Patent Claims

1. A method for producing an amorphous silicon sacrifice film comprising:

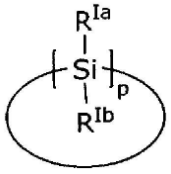
(i) polymerizing a cyclic polysilane comprising 5 or more silicon or a composition comprising the cyclic polysilane by light irradiation and/or heating to form a polymer having a polysilane skeleton,

(ii) preparing an amorphous silicon forming composition comprising the polymer having a polysilane skeleton, a polysilazane, and a solvent

(iii) applying the amorphous silicon forming composition above a substrate to form a coating film, and

(iv) heating the coating film in a non-oxidizing atmosphere.

2. The method according to claim 1, wherein the cyclic polysilane is represented by the following formula (I):



(I)

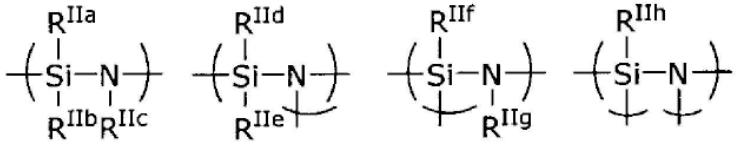
wherein

R^{Ia} and R^{Ib} are each independently hydrogen, halogen, C_{1-6} alkyl, or C_{6-10} aryl, and

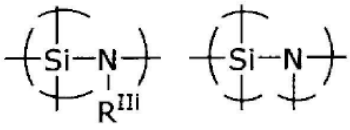
p is an integer of 5 or more.

3. The method according to claim 1 or 2, wherein the light irradiation in (i) is to irradiate light having the wavelength of 248 to 436 nm.

4. The method according to claim 1 or 2, wherein the polysilazane comprises 20 or more repeating units selected from the group consisting of the following formulas (II-1) to (II-6):



(II-1) (II-2) (II-3) (II-4)



(II-5) (II-6)

wherein R^{IIa} to R^{IIi} are each independently hydrogen or C_{1-4} alkyl.

5. The method according to claim 1 or 2, wherein the mass average molecular weight of said polysilazane is 900 to 15,000.

6. The method according to claim 1 or 2, wherein the ratio of the number of silicon atoms contained in the cyclic polysilane to that of silicon atoms contained in the polysilazane is 0.3 to 114.

7. The method according to claim 1 or 2, wherein the cyclic polysilane is selected from silyl cyclopentasilane, silyl cyclohexasilane, disilyl cyclohexasilane, cyclopentasilane and cyclohexasilane.

8. The method according to claim 1 or 2, wherein the polysilazane is perhydropolysilazane.

9. The method according to claim 1 or 2, wherein light having the wavelength of 248 to 436 nm is further irradiated after the formation of the coating film in (ii) .

10. The method according to claim 1 or 2, wherein the heating in (iii) is performed at 200 to 1,000°C.

11. The method according to claim 1 or 2, wherein the etching rate of the amorphous silicon sacrifice film to a 0.5 mass% hydrofluoric acid aqueous solution is 0 to 100 nm/min.

12. A method for manufacturing electronic devices, comprising:

producing an amorphous silicon sacrifice film by the method according to claim 1 or 2, and

removing said amorphous silicon sacrifice film by etching using an aqueous alkaline solution.

13. An amorphous silicon forming composition prepared with ingredients comprising:

(a) a polymer having a polysilane skeleton, which is formed by polymerizing a cyclic polysilane containing 5 or more silicon or a composition containing the cyclic polysilane by light irradiation and/or heating,

(b) a polysilazane, and

(c) a solvent.

14. The composition according to claim 13, wherein the ratio of the number of silicon atoms contained in the cyclic polysilane to that of silicon atoms contained in the polysilazane is 0.3 to 114.