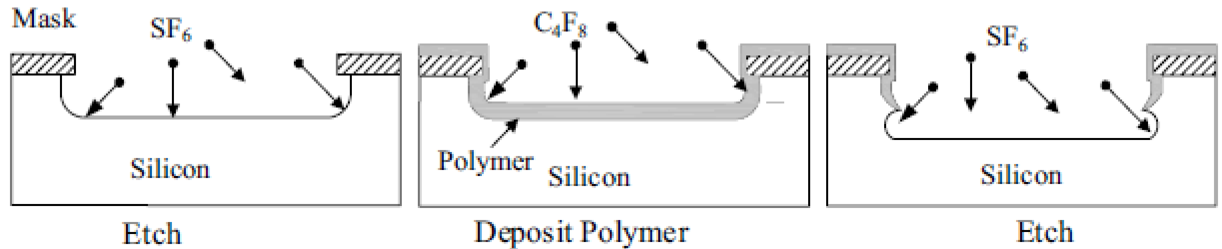
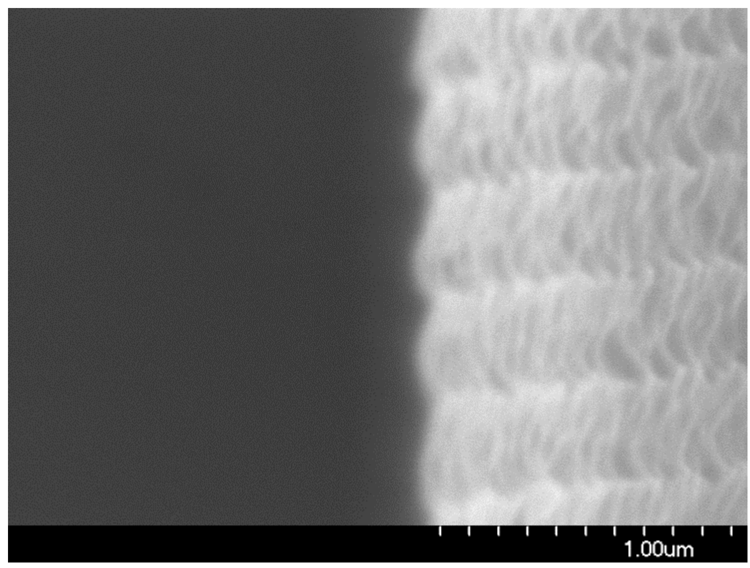
Deep RIE 장비 Manual

Kim min jae
UNIST Central Research Facilities (UCRF)

Etch process 개요

Deep RIE Etching 개요





Bosch process 에 의한 scallop effect 발생

Etch process 개요

Tegal200 schematic

P1 OK
DNET A#00
NO EPD
UPS: 100% NO TM
SECS Comm. : None

01/16/2012 2:56:09 pm
tegal
System
User : NANOTOOLS D. recipe: None D. Param. : NANOTOOLS

SS 02:41:52 PM CP1 P1 Standard Recipe start : SPC BOSH 2UM S1813
SS 02:41:51 PM CP1 P1 Step start : THERM -10C 200MM
SS 02:41:50 PM CP1 Sequence start : SPC BOSH 2UM S1813
MI 02:41:49 PM Data logging start : D:\AMS110\Data\\12-01-16 14H41M38\CP1-SPC BOSH 2UM S1813-P1-12-01-16 14H41M38.acq
SS 02:41:47 PM Batch start : 12-01-16 14H41M38 - Maintenance -
SS 02:41:47 PM Scheduler start

Source power
1 W
0 W
4.1E-5 mbar
OFF
압력 조절
150.1 °C
-100 mm source
-245 mm source
Home
Transfer
N2
N2
100.0 %
8.6E-1 mbar
N2
N2
-8.3 °C
ESC/He 이용, temp control
LF 300 W
0 W 0 W 0 V
(0 KHz)
1.0E1 mbar
10.5 sccm
Center
Bias power
TMP High vacuum 구현

Logout | Recipes ctrl. | System | Recipes edit | Setup | Data log | Maintenance | Equipment | Events | Stop Machine | Other actions

Matching Network
Blanked – off DN40
RF PowerSupply
Gas Inlet
Source
Antenna
DC Power– Supply
Dielectric Cylinder
Diffusion Chamber
Substrate Holder

