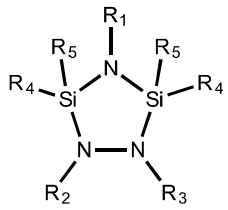
CLAIMS

1. A method of depositing a SiN film, comprising:

exposing a substrate to a silicon-nitrogen precursor and a NH_3 plasma to deposit a flowable SiN polymer; and

curing the flowable SiN polymer to form a cured SiN film;

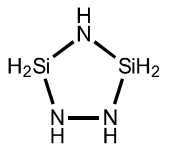
wherein the silicon-nitrogen precursor consists essentially of:



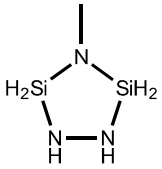
, wherein $R_1 – R_5$ are independently H or C1-C4 alkyl;

2. The method of claim 1, wherein at least one R group in the silicon-nitrogen precursor is a methyl group.

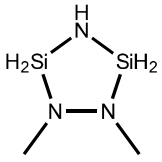
3. The method of claim 1, wherein the silicon-nitrogen precursor comprises one or more of:



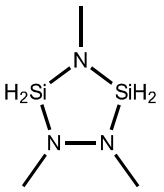
,



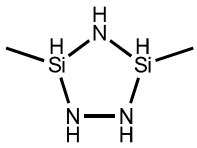
,



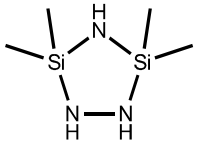
,



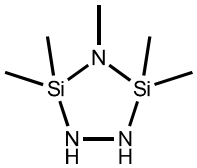
,



,



, or



.

4. The method of claim 1, wherein the plasma is generated using a remote plasma source.

5. The method of claim 1, wherein the flowable SiN polymer is cured by exposure to radicals in the plasma.

6. The method of claim 1, further comprising a post-deposition treatment comprising UV radiation exposure or annealing.

7. The method of claim 1, wherein the cured SiN film has a ratio of nitrogen atoms to silicon atoms of greater than or equal to about 0.7.

8. The method of claim 7, wherein the cured SiN film has a ratio of nitrogen atoms to silicon atoms of greater than or equal to about 1.0.

9. The method of claim 1, wherein the cured SiN film has a ratio of nitrogen atoms to silicon atoms is in the range of about 1.0 to 1.5.

10. The method of claim 1, wherein the substrate is maintained at a temperature of less than or equal to about 25 °C.

11. The method of claim 10, wherein the substrate is maintained at a temperature in the range of about -100 °C to about 25 °C.

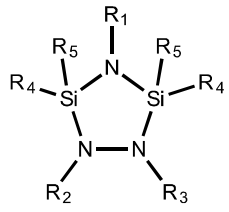
12. The method of claim 1, wherein the cured SiN film contains substantially no carbon atoms.

13. A method of depositing a SiN film, comprising:

exposing a substrate maintained at less than or equal to 25 °C to a silicon-nitrogen precursor and a NH_3 plasma to deposit a flowable SiN polymer; and

curing the flowable SiN polymer to form a cured SiN film;

wherein a ration of nitrogen to silicon atoms in the cured SiN film is greater than about 1.0 and the silicon-nitrogen precursor consists essentially of:



, wherein R_1 – R_5 are independently H or CH_3, with the proviso that at least one of R_1 to R_5 is methyl.