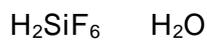
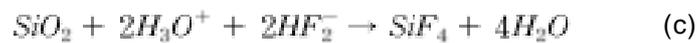
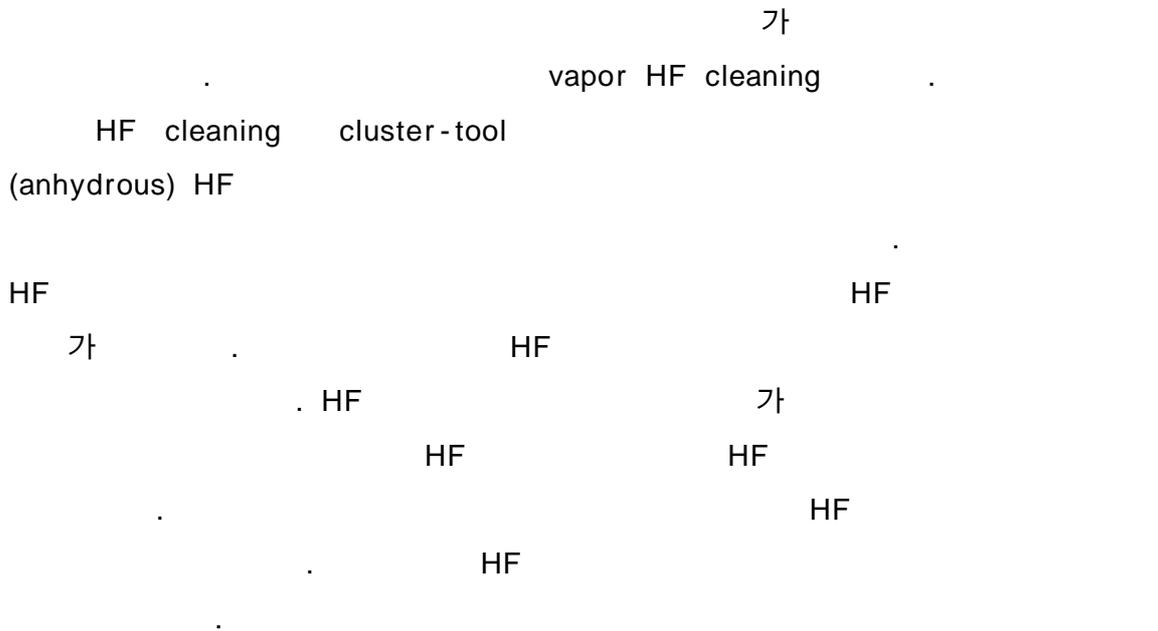
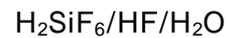


1. Vapor phase cleaning



(c)



FSI

oxide

etching

oxide etch

rate 10~300

, silicide sacrificial oxide etching

F가

DI water rinse

()

2. UV/O₃ and UV/Cl₂ cleaning

UV

가 .

UV cleaning Cl₂ O₂가 polymer UV/Cl₂ UV/O₃ 가 가

UV/O₃

. UV

depolymerization

UV

H₂O, CO₂, N₂

. UV/O₃

유기오염물 + $h\nu \rightarrow$ 여기된 유기오염물 (200~300nm UV) (a)

$O_2 + h\nu \rightarrow 2O$ (184.9nm UV) (b)

$O + O_2 \rightarrow O_3$ (c)

$O_3 + h\nu \rightarrow O + O_2$ (243.7nm UV) (d)

여기된 유기오염물 + (O, O₃) \rightarrow 휘발성 화합물 (e)

(a) Hg arc lamp UV

(b)~(e) 가 ,
가

UV/O₃ 184.9nm(O₂)

) 253.7nm(O₃))

UV UV source sample 가 sample

$$I = I_0 e^{-130pd}$$

(p : average ozone pressure, d : distance to sample in cm)

()

