CLAIMS

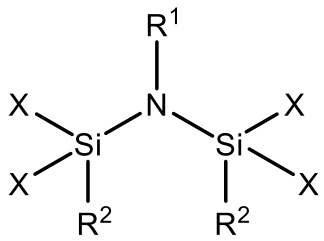
1. A composition for forming a silicon-containing film, the composition comprising a silazane precursor selected from the group consisting of 1,1,1,3,3,3-hexachloro-2-methyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-sec-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-tert-butyldisilazane, 1,1,1,3,3-pentachloro-2-methyldisilazane, 1,1,1,3,3-pentachloro-2-ethyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyldisilazane, 1,1,1,3,3-pentachloro-2-methyl-3-methyl-disilazane, 1,1,1,3,3-pentachloro-2-ethyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyl-3-methyldisilazane, 1,1,1,3,3,3-hexabromo-2-methyldisilazane, 1,1,1,3,3,3-bromo-2-ethyldisilazane, 1,1,1,3,3,3-bromo-2-n-propyldisilazane, 1,1,1,3,3,3-bromo-2-iso-propyldisilazane, 1,1,1,3,3,3-bromo-2-n-butyldisilazane, 1,1,1,3,3,3-bromo-2-sec-butyldisilazane, 1,1,1,3,3,3-bromo-2-iso-butyldisilazane, 1,1,1,3,3,3-bromo-2-tert-butyldisilazane, 1,1,1,3,3,3-hexaiodo-2-methyldisilazane, 1,1,1,3,3,3-iodo-2-ethyldisilazane, 1,1,1,3,3,3-iodo-2-n-propyldisilazane, 1,1,1,3,3,3-iodo-2-n-butyldisilazane, 1,1,1,3,3,3-iodo-2-iso-propyldisilazane, 1,1,1,3,3,3-iodo-2-iso-butyldisilazane, 1,1,1,3,3,3-iodo-2-sec-butyl-disilazane, 1,1,1,3,3,3-iodo-2-tert-butyl-disilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-sec-butyldisilazane, and 1,1,3,3-tetrachloro-1,3-dimethyl-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-methyldisilazane , 1,1,3,3-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-2-n-propyldisilazane, 1,1,3,3-tetrachloro-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-2-n-butyldisilazane, 1,1,3,3-tetrachloro-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-2-sec-butyldisilazane, 1,1,3,3-tetrachloro-2-tert-butyldisilazane, 1,1,3,3-tetrabromo-2-methyldisilazane, 1,1,3,3-tetrabromo-2-ethyldisilazane, 1,1,3,3-tetrabromo-2-n-propyldisilazane, 1,1,3,3-tetrabromo-2-iso-propyldisilazane, 1,1,3,3-tetrabromo-2-n-butyldisilazane, 1,1,3,3-tetrabromo-2-iso-butyldisilazane, 1,1,3,3-tetrabromo-2-sec-butyldisilazane, 1,1,3,3-tetrabromo-2-tert-butyldisilazane, 1,1,3,3-tetraiodo-2-methyldisilazane, 1,1,3,3-tetraiodo-2-ethyldisilazane, 1,1,3,3-tetraiodo-2-n-propyldisilazane, 1,1,3,3-tetraiodo-2-iso-propyldisilazane, 1,1,3,3-

tetraiodo-2-n-butyldisilazane, 1,1,3,3-tetraiodo-2-iso-butyldisilazane, 1,1,3,3-tetraiodo-2-sec-butyldisilazane, 1,1,3,3-tetraiodo-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-cyclopentyldisilazane, 1,1,3,3-tetrachloro-2-cyclohexyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclopentyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclohexyldisilazane, and

wherein the composition is free of organoamines, halide ions, metal ions.

