CLAIMS

1. A chemical vapor deposition method for producing a dielectric film, the method comprising:

providing a substrate in a reaction chamber;

introducing gaseous reagents into the reaction chamber wherein the gaseous reagents consist essentially of:

a silicon precursor comprising a hydrido-alkylsilicon compound having the chemical formula $R_nH_{4-n}Si$, wherein each R is independently selected from the group consisting of a linear, branched, or cyclic C_2 to C_{10} alkyl and n is 2-3,

at least one oxygen source, and optionally

at least one gas selected from the group consisting of He, Ar, N_2, Kr, Xe, NH_3, H_2, CO_2, and CO; and

applying energy to the gaseous reagents in the reaction chamber to induce reaction of the gaseous reagents and thereby deposit the film on the substrate, wherein the film has a dielectric constant ranging between 2.5 and 3.3.

2. The method of claim 1 wherein the silicon precursor is at least one selected from the group consisting of triethylsilane, diethylsilane, tri-n-propylsilane, di-n-propylsilane, ethyldi-n-propylsilane, diethyl-n-propylsilane, di-n-propylsilane, di-n-butylsilane, tri-n-butylsilane, tri-iso-propylsilane, diethylcyclopentylsilane, and diethylcyclohexylsilane.

3. The method of claim 1 wherein the deposition method is a plasma enhanced chemical vapor deposition method.

4. The method of claim 1 where the oxygen source comprises at least one oxygen source is selected from the group consisting of O_2, N_2O, NO, NO_2, CO_2, water, H_2O_2, and ozone.

5. The method of claim 1 further comprising the step of applying additional energy to the deposited film.

6. The method of claim 5 wherein the additional energy is at least one selected from the group consisting of a thermal treatment, an ultraviolet (UV) treatment, an electron beam treatment, and a gamma radiation treatment.

7. The method of claim 6 wherein the additional energy comprises UV treatment and thermal treatment, wherein the UV treatment occurs during at least a portion of the thermal treatment.

8. The method of claim 1, wherein the film comprises a composition $Si_vO_wC_xH_yF_z$, wherein v+w+x+y+z = 100%, v is from 10 to 35 atomic%, w is from 10 to 65 atomic%, x is from 5 to 40 atomic%, y is from 10 to 50 atomic% and z is from 0 to 15 atomic%.

9. A gaseous reagent composition for producing a dielectric film by a chemical vapor deposition process, the gaseous reagent composition consisting essentially of a silicon precursor comprising a hydrido-alkylsilicon compound having the chemical formula $R_nH_{4-n}Si$ wherein each R is independently selected from the group consisting of a linear, branched, or cyclic C_2 to C_{10} alkyl and n is 2-3, at least one oxygen source, and optionally at least one gas selected from the group consisting of He, Ar, N_2, Kr, Xe, NH_3, H_2, CO_2, and CO, wherein the silicon precursor has no more than 100 ppm of halide ions or water.

10. The gaseous reagent composition according to claim 9, wherein the silicon precursor has no more than 1 ppm of halide ions or water.