CLAIMS

1. A method of depositing a silicon-containing film on a substrate, the method comprising:

providing a substrate;

exposing the substrate to at least one silicon-containing precursor, each of the at least one silicon-containing precursor having (i) at least one of one or more silicon-hydrogen bonds and silicon-silicon bonds and (ii) at least one of one or more silicon-oxygen bonds and one or more silicon-carbon bonds;

exposing the substrate to a reactant to react with the silicon-containing precursor and form at least a portion of a silicon-containing film; and

alternating between exposing of the substrate to the silicon-containing precursor and the exposing of the substrate to the reactant in cycles until a desired thickness of the silicon-containing film is deposited,

wherein the reactant comprises radicals of hydrogen generated from igniting a plasma outside of a chamber housing the substrate, and

wherein the radicals of hydrogen reacts with the silicon-containing precursor under conditions that selectively break one or both of the silicon-hydrogen bonds and the silicon-silicon bonds but preserve the silicon-oxygen bonds and the silicon-carbon bonds.

2. The method of claim 1, wherein a plasma is ignited during the exposing of the substrate to the reactant.

3. The method of claim 2, wherein the plasma is generated remotely.

4. The method of claim 1, wherein the silicon-containing film comprises oxygen and silicon.

5. The method of claim 1, wherein the silicon-containing film comprises silicon carbide doped with oxygen.

6. The method of claim 1, wherein the at least one silicon-containing precursor is selected from the group consisting of pentamethyldisiloxane (PMDSO), tetramethyldisiloxane (TMDSO), hexamethyltrisiloxane, and heptamethyltrisiloxane.

7. The method of claim 1, wherein a chamber housing the substrate is purged between exposing the substrate to the silicon-containing precursor and exposing the substrate to the reactant.

8. The method of claim 1, wherein the at least one silicon-containing precursor further comprises an organo-silicon precursor.

9. The method of claim 8, wherein the organo-silicon precursor is selected from the group consisting of siloxanes, alkoxy silanes, and alkylsilanes.

10. The method of claim 9, wherein the organo-silicon precursor selected is a caged siloxane.

11. The method of claim 9, wherein the organo-silicon precursor selected is a linear siloxane.

12. The method of claim 1, wherein the at least one silicon-containing precursor comprising a disiloxane or trisiloxane.

13. The method of claim 1, wherein the at least one silicon-containing precursor comprises a caged siloxane.