2. A composition for forming a silicon-containing film, the composition comprising:

(a) at least one silazane represented by Formula I:



I

wherein R^1 is selected from the group consisting of a linear or branched C_1 to C_{10} alkyl group, a linear or branched C_3 to C_{10} alkenyl group, a linear or branched C_3 to C_{10} alkynyl group, a C_3 to C_{10} cyclic alkyl group, a C_2 to C_6 dialkylamino group, an electron withdrawing group, and a C_6 to C_{10} aryl group; R^2 is selected from the group consisting of hydrogen, a linear or branched C_1 to C_{10} alkyl group, a linear or branched C_3 to C_6 alkenyl group, a linear or branched C_3 to C_6 alkynyl group, a C_3 to C_{10} cyclic alkyl group, a C_2 to C_6 dialkylamino group, a C_6 to C_{10} aryl group, a linear or branched C_1 to C_6 fluorinated alkyl group, an electron withdrawing group, a C_4 to C_{10} aryl group, and a halide selected from the group consisting of Cl, Br, and I; and X is a halide selected from Cl, Br, and I; and

(b) a solvent, wherein the solvent has a boiling point, wherein the difference between the boiling point of the solvent and that of the at least one silazane is 40°C or less, and wherein the composition is substantially free of organoamines, halide ions, and metal ions.

3. The composition of claim 2 wherein the silazane precursor comprises at least one selected from the group consisting of 1,1,1,3,3,3-hexachloro-2-methyldisilazane, 1,1,1,3,3,3-hexachloro-2-ethyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-sec-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-tert-butyldisilazane, 1,1,1,3,3-pentachloro-2-methyldisilazane, 1,1,1,3,3-pentachloro-2-ethyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyldisilazane, 1,1,1,3,3-pentachloro-2-methyl-3-methyl-disilazane, 1,1,1,3,3-pentachloro-2-ethyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyl-3-methyldisilazane, 1,1,1,3,3,3-hexabromo-2-methyldisilazane, 1,1,1,3,3,3-bromo-2-ethyldisilazane, 1,1,1,3,3,3-bromo-2-n-propyldisilazane, 1,1,1,3,3,3-bromo-2-iso-propyldisilazane, 1,1,1,3,3,3-bromo-2-n-butyldisilazane, 1,1,1,3,3,3-bromo-2-sec-butyldisilazane, 1,1,1,3,3,3-bromo-2-iso-butyldisilazane, 1,1,1,3,3,3-bromo-2-tert-butyldisilazane, 1,1,1,3,3,3-hexaiodo-2-methyldisilazane, 1,1,1,3,3,3-iodo-2-ethyldisilazane, 1,1,1,3,3,3-iodo-2-n-propyldisilazane, 1,1,1,3,3,3-iodo-2-n-butyldisilazane, 1,1,1,3,3,3-iodo-2-iso-propyldisilazane, 1,1,1,3,3,3-iodo-2-iso-butyldisilazane, 1,1,1,3,3,3-iodo-2-sec-butyl-disilazane, 1,1,1,3,3,3-iodo-2-tert-butyl-disilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-methyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-sec-butyldisilazane, and 1,1,3,3-tetrachloro-1,3-dimethyl-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-methyldisilazane , 1,1,3,3-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-2-n-propyldisilazane, 1,1,3,3-tetrachloro-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-2-n-butyldisilazane, 1,1,3,3-tetrachloro-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-2-sec-butyldisilazane, 1,1,3,3-tetrachloro-2-tert-butyldisilazane, 1,1,3,3-tetrabromo-2-methyldisilazane, 1,1,3,3-tetrabromo-2-ethyldisilazane, 1,1,3,3-tetrabromo-2-n-propyldisilazane, 1,1,3,3-tetrabromo-2-iso-propyldisilazane, 1,1,3,3-tetrabromo-2-n-butyldisilazane, 1,1,3,3-tetrabromo-2-iso-butyldisilazane, 1,1,3,3-tetrabromo-2-sec-butyldisilazane, 1,1,3,3-tetrabromo-2-tert-butyldisilazane, 1,1,3,3-tetraiodo-2-methyldisilazane, 1,1,3,3-tetraiodo-2-ethyldisilazane, 1,1,3,3-tetraiodo-2-n-propyldisilazane, 1,1,3,3-tetraiodo-2-iso-propyldisilazane, 1,1,3,3-tetraiodo-2-n-butyldisilazane, 1,1,3,3-tetraiodo-2-iso-

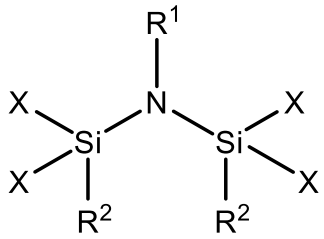
butyldisilazane, 1,1,3,3-tetraiodo-2-sec-butyldisilazane, 1,1,3,3-tetraiodo-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-cyclopentyldisilazane, 1,1,3,3-tetrachloro-2-cyclohexyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclopentyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclohexyldisilazane.