Process chamber

Process parameter

구 분	설 명	비 고
Source Power(Ws)	RF Power (13,56MHz) applied on the antenna, initiating & maintaining the plasma ON.	
Pressure(p)	Pressure in the diffusion chamber	
Bias Power(Wb)	Power applied to the chuck, can be Radio Frequency (13,56MHz) or Low Frequency (280kHz –320kHz)	
Gas pulse	Flow and duration, for etch, deposition, and polymer removal phases	
Chuck Distance	Distance between source and wafer Chuck	

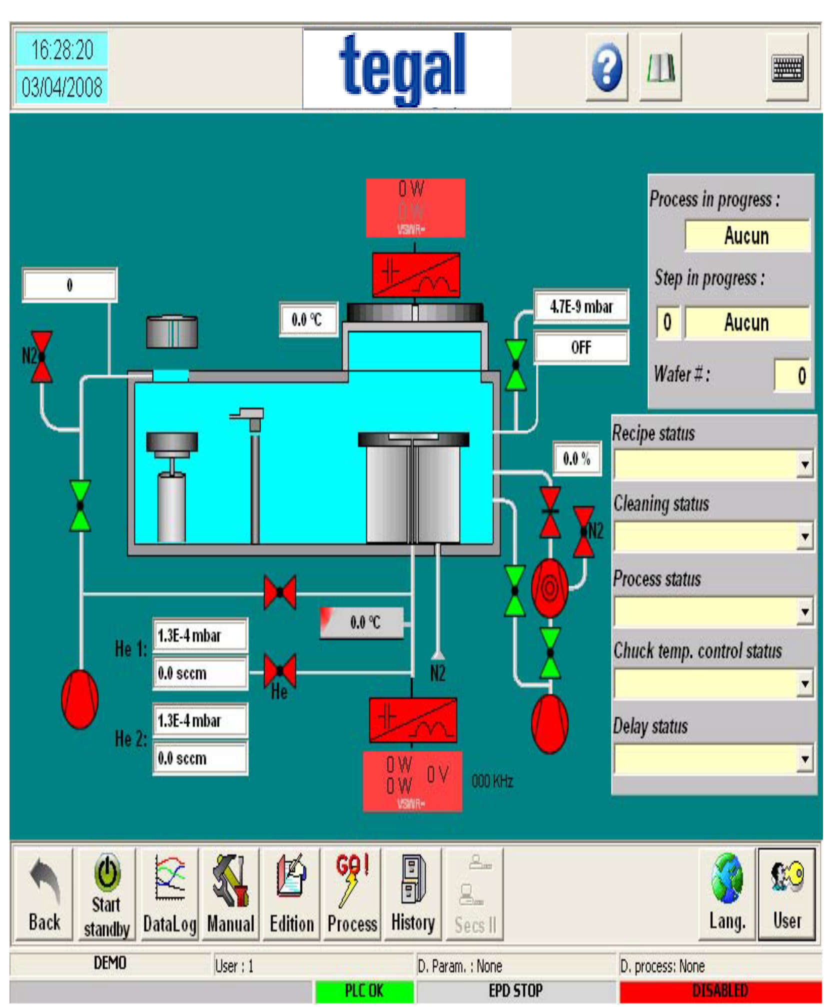
General parameter trends

- ↗ **Ws**, ↗ Etch rate, ↗ polymer removal rate & deposition rate.
- ↗ **P**, ↗ Etch rate, ↗ polymer deposition rate.
- ↗ **Wb**, ↗ Etch rate,
  ↘ Selectivity
- ↗**Source -chuck distance**, ↘Etch rate
  ↗Selectivity

Process choice summary

	Bosch Std	O_2 on C_4F_8	Tripulse	Non-pulse
High etch rate	↑↑	↑	↑↑	↓↓
High aspect ratio	→	↑	↑↑	↓↓
High aspect ratio on small features	↓	↑↑	↑	↓↓
High selectivity	↑	↓	↓	→
High smoothness	↑	→	→	↑↑
No scallops	↓↓	↓↓	↓↓	↑↑

