CLAIMS

1. A process for cleaning the treatment chamber of an apparatus used for semiconductor manufacturing wherein a gas mixture comprising or consisting of fluorine in a range of equal to or greater than 20% (v/v) to equal to or less than 40% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 45% (v/v) and argon in a range of equal to or greater than 25% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v), is used as the etching gas.

2. The process of claim 1 wherein the gas mixture comprises or consists of fluorine in a range of equal to or greater than 25% (v/v) to equal to or less than 35% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 45% (v/v) and argon in a range of equal to or greater than 25% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

3. The process of claim 2 wherein the gas mixture comprises or consists of fluorine in a range of equal to or greater than 27.5% (v/v) to equal to or less than 32.5% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 45% (v/v) and argon in a range of equal to or greater than 25% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

4. The process of claim 3 wherein the gas mixture comprises or consists of fluorine in a range of equal to or greater than 27.5% (v/v) to equal to or less than 32.5% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 32.5% (v/v) and argon in a range of equal to or greater than 37.5% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

5. The process of claim 4 wherein the gas mixture consists of around 30% (v/v) fluorine, around 30% (v/v) nitrogen and around 40% (v/v) argon.

6. The process of any one of claims 1 to 5 wherein the gas mixture is used in the main chamber cleaning step.

7. The process of any one of claims 1 to 6 wherein the pressure in the chamber is in the range between 133 and 467 Pa.

8. The process of any one of claims 1 to 7 wherein the process is plasma-assisted using a remote plasma source with a frequency from 100 KHz to 1 GHz, preferably around 400 KHz.

9. The process of any one of claims 1 to 8 wherein the apparatus is optimized for the use of NF_3 as etching gas.

10. The process of any one of claims 1 to 9 wherein an inorganic material sele from the group consisting of amorphous Si, Si_3N_4, SiO_xN_y wherein $0 < x \leq 3$ and $0 \leq y \leq 4$, SiO_2, TaN, TiN or W, preferably SiO_2, is removed by etching with the etching gas.

11. A gas mixture comprising or consisting of fluorine in a range of equal to or greater than 20% (v/v) to equal to or less than 40% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 45% (v/v) and argon in a range of equal to or greater than 25% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

12. The gas mixture of claim 11 wherein the gas mixture comprises or consists of fluorine in a range of equal to or greater than 25% (v/v) to equal to or less than 35% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 45% (v/v) and argon in a range of equal to or greater than 25% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

13. The gas mixture of claim 12 wherein the gas mixture comprises or consists of fluorine in a range of equal to or greater than 27.5% (v/v) to equal to or less than 32.5% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 45% (v/v) and argon in a range of equal to or greater than 25% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

14. The gas mixture of claim 13 wherein the gas mixture comprises or consists of fluorine in a range of equal to or greater than 27.5% (v/v) to equal to or less than 32.5% (v/v), nitrogen in a range of equal to or greater than 27.5% (v/v) to equal to or less than 32.5% (v/v) and argon in a range of equal to or greater than 37.5% (v/v) to equal to or less than 42.5% (v/v), relative to the total composition of fluorine, argon, nitrogen and optional other components as 100 % (v/v).

15. The gas mixture of claim 14 wherein the gas mixture consists of around 30% (v/v) fluorine, around 30% (v/v) nitrogen and around 40% (v/v) argon.