CLAIMS:

1. A deposition method comprising:

delivering a silicon-containing precursor and a carrier precursor to a processing region of a semiconductor processing chamber;

forming a plasma of the silicon-containing precursor and the carrier precursor within the processing region of the semiconductor processing chamber;

depositing a first amount of a silicon-containing material on a substrate disposed within the processing region of the semiconductor processing chamber, wherein the depositing occurs at a first chamber pressure;

adjusting the first chamber pressure to a second chamber pressure less than the first chamber pressure; and

depositing a second amount of the silicon-containing material on the first amount of the silicon-containing material.

2. The deposition method of claim 1, wherein the silicon-containing precursor is a silicon-and-oxygen-containing precursor, and wherein the silicon-containing material comprises silicon oxide.

3. The deposition method of claim 1, wherein the first chamber pressure is less than or about 20 Torr, and wherein the second chamber pressure is less than or about 10 Torr.

4. The deposition method of claim 1, wherein a substrate temperature is maintained above or about 300° C while depositing the first amount of the silicon-containing material and the second amount of the silicon-containing material.

5. The deposition method of claim 1, further comprising:

increasing a volumetric flow rate of the carrier precursor while adjusting the first chamber pressure to the second chamber pressure, wherein the carrier precursor comprises argon.

6. The deposition method of claim 1, wherein the second amount of the silicon-containing material is characterized by a greater density than the first amount of the silicon-containing material.

7. The deposition method of claim 1, wherein the silicon-containing precursor comprises tetraethyl orthosilicate, and wherein the second amount of the silicon-containing material is characterized by a thickness of less than or about 100 nm.

8. A deposition method comprising:

delivering a silicon-containing precursor and a carrier precursor to a processing region of a semiconductor processing chamber;

forming a plasma of the silicon-containing precursor and the carrier precursor within the processing region of the semiconductor processing chamber;

depositing a first amount of a silicon-containing material on a substrate disposed within the processing region of the semiconductor processing chamber, wherein the depositing occurs at a first chamber pressure;

adjusting the carrier precursor from a first volumetric flow rate to a second volumetric flow rate greater than the first volumetric flow rate; and

depositing a second amount of the silicon-containing material on the first amount of the silicon-containing material.

9. The deposition method of claim 8, wherein the silicon-containing precursor is a silicon-and-oxygen-containing precursor, wherein the silicon-containing material comprises silicon oxide, and wherein the second volumetric flow rate is more than 50% greater than the first volumetric flow rate.

10. The deposition method of claim 8, further comprising:

adjusting the first chamber pressure to a second chamber pressure less than the first chamber pressure while adjusting the carrier precursor from the first volumetric flow rate to the second volumetric flow rate.

11. The deposition method of claim 10, wherein the first chamber pressure is less than or about 15 Torr, and wherein the second chamber pressure is less than or about 7 Torr.

12. The deposition method of claim 8, wherein the second amount of the silicon-containing material is characterized by a thickness of less than or about 100 nm, and wherein the second amount of the silicon-containing material is characterized by a compressive

stress greater than or about a compressive stress associated with the first amount of the silicon-containing material.

13. A deposition method comprising:

delivering a silicon-and-oxygen-containing precursor and a carrier precursor to a processing region of a semiconductor processing chamber;

forming a plasma of the silicon-and-oxygen-containing precursor and the carrier precursor within the processing region of the semiconductor processing chamber;

depositing a first amount of a silicon-and-oxygen-containing material on a substrate disposed within the processing region of the semiconductor processing chamber, wherein the depositing occurs at a first chamber pressure;

adjusting the first chamber pressure to a second chamber pressure less than the first chamber pressure;

while adjusting chamber pressure, increasing a volumetric flow rate of the carrier precursor; and

depositing a second amount of the silicon-and-oxygen-containing material on the first amount of the silicon-and-oxygen-containing material.

14. The deposition method of claim 13, wherein the first chamber pressure is less than or about 20 Torr, wherein the second chamber pressure is less than or about 10 Torr, wherein the silicon-and-oxygen-containing precursor comprises tetraethyl orthosilicate, and wherein the carrier precursor comprises argon.

15. The deposition method claim 13, wherein the first amount of the silicon-and-oxygen-containing material is deposited over a first period of time, and wherein the second amount of the silicon-and-oxygen-containing material is deposited over a second period of time less than the first period of time.

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