Operation manual



Item	Designation	설 명	비 고
①	Back	Back to the previous screen.	
②	Start Standby	Access to the “Machine Stand by” function.	
③	Data Log	Access to the “Data Logging” function.	
④	Manual	Access to the “Maintenance” function.	
⑤	Edition	Access to the “Process edition” function.	
⑥	GO ! Process	Access to the “Run Process” function.	
⑦	History	Access to the “History” function.	
⑨	Maint.	Direct access to the “Maintenance times” funct ion. This icon appears only if a working time p eriod has elapsed in order to inform you that a maintenance operation has to be carried out.	
⑩	Alarm	Direct access to the “Alarms” screen. This icon a ppears only if a fault has occurred on the machi ne.	
⑪	Lang.	Access to the “Language” function.	
⑫	User	Access to the “User management” function.	

② Start stanby

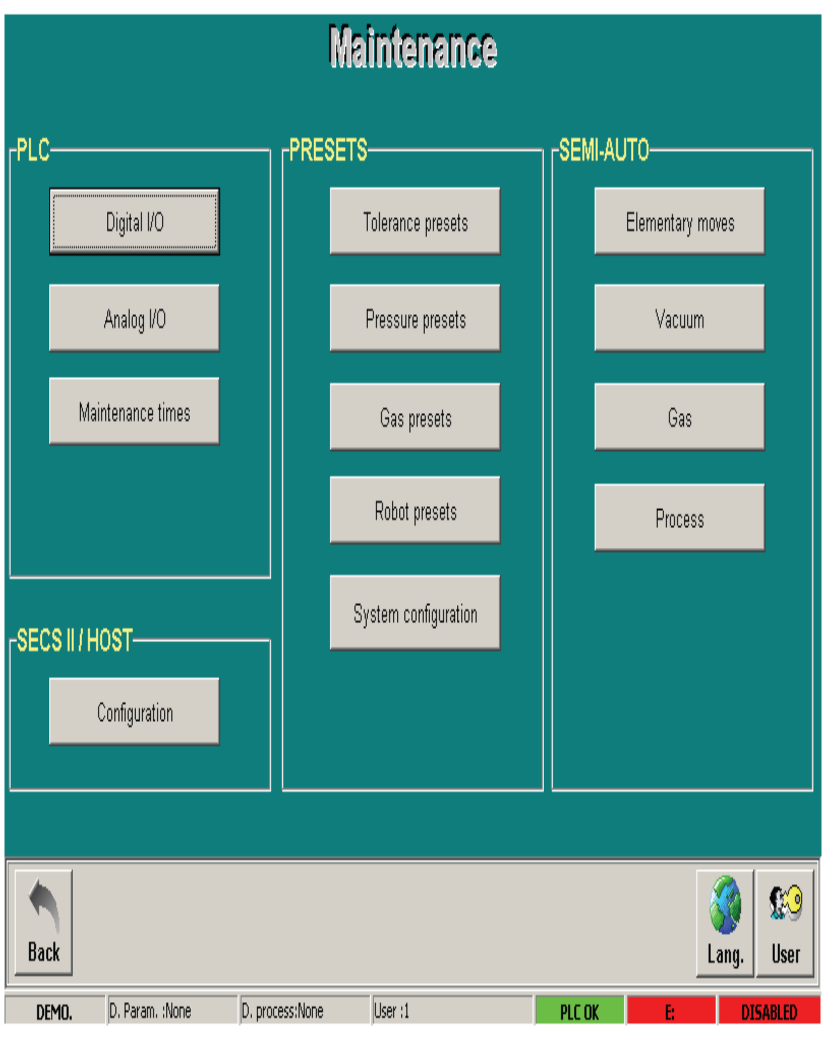
The “Machine Stand by” function allows to protect the chuck alumina when the machine is not operating. To do it, a dummy wafer is automatically loaded on the chuck and remains in place as long as the machine is not used. This operation allows to avoid any possible contamination.
Click the “Start Standby” button in the Navigation area. Depending on the configuration of your machine, different messages may be displayed.

③ Data log

1) logging of curves representative of defined PLC analog and DeviceNet™ inputs,
2) logging of flow/pressure curves,
3) logging of leak back rate curves,
4) throttle valve management.

