CLAIMS

1. A method of modifying a film, the method comprising modifying a first dielectric film deposited on a substrate by exposing the first dielectric film to a plasma comprising a deuterium-containing precursor to form a modified dielectric film containing deuterium,

wherein the first dielectric film is substantially free of hydrogen and deuterium;

wherein the substrate has a temperature in the range of 150 °C to 450 °C;

wherein the plasma has a pressure in the range of 1 to 100 millitorr;

wherein the plasma has a power in the range of 1000 to 10,000 watts; and

wherein the plasma has a gas flow rate in the range of 50 to 1000 sccm.

2. The method of claim 1, wherein the deuterium-containing precursor comprises one or more of D_2, D_2O, DH (deuterium-hydrogen) or HDO (deuterium-hydrogen oxide).

3. The method of claim 1, wherein the plasma further comprise comprises one or more of argon (Ar), helium (He), hydrogen (H_2), nitrogen (N_2), oxygen (O_2), ammonia (NH_3), or nitrogen fluoride (NF_3).

4. The method of claim 1, wherein the first dielectric film is part of a CMOS device.

5. The method of claim 1, wherein the first dielectric film is part of an optical solid state device.

6. The method of claim 1, wherein the substrate is positioned on a multi-zone susceptor, with each zone having independent temperature control.

7. The method of claim 6, wherein the multi-zone susceptor has at least two zones.

8. The method of claim 7, wherein the multi-zone susceptor comprises an inner zone and an outer zone.

9. The method of claim 7, wherein the multi-zone susceptor has radially spaced zones.

10. The method of claim 7, wherein the multi-zone susceptor comprises an inner zone and an outer zone, and each of the inner zone and outer zone comprise radially spaced zones.

11. The method claim 6, wherein more deuterium is incorporated into the first dielectric film in higher temperature zones than in lower temperature zones.