example, to 0.18 MPa above atmospheric pressure (i.e. to about 2.8 Bara) while the pressure in the gas generating system (the electrolytic cell) is between atmospheric pressure and 820 torr (approximately 109 kPa) No data are given as to the pressure of gases delivered to the semiconductor tool.

US 2006/0130929 discloses a method of supplying F_2 to a processing system wherein an on-site F_2 generator supplies high purity F_2 to the processing system. A transportable gas storage vessel can be applied with F_2 stored at typically less than 35 psig (2.4 bar abs or 240 kPa). A fixed storage tank is operated at a pressure of 5 to 25 psig (0.34 to 1.7 bar abs or 34 kPa to 170 kPa). The delivery pressure is not indicated.

Object of the present invention is to provide an improved process for delivery of fluorine to processes wherein it is desirable to use pure fluorine.

In one aspect, there is provided a method for the manufacture of electronic devices comprising etching of items in a chamber or for cleaning a chamber using elemental fluorine as etching agent or chamber cleaning agent, said method comprising: at least a step of manufacture of elemental fluorine, and at least one step of purification, at least one step of storage, and at least one step of delivery of the elemental fluorine to a point of use, wherein the elemental fluorine is kept in the steps of purification, storage, and delivery under a pressure which is greater than ambient pressure.

The disclosure~~invention~~ concerns a method for the manufacture of electronic devices, especially semiconductors, photovoltaic cells, MEMS, or TFTs, comprising etching of items in a chamber or cleaning a chamber using elemental fluorine as etching agent or chamber cleaning agent comprising at least a step of manufacture of the elemental fluorine, a step of delivery of the fluorine to the point of use, and optionally at least one further step selected from the group consisting of a step of purification and a step of storage, wherein the elemental fluorine is kept at least in the step of delivery to the point of use under a pressure which is greater than ambient pressure.

The chamber is generally a chamber wherein electronic devices are etched, or which is to be cleaned from time to time or according to a schedule to remove undesired deposits.

Thus, at least the step of delivery of the fluorine to the point of use is performed under a pressure which is greater than ambient pressure. It is especially preferred that the method of the present invention further comprises at least one step selected from the group consisting of purification and storage, and that the elemental fluorine is kept at least in the steps of delivery to the point of use and in at least one of the steps of purification and storage under a pressure which is above ambient pressure. In another preferred embodiment, the method comprises at least one step of each of purification, storage and delivery and is kept in all three steps under a pressure which is higher than ambient pressure. The word "a", e.g. in an expression like "a step", is not intended to limit the expression to a single step. The term "comprising" includes the meaning "consisting of". Advantage of maintaining the fluorine under a pressure which is

CLAIMS

1. A method for the manufacture of electronic devices comprising etching of items in a chamber or cleaning a chamber using elemental fluorine as etching agent or chamber cleaning agent comprising at least a step of manufacture of the elemental fluorine, a step of delivery of the fluorine to the point of use, and optionally at least one further step selected from the group consisting of a step of purification and a step of storage wherein the elemental fluorine is kept at least in the step of delivery to the point of use under a pressure which is greater than ambient pressure.

2. The method of claim 1 wherein the electronic devices are selected from the group consisting of semiconductors, photovoltaic cells, MEMS, and TFTs.

3. The method of claim 1 or 2 wherein the method comprises at least the step of manufacture of the elemental fluorine, the step of delivery of the fluorine to the point of use, and at least one further step selected from the group consisting of a step of purification and a step of storage of the elemental fluorine wherein the elemental fluorine is kept under a pressure which is greater than ambient pressure in the steps of its delivery to the site of use and storage and/or purification.

4. The method of anyone of claims 1 to 3 wherein the elemental fluorine is kept under a pressure which is greater than ambient pressure in the steps of its purification and its delivery to the site of use.

5. The method of anyone of claims 1 to 4 wherein the elemental fluorine is kept under a pressure which is greater than ambient pressure in the steps of its purification, storage and delivery to the site of use.

6. The method of anyone of claims 1 to 5 wherein the elemental fluorine is kept under a pressure which is greater than ambient pressure in the steps of its electrolytic generation, purification, storage and delivery to the site of use.

7. The method of anyone of claims 1 to 6 wherein the elemental fluorine is kept at a pressure of about 2 to 3 bar (abs.).

