy, which may contain a substituent; and two or more of R¹⁷ to R²⁰ may be bonded to form cyclic structure(s), said cyclic structure may contain hetero atom(s), N is a constituent atom of a nitrogen-containing heterocyclic ring, said nitrogen-containing heterocyclic ring is a 3- to 10-membered ring, and said nitrogen-containing heterocyclic ring may further have C₁₋₂₀ aliphatic hydrocarbyl, which are different from C_qH_{2q}OH group and may contain substituent.

[12] The composition according to any one of claims 1 to 11, wherein the amount of said condensation catalyst generator is 0.1 to 5.0 mass% based on the mass of the (I) polysiloxane.

[13] The composition according to any one of claims 1 to 12, wherein said substituted or unsubstituted polycyclic hydrocarbon is a bicyclic compound.

[14] The composition according to any one of claims 1 to 12, wherein said substituted or unsubstituted polycyclic hydrocarbon is a tricyclic compound.

[15] The composition according to any one of claims 1 to 12, wherein said substituted or unsubstituted polycyclic hydrocarbon is a hexacyclic compound.

[16] The composition according to any one of claims 1 to 15, wherein the solid content is 2.0 to 50 mass% based on the total mass of the composition.

[17] A method for producing a low dielectric constant siliceous film with dispersed pores comprising: forming a coating above a substrate with the composition according to any one of claims 1 to 16 and curing the coating.

[18] The method for producing a low dielectric constant siliceous film according to claim 17, wherein further step of photo-irradiation is carried out on the formed coating prior to the curing.

[19] The method for producing a low dielectric constant siliceous film with dispersed pores according to claim 17 or 18, wherein the curing is carried out at a temperature of 250°C or below.

[20] The method for producing a low dielectric constant siliceous film with dispersed pores according to any one of claims 17 to 19, wherein said low dielectric constant siliceous film with dispersed pores has a thickness of 100 nm or more.

[21] A low dielectric constant siliceous film with dispersed pores obtainable by the method according to any one of claims 17 to 20.

[22] A method for producing an electronic device, wherein the device comprising a low dielectric constant siliceous film with dispersed pores produced by the method according to any one of claims 17 to 20.