UV/O₃

Ar/F

UV/O₃

UV/Cl₂

Cl 가

가

UV

UV/Cl₂

SC-2 가

가

UV

HF/H₂O

Fig. 1

Cl₂- (radical)

(MCl_x)

Na

UV/Cl₂

UV-lamp

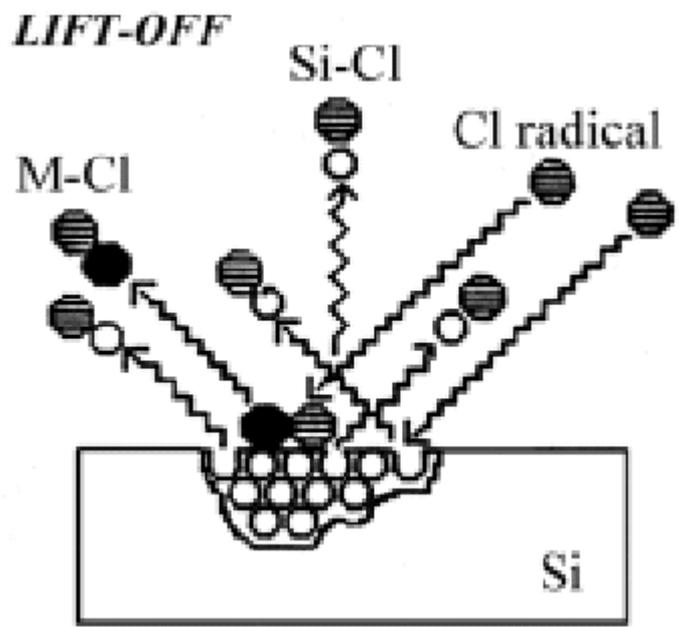


Fig. 1. Formation of metal chlorides and removal through lift-off process

3. Plasma cleaning

르

Fig. 2

가

Fig. 3

가

가 가

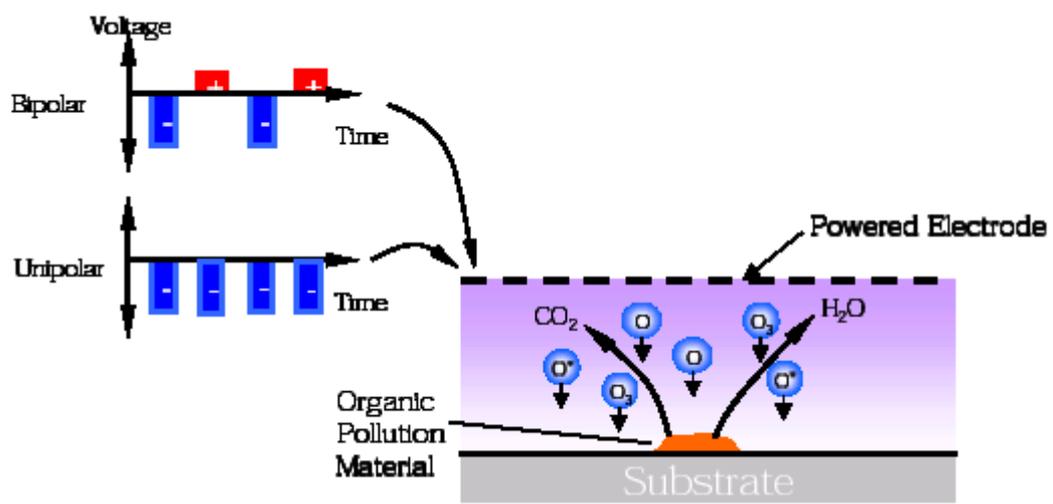


Fig. 2.