8. The method of anyone of claims 1 to 7 wherein the elemental fluorine is produced by electrolysis of HF in the presence of an adduct of KF and HF as electrolyte salt, or by thermally splitting off fluorine from high valency metal fluorides.

9. The method of anyone of claims 1 to 8 wherein the elemental fluorine is produced on-site.

10. The method of anyone of claims 1 to 9 wherein the elemental fluorine is produced and delivered on-site for use in the manufacture of semiconductors, MEMS, solar cells and TFTs.

11. The method of anyone of claims 1 to 10 wherein the elemental fluorine is produced by electrolysis of HF in the presence of an adduct of KF and HF as electrolyte salt, purified and delivered on-site under a pressure of 2 to 3 bar (abs.) into an etching chamber as etchant in the manufacture of semiconductors, MEMS, solar cells and TFTs.

12. The method of anyone of claims 1 to 10 wherein the elemental fluorine is produced by electrolysis of HF in the presence of an adduct of KF and HF as electrolyte salt, purified and delivered on-site under a pressure of 2 to 3 bar (abs.) as chamber cleaning agent into a thermal or plasma-assisted etching chamber used for the manufacture of semiconductors, MEMS, solar cells and TFTs.

13. The method of claims1, 11 or 12 wherein the etching chamber is a plasma etching chamber.

14. The method of anyone of claims 1 to 13 wherein the elemental fluorine is manufactured by electrolysis in a fluorine generator which is in fluid communication with the chamber.

15. The method of claim 14 wherein the fluorine generator is located in proximity of the chamber.

CLAIMS

1. A method for the manufacture of electronic devices comprising etching of items in a chamber or for cleaning a chamber using elemental fluorine as etching agent or chamber cleaning agent, said method comprising: at least a step of manufacture of elemental fluorine, and at least one step of purification, at least one step of storage, and at least one step of delivery of the elemental fluorine to a point of use, wherein the elemental fluorine is kept in the steps of purification, storage, and delivery under a pressure which is greater than ambient pressure.

2. The method of claim 1 being for the manufacture of electronic devices selected from the group consisting of semiconductors, photovoltaic cells, micro-electromechanical systems, and thin film transistors.

3. The method of claim 1, wherein the elemental fluorine is kept under a pressure which is greater than ambient pressure in the step of electrolytic generation.

4. The method of claim 1, wherein the elemental fluorine is kept at a pressure of about 2 to 3 bar (abs.).

5. The method of claim 1, wherein the elemental fluorine is produced by electrolysis of HF in the presence of an adduct of KF and HF as electrolyte salt, or by thermally splitting off fluorine from high valency metal fluorides.

6. The method of claim 1, wherein the elemental fluorine is produced on-site of its point of use.

7. The method of claim 1, wherein the elemental fluorine is produced and delivered on-site for use in the manufacture of semiconductors, micro-electromechanical systems, solar cells and thin film transistors.

8. The method of claim 1, wherein the elemental fluorine is produced by electrolysis of HF in the presence of an adduct of KF and HF as electrolyte salt, purified and delivered on-site under a pressure of from 2 to 3 bars absolute into an etching chamber as etchant in the manufacture of semiconductors, micro-electromechanical systems, solar cells, and thin film transistors.

9. The method of claim 1, wherein the elemental fluorine is produced by electrolysis of HF in the presence of an adduct of KF and HF as electrolyte salt, purified and delivered on-site under a pressure of from 2 to 3 bars absolute as chamber cleaning agent into a thermal or plasma-assisted etching chamber used for the manufacture of semiconductors, micro-electromechanical systems, solar cells and thin film transistors.

10. The method of claim 9, wherein the etching chamber is a plasma etching chamber.

11. The method of claim 1 wherein the elemental fluorine is manufactured by electrolysis in a fluorine generator which is in fluid communication with the chamber.

12. The method of claim 11 wherein the fluorine generator is located in proximity of the chamber.

13. The method of claim 1 wherein the oxygen content is below 750 ppm by volume.

14. The method of claim 1 wherein the content of carbon dioxide is equal to or lower than 10 ppm by volume.

15. The method of claim 1 wherein an apparatus having double isolation valves having a vacuum connection in between is used to generate and to deliver F_2 in the steps of its manufacture and of its delivery.