CLAIMS:

1. A deposition method comprising:

electrostatically chucking a semiconductor substrate at a first positive voltage within a processing region of a semiconductor processing chamber;

performing a deposition process, wherein the deposition process comprises forming a plasma within the processing region of the semiconductor processing chamber;

halting formation of the plasma within the semiconductor processing chamber;

simultaneously with the halting, increasing the first positive voltage of electrostatic chucking to a second positive voltage; and

purging the processing region of the semiconductor processing chamber.

2. The deposition method of claim 1, wherein the first positive voltage is +200 V or less.

3. The deposition method of claim 1, wherein the second positive voltage is +500 V or more.

4. The deposition method of claim 1, wherein the semiconductor substrate is electrostatically chucked to a substrate support, wherein the semiconductor processing chamber comprises a showerhead, and wherein the deposition process occurs with the semiconductor substrate positioned at a first distance from the showerhead.

5. The deposition method of claim 4, wherein the showerhead is maintained at a first temperature during the deposition process.

6. The deposition method of claim 4, further comprising:

repositioning the semiconductor substrate to a second distance from the showerhead when the first positive voltage is increased to the second positive voltage, wherein the second distance is greater than the first distance.

7. The deposition method of claim 6, wherein the second distance is more than 25% greater than the first distance.

8. The deposition method of claim 1, wherein the deposition process comprises depositing silicon oxide using tetraethyl orthosilicate.

9. A deposition method comprising:

electrostatically chucking a semiconductor substrate at a first positive voltage within a processing region of a semiconductor processing chamber;

performing a pre-treatment process, wherein the pre-treatment process comprises forming a plasma of an oxygen-containing precursor;

performing a deposition process, wherein the deposition process comprises forming a plasma within the processing region of the semiconductor processing chamber;

halting formation of the plasma within the semiconductor processing chamber;

simultaneously with the halting, increasing the first positive voltage of electrostatic chucking to a second positive voltage; and

purging the processing region of the semiconductor processing chamber.

10. The deposition method of claim 9, wherein the first positive voltage is +900 V or less.

11. The deposition method of claim 9, wherein the second positive voltage is +500 V or more.

12. The deposition method of claim 9, wherein the semiconductor substrate comprises silicon, and wherein pre-treatment process produces an oxygen-radicalized surface termination of the silicon of the semiconductor substrate.

13. The deposition method of claim 12, wherein the deposition process produces a silicon oxide film overlying the semiconductor substrate, the silicon oxide film having a thickness of or about 2.5 μm.