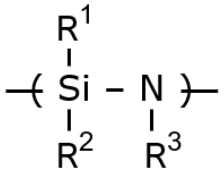
CLAIMS

[1] A method for manufacturing a silicon nitrogenous film comprising:
(i) applying a silicon nitrogenous film forming composition comprising a polysilazane and a solvent above a substrate to form a coating film,
(ii) irradiating an electron beam onto the coating film under a non-oxidizing atmosphere,
(iii) at least one process selected from the group consisting of
(a) irradiating a vacuum ultra-violet light onto the electron beam irradiated coating film under a non-oxidizing atmosphere and
(b) plasma processing onto the electron beam irradiated coating film, and
(iv) heating the treated-coating film of step (iii) under a non-oxidizing atmosphere.

[2] The method according to claim 1, wherein an irradiation dose of the electron beam is 10 MGy to 100 MGy.

[3] The method according to claim 1 or claim 2, wherein the vacuum ultra-violet light having the wavelength of 100 to 200 nm.

[4] The method according to any one of claims 1 to 3, wherein the polysilazane comprises a repeating unit represented by the following formula (1):



(1)

wherein R^1 to R^3 are each independently a single bond, hydrogen or C_{1-4} alkyl.

[5] The method according to any one of claims 1 to 4, wherein the mass average molecular weight of the polysilazane is 900 to 15,000 measured by gel permeation chromatography in terms of polystyrene.

[6] The method according to any one of claims 1 to 5, wherein the polysilazane is perhydropolysilazane.

[7] The method according to any one of claims 1 to 6, wherein the heating in (iv) is performed at 300 to 800°C.

[8] The method according to any one of claims 1 to 7, wherein the irradiated energy of the vacuum ultra-violet light is 3 to 15 J/cm^2.