CLAIMS

1. A system comprising:

a pumping system (108; 208) configured to pump respective exhaust gases from each of a plurality of chemical etching process chambers (106; 206; 306) and to combine the exhaust gases to provide a combined exhaust gas; and

a noble gas recovery system (110; 210; 310; 410; 510) configured to process the combined exhaust gas to remove one or more noble gases therefrom:

wherein the pumping system (108; 208) comprises:

a plurality of turbo pumps (112; 212; 312), each turbo pump (112; 212; 312) in the plurality of turbo pumps (112; 212; 312) configured to pump the exhaust gas from a respective one of the plurality of process chambers (106; 206; 306);

a pumping module (114; 214; 314) configured to receive and combine the respective streams of exhaust gas from the turbo pumps (112; 212; 312) and pump the combined exhaust gas to the noble gas recovery system (110; 210; 310; 410; 510); and characterised by

a plurality of perfluorocompound (PFC) removal or conversion modules (402) configured to remove PFCs from the exhaust gas streams output by the plurality of turbo pumps (312) or to convert the PFCs into other compounds before they enter the pumping module (114; 214; 314), each of the plurality of PFC removal or conversion modules being coupled to a respective one of the plurality of turbo pumps (112; 212; 312), each of the plurality of PFC removal or conversion modules (402) comprising a plasma; and by

the noble gas recovery system (110; 210; 310; 410; 510) comprising:

a wet scrubber (420) configured to perform a scrubbing process on the combined exhaust gas.

2. The system of claim 1, wherein

the pumping system (108; 208) is configured to receive a purge gas and combine the exhaust gases with the purge gas; and

the system further comprises a vacuum pressure swing adsorption module (354) configured to separate the purge gas from the combined exhaust gas, wherein the purge gas is, for example, nitrogen.

3. The system of claim 2, wherein the vacuum pressure swing adsorption module (354) is configured to provide the separated purge gas to the pumping system (108; 208).

4. The system of any of claims 1 to 3, wherein the noble gas recovery system (110; 210; 310; 410; 510) comprises a gas chromatography separation module (358) configured to receive a gas stream from the wet scrubber (420) to separate one or more noble gases from the other components of the gas stream received from the wet scrubber (420).

5. The system of claim 4, wherein:

the gas chromatography separation module (358) is configured to receive a carrier gas for use in transfer of the combined exhaust gas through the gas chromatography separation module (358); and

the noble gas recovery system (110; 210; 310; 410; 510) further comprises a separation module (360) to separate the one or more noble gases from the carrier gas.

6. The system of claim 5, whereinthe separation module (360) comprises a metal-organic framework (MOF).

7. The system of claim 5 or 6, wherein the separated carrier gas is reused or recycled by the gas chromatography separation module (358), and wherein the carrier gas is, for example, helium.

8. The system of any of claims 5 to 7, wherein the noble gas recovery system (110; 210; 310; 410; 510) further comprises a purification module (118; 218; 370) configured to receive one or more noble gases output by the separation module (360) and purify the received one or more noble gases.

9. The system of any of claim 8, wherein the purification module (118; 218; 370) is configured to perform cryogenic purification.

10. The system of any of claims 1 to 9, wherein the noble gas recovery system (110; 210; 310; 410; 510) comprises a drier configured to perform a drying process on a gas stream output from the wet scrubber (420).

11. The system of claim 10, when dependent on any of claims 4 to 9, wherein the gas chromatography separation module is configured to receive the gas stream from the drier to separate one or more noble gases from the other components of the gas stream received from the drier using a gas chromatography process, and to output the separated one or more noble gases.

12. The system of any of claims 1 to 11, wherein one or more of the PFC removal or conversion modules (402) comprises a plasma reactor.