We claim:

1. A Si-containing film forming composition comprising

a) a catalyst and/or a polysilane; and

b) a N-H free, C-free, and Si-rich perhydropolysilazane having a molecular weight ranging from approximately 332 dalton to approximately 100,000 dalton and comprising N-H free repeating units having the formula $[-N(SiH_3)_x(SiH_2-)_y]$, wherein x=0, 1, or 2 and y= 0, 1, or 2 with x+y=2 ; and x= 0, 1 or 2 and y=1, 2, or 3 with x+y=3.

2. The Si-containing film forming composition of claim 1, wherein the N-H free, C-free, and Si-rich perhydropolysilazane has a Si:N ratio ranging from approximately 1.5:1 to approximately 2.5:1.

3. The Si-containing film forming composition of claim 1, wherein the N-H free, C-free, and Si-rich perhydropolysilazane has no –Si(-)(H)- and a SiH_2:SiH_3 ratio ranging from approximately 1 to approximately 5, preferably from approximately 3.5 to approximately 4.5.

4. The Si-containing film forming composition of claim 1, wherein the catalyst is selected from the group consisting of a desilylative coupling catalyst, a dehydrocoupling catalyst and both a desilylative coupling and dehydrocoupling catalyst.

5. The Si-containing film forming composition of claim 4, wherein the catalyst has the formula ML_4, with M being a Group IV or Group V element and each L independently being selected from is selected from the group consisting of NR_2, OR, R_5Cp, $N^{R, R'}$ R''-amd, beta-diketonate, iminoketonate, diiminate, and combinations thereof, with R, R' and R" independently being H, a C_1-C_4 hydrocarbon, or a trialkylsilyl group.

6. The Si-containing film forming composition of claim 4, wherein the catalyst is a metal carbonyl or a metal carbonyl containing molecule, the metal being selected from Co, Ni, Ru, Fe, Rh, Os.

7. The Si-containing film forming composition of claim 4, wherein the catalyst is $Co_2(CO)_8$.

8. The Si-containing film forming composition of any one of claims 1 to 7, comprising the polysilane.

9. The Si-containing film forming composition of any one of claims 1 to 7, wherein
the Si-containing film forming composition comprises the catalyst.

10. The Si-containing film forming composition of any one of claim 8, wherein the polysilane has a formula

$$Si_xH_{(2x+2),}$$

wherein x ranges from approximately 4 to approximately 50, preferably from approximately 10 to approximately 40, and more preferably from approximately 15 to approximately 30, or the formula

$$Si_nH_{2n+1-m}(NR_2)_m,$$

wherein with each R is independently H or a C_1-C_4 hydrocarbon; m is 1 or 2; and n ranges from approximately 3 to approximately 50, preferably from approximately 10 to approximately 40, and more preferably from approximately 15 to approximately 30.

11. A method of forming a Si-containing film on a substrate, the method comprising contacting the Si-containing film forming composition of any one of claims 1 to 7 with the substrate via a spin coating, spray coating, dip coating, or slit coating technique to form the Si-containing film.

12. The method of claim 11, wherein the substrate comprises trenches having an aspect ratio ranging from approximately 1:1 to approximately 1:100.

13. The method of claim 11, further comprising exposing the Si-containing film at a temperature ranging from approximately 30°C to 200°C, preferably from approximately 80°C to approximately 150°C under an inert atmosphere.

14. The method of claim 13, further comprising exposing the Si-containing film to a N-H containing atmosphere, at a temperature ranging from 200°C to 1000°C, preferably from 200°C to 600°C.