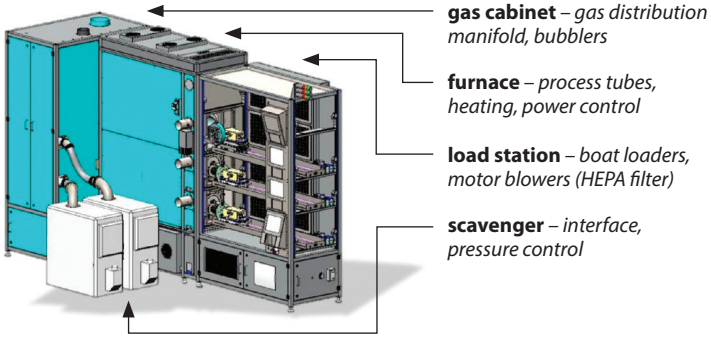
Low Pressure

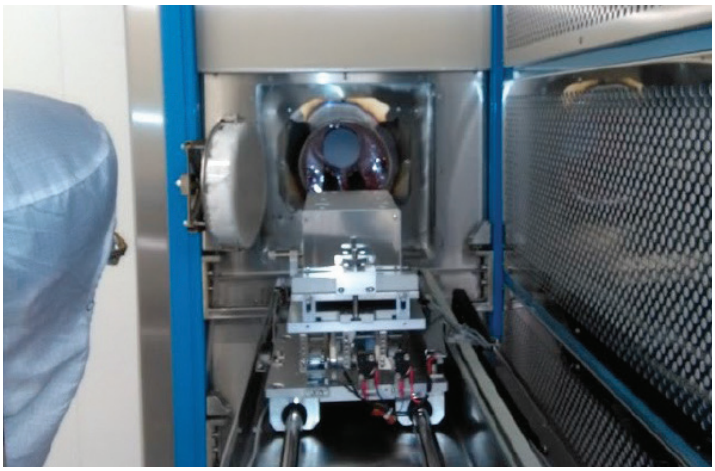
Chemical Vapor Deposition

DESCRIPTION

Equipment is designed for thermal processing of wafers at reduced pressure (LPCVD) and with addition of **process gases**. Wafers are placed to the inside of cylindrically shaped, open ends (LPCVD) quartz process tubes. Stainless steel flanges are attached to each open end of the process tube - they are used for evacuation of process tube and for injection of process gases.
Heating is performed by cylindrically shaped, thermally insulated heating element divided into independent three zones.
Wafers are placed perpendicularly to tube axis on **quartz wafer boats** that are moved in and out using SiC paddle on a motorized loader.



Up to 50 wafers of 100 mm can be placed in one quartz boat (single side deposition is possible by placing the wafers back-to-back) the atmospheric tube is equipped with soft load port (paddle places the boat in the center of the quartz tube and leaves the oven, the opening is sealed by insulating door)



Proces gasses
N_2
O_2
N_2O
NH_3
H_2
SiH_4 silane
SiH_2Cl_2 dichlorosilane

Dopant diffusion
Phosphorus
from $PoCl_3$ in bubbler

Boron
from BBr_3 in bubbler

Cleaning
DCE dichloroethylene
from bubbler

SPECIFICATION

currently 3 positions (of 4 available) are used for:

» **silicon nitride** (SixNy - variable stechiometry) growth
low pressure process from SiH_2Cl_2 and NH_3 prec.
up to 500nm thick layers in temp. range 600–800 °C

» **polycrystaline silicon** growth
from SiH_4 decomposition at low pressure
rate about 20 nm/min at 600 °C

» **atmospheric** pressure **oxidation** process
- dry oxidation - up to 4 nm/min at 900–1050 °C
- wet oxidation - up to 5 nm/min [using external burner creating hot water vapour from $H_2 + O_2$ reaction]

highest quality oxides are obtained with simultaneous DCE etching of spurious depositions

this position allows also for N and P-type doping (using phosphorus and boron) down to 40 Ohm/square resist.

silicon oxide/oxinitride growth at low pressure is possible in original design (high temp. from SiH_2Cl_2 and N_2O, low temp. process from SiH_4 and O_2), currently these are not used (oxides of similar quality are available from PECVD reactors)

- homogeneity required in all processes across a single wafer is better than 3%, less than 8% for the whole batch

MORE INFO

Guarantor: Filip Münz (Filip.Munz@ceitec.vutbr.cz)
Web: http://nano.ceitec.cz