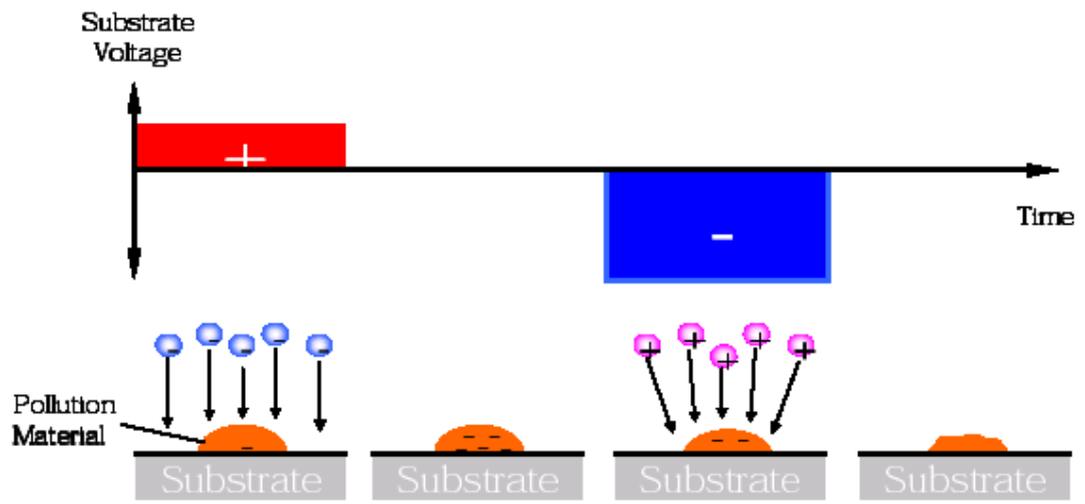


Fig. 3.

250

ECR /

$H_nSiR(n<3, R : \text{hydrocarbon})$

$SiO^*(g), H_2O^*(\text{vapor})$ SiH_n

가 CF_4 Cl_2 가 HCl

, cluster-tool

system 가

subsurface 가

Si

, 가

가

RF , , ECR , ICP

4. Sputter cleaning

Sputtering-off fig. 4 가
(momentum transfer)
, Ar heavy element low energy sputtering

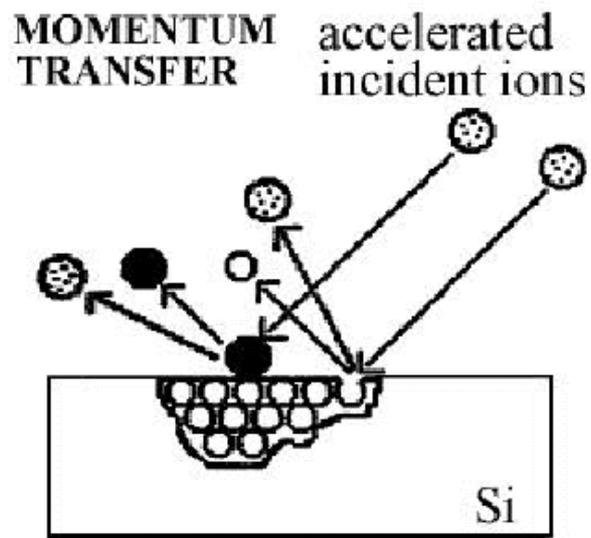


Fig. 4. via sputtering-off

5. Purely thermally enhanced cleaning

Fig. 5 가 가
가 가
H₂ 1000 가 가 ,

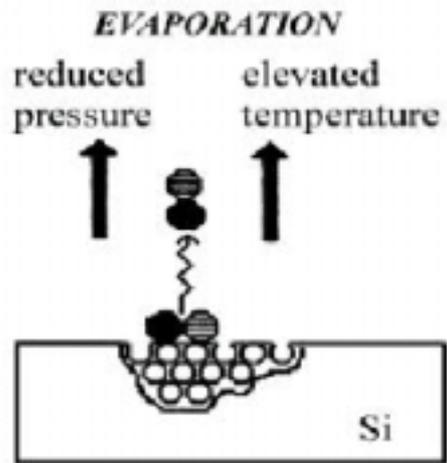


Fig. 5. evaporation of contaminants at reduced pressure and increased temperature