Operation manual

④ Manual



1. PLC

1) Digital I/O, Analog I/O : Direct access to the PLC controls
2) Maintenance times : Direct access to the "Maintenance times" function

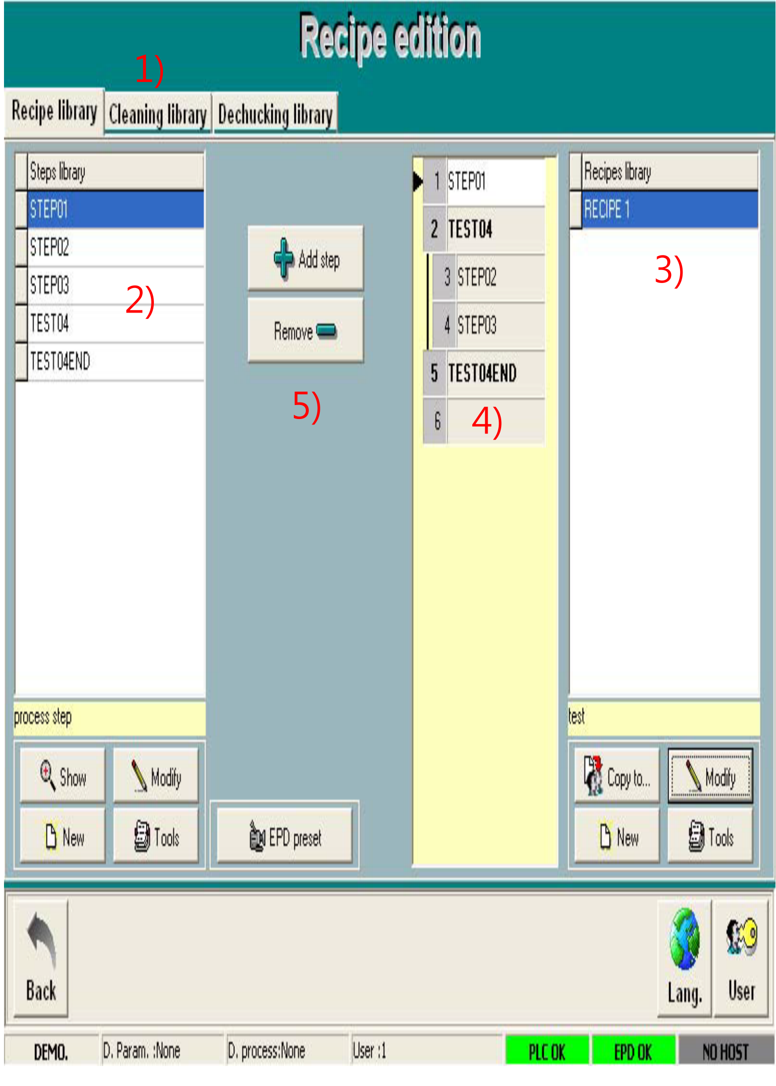
2. Presets

1) Tolerance presets : 각 setting값의 tolerance값 부여
2) Pressure presets : 압력 setting값에 대한 tolerance값 부여
3) Gas presets : 사용하는 Gas setting값의 tolerance값 부여
4) Robot presets : count 조정을 통해 robot moving 제어

3. Semi-Auto

1) Elementary moves: wafer 위치 manual moving
2) Vacuum : chamber venting/pumping 기능
3) Gas : Gas manual flow
4) Process : temp, he flow등 prcess para 조정

⑤ Edition



1) Library

1) Recipe library : process recipe
2) Cleaning library : cleaning recipe
3) Dechucking library : sample dechcking recipe

2) Step library

1) process, delay, chuck temp, loop control recipe

3. Recipe library

1) temp,He pressure, process recipe 모음

4. Recipe detail

1) batch recipe 형성 : temp,He pressure, process recipe setting, 5)항목을 통해 순서 변경 가능

⑥ Go! Process

- create a new batch which will define the etching recipe to be executed for each wafer
- load/save an existing batch
- choose a dechucking recipe (**only for the machines equipped with an ESC PIN chuck). The dechucking recipe is executed after the** etching recipe to ensure a correct unloading of the wafer.
- choose a cleaning recipe. The cleaning recipe is executed after the wafer is unloaded.
- run the selected batch processing
- follow the progression of the batch processing in real time.

감사합니다.

문의 사항 : UCRF 김민재
(mjkim@unist.ac.kr / 217-4064 / 010-4848-2951)