4. The composition of claim 2 wherein the solvent comprises at least one selected from the group consisting of ether, tertiary amine, alkyl hydrocarbon, aromatic hydrocarbon, and tertiary aminoether.

5. A method for forming a silicon-containing film on at least one surface of a substrate by a deposition process selected from a chemical vapor deposition process and an atomic layer deposition process, the method comprising:

providing the at least one surface of the substrate in a reaction chamber;

introducing at least one silazane precursor represented by the following Formula I below:



I

wherein R^1 is selected from the group consisting of a linear or branched C_1 to C_{10} alkyl group, a linear or branched C_3 to C_{10} alkenyl group, a linear or branched C_3 to C_{10} alkynyl group, a C_3 to C_{10} cyclic alkyl group, a C_2 to C_6 dialkylamino group, an electron withdrawing group, and a C_6 to C_{10} aryl group; R^2 is selected from hydrogen, a linear or branched C_1 to C_{10} alkyl group, a linear or branched C_2 to C_6 alkenyl group, a linear or branched C_3 to C_6 alkynyl group, a C_3 to C_{10} cyclic alkyl group, a C_2 to C_6 dialkylamino group, a C_6 to C_{10} aryl group, a linear or branched C_1 to C_6 fluorinated alkyl group, an electron withdrawing group, a C_4 to C_{10} aryl group, and a halide selected from the group

consisting of Cl, Br, and I; and X is a halide selected from the group consisting of Cl, Br, and I; and

introducing a nitrogen-containing source into the reactor wherein the at least one silazane precursor and the nitrogen-containing source react to form the film on the at least one surface, wherein the silazane is substantially free of organoamines, halide ions, and metal ions.

6. The method of claim 5 wherein the at least one silazane is selected from the group consisting of 1,1,1,3,3,3-hexachloro-2-methyldisilazane, 1,1,1,3,3,3-hexachloro-2-ethyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-sec-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-tert-butyldisilazane, 1,1,1,3,3-pentachloro-2-methyldisilazane, 1,1,1,3,3-pentachloro-2-ethyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyldisilazane, 1,1,1,3,3-pentachloro-2-methyl-3-methyl-disilazane, 1,1,1,3,3-pentachloro-2-ethyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyl-3-methyldisilazane, 1,1,1,3,3,3-hexabromo-2-methyldisilazane, 1,1,1,3,3,3-bromo-2-ethyldisilazane, 1,1,1,3,3,3-bromo-2-n-propyldisilazane, 1,1,1,3,3,3-bromo-2-iso-propyldisilazane, 1,1,1,3,3,3-bromo-2-n-butyldisilazane, 1,1,1,3,3,3-bromo-2-sec-butyldisilazane, 1,1,1,3,3,3-bromo-2-iso-butyldisilazane, 1,1,1,3,3,3-bromo-2-tert-butyldisilazane, 1,1,1,3,3,3-hexaiodo-2-methyldisilazane, 1,1,1,3,3,3-iodo-2-ethyldisilazane, 1,1,1,3,3,3-iodo-2-n-propyldisilazane, 1,1,1,3,3,3-iodo-2-n-butyldisilazane, 1,1,1,3,3,3-iodo-2-iso-propyldisilazane, 1,1,1,3,3,3-iodo-2-iso-butyldisilazane, 1,1,1,3,3,3-iodo-2-sec-butyl-disilazane, 1,1,1,3,3,3-iodo-2-tert-butyl-disilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-methyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-sec-butyldisilazane, and 1,1,3,3-tetrachloro-1,3-dimethyl-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-methyldisilazane , 1,1,3,3-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-2-n-propyldisilazane, 1,1,3,3-tetrachloro-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-2-n-butyldisilazane, 1,1,3,3-tetrachloro-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-2-sec-

