The Claims defining the invention are as follows:

1. A method of operation of a semiconductor manufacturing process chamber, comprising etching a film on a semiconductor using an etch gas comprising a first fluoroolefin and a second fluoroolefin, wherein the first fluoroolefin is cis-1,1,1,4,4,4-hexafluoro-2-butene and the second fluoroolefin is 1,1,1,4,4,4-hexafluoro-2-butyne.

2. The method of claim 1, wherein the step of etching a film further comprises

transferring a photomask to the semiconductor to create a masked surface and an exposed surface,

forming a plasma of said etch gas, and

exposing the exposed surface of the semiconductor to the plasma to remove portions of the exposed surface of the semiconductor to form an etched surface of the semiconductor.

3. The method of claim 2, wherein the method further comprises the steps of forming a second etch gas, activating the second etch gas to form a second plasma, depositing the second plasma on the etched surface to form a polymer layer on the etched surface of the semiconductor.

4. The method of claim 2 wherein the said surface film is selected from the group consisting of silicon oxide, gallium nitride, silicon nitride, silicon oxynitride, silicon carbonitride, tungsten nitride, titanium nitride, and tantalum nitride.

5. The method of claim 2, wherein step of forming a plasma from the etch gas is performed in a remote chamber or in the process chamber.

6. The method of claim 1, wherein the etch gas further comprises oxygen in molar ratio of oxygen : fluoroolefin that is at least about 1:1.

7. The method of claim 5, wherein the pressure in the process chamber is no more than 30 torr.

8. The method of claim 5, wherein the pressure in the remote chamber is from 0.5 torr to 50 torr.

9. A method for removing surface deposits from a surface in a process chamber, comprising: activating a gas mixture comprising oxygen, a first fluoroolefin, and a second fluoroolefin wherein the molar percentage of fluoroolefin in the said gas mixture is from about 5% to about 99%, and contacting said activated gas mixture with the surface deposits and thereby removing at least some of said deposits; wherein the first fluoroolefin is cis-1,1,1,4,4,4-hexafluoro-2-butene and the second fluoroolefin is 1,1,4,4,4-hexafluoro-2-butyne.

10. The method of claim 9, wherein said process chamber is the interior of a deposition chamber that is used in fabricating electronic devices.

11. The method of claim 9, wherein the step of activating said gas mixture takes place in a remote chamber.

12. A method of operation of a semiconductor manufacturing process chamber, comprising etching a film on a semiconductor using an etch gas comprising a first fluoroolefin and a second fluoroolefin, wherein the first fluoroolefin is trans-1,1,1,4,4,4-hexafluoro-2-butene and the second fluoroolefin is 1,1,1,4,4,4-hexafluoro-2-butyne.

13. The method of claim 12, wherein the step of etching a film further comprises

transferring a photomask to the semiconductor to create a masked surface and an exposed surface,

forming a plasma of said etch gas, and

exposing the exposed surface of the semiconductor to the plasma to remove portions of the exposed surface of the semiconductor to form an etched surface of the semiconductor.

14. The method of claim 13, wherein the method further comprises the steps of forming a second etch gas, activating the second etch gas to form a second plasma, depositing the second plasma on the etched surface to form a polymer layer on the etched surface of the semiconductor.

15. The method of claim 13, wherein the said surface film is selected from the group consisting of silicon oxide, gallium nitride, silicon nitride, silicon oxynitride, silicon carbonitride, tungsten nitride, titanium nitride, and tantalum nitride.

16. The method of claim 13, wherein step of forming a plasma from the etch gas is performed in a remote chamber or in the process chamber.

17. The method of claim 12, wherein the etch gas further comprises oxygen in molar ratio of oxygen : fluoroolefin that is at least about 1:1.

18. The method of claim 16, wherein the pressure in the process chamber is no more than 30 torr.

19. The method of claim 16, wherein the pressure in the remote chamber is from 0.5 torr to 50 torr.

20. A method for removing surface deposits from a surface in a process chamber, comprising: activating a gas mixture comprising oxygen, a first fluoroolefin, and a second fluoroolefin wherein the molar percentage of fluoroolefin in the said gas mixture is from about 5% to about 99%, and contacting said activated gas mixture with the surface deposits and thereby removing at least some of said deposits; wherein the first fluoroolefin is trans-1,1,1,4,4,4-hexafluoro-2-butene and the second fluoroolefin is 1,1,1,4,4,4-hexafluoro-2-butyne.

21. The method of claim 20, wherein said process chamber is the interior of a deposition chamber that is used in fabricating electronic devices.

22. The method of claim 20, wherein the step of activating said gas mixture takes place in a remote chamber.