CLAIMS:

1. A semiconductor processing method comprising:

delivering a deposition precursor comprising a boron-containing precursor to a processing region of a semiconductor processing chamber;

forming a plasma of the deposition precursor within the processing region of the semiconductor processing chamber; and

depositing a boron-containing material on a substrate disposed within the processing region of the semiconductor processing chamber, wherein the substrate is characterized by a temperature of less than 50°C, and wherein the semiconductor processing chamber is characterized by a pressure of less than 100 mTorr.

2. The semiconductor processing method of claim 1, wherein the method further comprises delivering an inert precursor to the processing region of the semiconductor processing chamber, wherein a flow rate ratio of the inert precursor to the deposition precursor is greater than 10:1.

3. The semiconductor processing method of claim 2, wherein the inert precursor comprises at least one of helium or argon.

4. The semiconductor processing method of claim 1, wherein the semiconductor processing chamber is characterized by a pressure of less than 50 mTorr.

5. The semiconductor processing method of claim 1, wherein the deposition precursor further comprises a boron-containing precursor.

6. The semiconductor processing method of claim 1, wherein the deposition precursor further comprises at least one of a silicon-containing precursor or a nitrogen-containing precursor.

7. The semiconductor processing method of claim 1, wherein the boron-containing material comprises at least one of boron carbide, boron-nitride, boron-carbon-

nitride, boron-containing silicon, boron-containing silicon oxide, boron-and-boron-containing silicon oxide, or boron-containing silicon nitride.

8. The semiconductor processing method of claim 1, wherein the plasma is a bias plasma formed at a bias power is greater than 2000 Watts.

9. A semiconductor processing method comprising:

delivering a deposition precursor comprising a boron-containing precursor to a processing region of a semiconductor processing chamber;

applying a bias power to a substrate disposed within the processing region of the semiconductor processing chamber, wherein the bias power is greater than 3000 Watts;

forming a plasma of the deposition precursor within the processing region of the semiconductor processing chamber; and

depositing a boron-containing material on the substrate, wherein the substrate is characterized by a temperature of less than 50°C.

10. The semiconductor processing method of claim 9, wherein the deposition precursor further comprises an inert precursor.

11. The semiconductor processing method of claim 10, wherein a flow rate ratio of the inert precursor to the boron-containing precursor is greater than 10:1.

12. The semiconductor processing method of claim 9, wherein the bias power is greater than 4000 Watts.

13. A semiconductor processing method comprising:

delivering a boron-containing precursor to a processing region of a semiconductor processing chamber;

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

depositing a boron-containing material on a substrate disposed within the processing region of the semiconductor processing chamber, wherein the boron-containing material is characterized by an as-deposited surface roughness of less than 2 nm, and wherein the substrate is characterized by a temperature of less than 50°C.

14. The semiconductor processing method of claim 13, wherein the processing method further comprises:

delivering an inert precursor to the processing region of the semiconductor processing chamber, wherein a flow rate ratio of the inert precursor to the boron-containing precursor is greater than 10:1; and

applying a bias power to the substrate during the deposition of the boron-containing material, wherein the bias power is greater than 3000 Watts.

15. The semiconductor processing method of claim 13, wherein the boron-containing material is characterized by an as-deposited stress that is less than -500 MPa.

16. The semiconductor processing method of claim 13, wherein the boron-containing material further comprises carbon atoms, and wherein greater than 60% of the carbon atoms have sp^3 hybridized bonds.

17. The semiconductor processing method of claim 13, wherein the boron-containing material comprises less than 25 mol% hydrogen.

18. The semiconductor processing method of claim 13, wherein the boron-containing material comprises at least one of boron carbide, boron-nitride, boron-carbon-nitride, boron-containing silicon, boron-containing silicon oxide, boron-and-boron-containing silicon oxide, or boron-containing silicon nitride.