butyldisilazane, 1,1,3,3-tetrachloro-2-tert-butyldisilazane, 1,1,3,3-tetrabromo-2-methyldisilazane, 1,1,3,3-tetrabromo-2-ethyldisilazane, 1,1,3,3-tetrabromo-2-n-propyldisilazane, 1,1,3,3-tetrabromo-2-iso-propyldisilazane, 1,1,3,3-tetrabromo-2-n-butyldisilazane, 1,1,3,3-tetrabromo-2-iso-butyldisilazane, 1,1,3,3-tetrabromo-2-sec-butyldisilazane, 1,1,3,3-tetrabromo-2-tert-butyldisilazane, 1,1,3,3-tetraiodo-2-methyldisilazane, 1,1,3,3-tetraiodo-2-ethyldisilazane, 1,1,3,3-tetraiodo-2-n-propyldisilazane, 1,1,3,3-tetraiodo-2-iso-propyldisilazane, 1,1,3,3-tetraiodo-2-n-butyldisilazane, 1,1,3,3-tetraiodo-2-iso-butyldisilazane, 1,1,3,3-tetraiodo-2-sec-butyldisilazane, 1,1,3,3-tetraiodo-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-cyclopentyldisilazane, 1,1,3,3-tetrachloro-2-cyclohexyldisilazane, 1,1,3,3-tetrachloro-1,3,-dimethyl-2-cyclopentyldisilazane, and 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclohexyldisilazane.

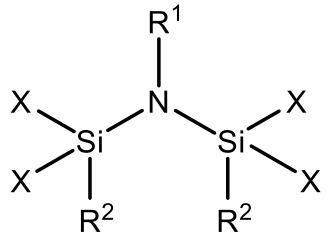
7. The method of claim 5 wherein the nitrogen-containing source is selected from the group consisting of ammonia, hydrazine, monoalkylhydrazine, dialkylhydrazine, nitrogen, nitrogen/hydrogen, ammonia plasma, nitrogen plasma, nitrogen/hydrogen plasma, and mixtures thereof.

8. The method of claim 5 wherein the silicon-containing film is selected from the group consisting of silicon nitride and silicon carbonitride.

9. A method of forming a silicon-containing film wherein the film is selected from an amorphous and a crystalline film from a deposition process selected from by plasma enhanced atomic layer deposition and plasma enhanced cyclic chemical vapor deposition, the method comprising:

placing one or more substrates into a reactor which is heated to one or more temperatures ranging from ambient temperature to about 1000°C;

introducing at least one silazane precursor represented by the following Formula I below:



I

wherein R^1 is selected from the group consisting of a linear or branched C_1 to C_{10} alkyl group, a linear or branched C_3 to C_{10} alkenyl group, a linear or branched C_3 to C_{10} alkynyl group, a C_3 to C_{10} cyclic alkyl group, a C_2 to C_6 dialkylamino group, an electron withdrawing group, and a C_6 to C_{10} aryl group; R^2 is selected from the group consisting of hydrogen, a linear or branched C_1 to C_{10} alkyl group, a linear or branched C_2 to C_6 alkenyl group, a linear or branched C_3 to C_6 alkynyl group, a C_3 to C_{10} cyclic alkyl group a C_2 to C_6 dialkylamino group, a C_6 to C_{10} aryl group, a linear or branched C_1 to C_6 fluorinated alkyl group, an electron withdrawing group, a C_4 to C_{10} aryl group, and a halide selected from the group consisting of Cl, Br, and I; and X is a halide selected from the group consisting of Cl, Br, and I, wherein the silazane is substantially free of organoamines, halide ions, metal ions;

purging the reactor with a purge gas;

providing a plasma source into the reactor to at least partially react with the at least one silazane precursor and deposit the silicon-containing film onto the one or more substrates; and

purging the reactor with a purge gas.

10. The method of claim 9 wherein the plasma source is selected from the group consisting of a plasma comprising hydrogen and argon, a plasma comprising hydrogen and helium plasma, an argon plasma, a helium plasma, and mixtures thereof.

11. The method of claim 9 wherein the at least one silazane is selected from the group consisting of 1,1,1,3,3,3-hexachloro-2-methyldisilazane, 1,1,1,3,3,3-hexachloro-2-ethyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-iso-propyldisilazane, 1,1,1,3,3,3-hexachloro-2-n-butyldisilazane, 1,1,1,3,3,3-hexachloro-

2-iso-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-sec-butyldisilazane, 1,1,1,3,3,3-hexachloro-2-tert-butyldisilazane, 1,1,1,3,3-pentachloro-2-methyldisilazane, 1,1,1,3,3-pentachloro-2-ethyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyldisilazane, 1,1,1,3,3-pentachloro-2-methyl-3-methyl-disilazane, 1,1,1,3,3-pentachloro-2-ethyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-n-propyl-3-methyldisilazane, 1,1,1,3,3-pentachloro-2-iso-propyl-3-methyldisilazane, 1,1,1,3,3,3-hexabromo-2-methyldisilazane, 1,1,1,3,3,3-bromo-2-ethyldisilazane, 1,1,1,3,3,3-bromo-2-n-propyldisilazane, 1,1,1,3,3,3-bromo-2-iso-propyldisilazane, 1,1,1,3,3,3-bromo-2-n-butyldisilazane, 1,1,1,3,3,3-bromo-2-sec-butyldisilazane, 1,1,1,3,3,3-bromo-2-iso-butyldisilazane, 1,1,1,3,3,3-bromo-2-tert-butyldisilazane, 1,1,1,3,3,3-hexaiodo-2-methyldisilazane, 1,1,1,3,3,3-iodo-2-ethyldisilazane, 1,1,1,3,3,3-iodo-2-n-propyldisilazane, 1,1,1,3,3,3-iodo-2-n-butyldisilazane, 1,1,1,3,3,3-iodo-2-iso-propyldisilazane, 1,1,1,3,3,3-iodo-2-iso-butyldisilazane, 1,1,1,3,3,3-iodo-2-sec-butyl-disilazane, 1,1,1,3,3,3-iodo-2-tert-butyl-disilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-methyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-n-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-sec-butyldisilazane, and 1,1,3,3-tetrachloro-1,3-dimethyl-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-methyldisilazane , 1,1,3,3-tetrachloro-2-ethyldisilazane, 1,1,3,3-tetrachloro-2-n-propyldisilazane, 1,1,3,3-tetrachloro-2-iso-propyldisilazane, 1,1,3,3-tetrachloro-2-n-butyldisilazane, 1,1,3,3-tetrachloro-2-iso-butyldisilazane, 1,1,3,3-tetrachloro-2-sec-butyldisilazane, 1,1,3,3-tetrachloro-2-tert-butyldisilazane, 1,1,3,3-tetrabromo-2-methyldisilazane, 1,1,3,3-tetrabromo-2-ethyldisilazane, 1,1,3,3-tetrabromo-2-n-propyldisilazane, 1,1,3,3-tetrabromo-2-iso-propyldisilazane, 1,1,3,3-tetrabromo-2-n-butyldisilazane, 1,1,3,3-tetrabromo-2-iso-butyldisilazane, 1,1,3,3-tetrabromo-2-sec-butyldisilazane, 1,1,3,3-tetrabromo-2-tert-butyldisilazane, 1,1,3,3-tetraiodo-2-methyldisilazane, 1,1,3,3-tetraiodo-2-ethyldisilazane, 1,1,3,3-tetraiodo-2-n-propyldisilazane, 1,1,3,3-tetraiodo-2-iso-propyldisilazane, 1,1,3,3-tetraiodo-2-n-butyldisilazane, 1,1,3,3-tetraiodo-2-iso-butyldisilazane, 1,1,3,3-tetraiodo-2-sec-butyldisilazane, 1,1,3,3-tetraiodo-2-tert-butyldisilazane, 1,1,3,3-tetrachloro-2-cyclopentyldisilazane, 1,1,3,3-tetrachloro-2-cyclohexyldisilazane, 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclopentyldisilazane, and 1,1,3,3-tetrachloro-1,3-dimethyl-2-cyclohexyldisilazane.