

Micro- & Nano-Pillar Etch

Module Recipe

Step Name		2		3		4	
		D1		E1a		E1b	
Process Time	Secs	1.2	1.0	1.0	1.2	1.0	1.0
Process Pressure	mTorr	45.0	45.0 ± 40 %	25.0	25.0 ± 30 %	28.0	28.0 ± 30 %
APC Setpoint Position	%	100.0		100.0		100.0	
APC Mode		Automatic		Automatic		Automatic	
Source power	Watts	2500.0	2500.0 ± 50 %	2500.0	2500.0 ± 50 %	2500.0	2500.0 ± 50 %
Source MU tune capacitor		3		3		3	
Source MU load capacitor		1		1		1	
Source RF Control Mode		Load		Load		Load	
Source 2 power	Watts	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %
Source 2 MU tune capacitor		1		1		1	
Source 2 MU load capacitor		1		1		1	
Source 2 RF Control Mode		Load		Load		Load	
Platen HF Power	Watts	0.0	0.0 ± 40 %	95.0	105.0 ± 40 %	0.0	0.0 ± 5 %
Platen HF Capacitor Adjust		Automatic		Automatic		Automatic	
Platen HF Tune Capacitor	%	50.0 ± 5 %		50.0 ± 5 %		50.0 ± 5 %	
Platen HF Load Capacitor	%	50.0 ± 5 %		50.0 ± 5 %		50.0 ± 5 %	
Platen HF Padding Capacitor		3		3		3	
Platen HF Control Mode		Load		Load		Load	
Platen HF Modulation Enabled		Enable		Enable		Enable	
Platen HF Modulation Frequency	Hz	150		150		150	
Platen HF Modulation Duty Cycle	%	40		40		40	
Helium pressure	Torr	15.0	15.0 ± 20 %	15.0	15.0 ± 20 %	15.0	15.0 ± 20 %
Helium Flow Warning Level	sccm	10.0		10.0		10.0	
Helium Flow Fault Level	sccm	20.0		20.0		20.0	
Coil current	Amps	10.0	± 20 %	10.0	± 20 %	10.0	± 20 %
Loop destination		0		0		2	
Number of loops		0		0		30	
Loop Variation Parameter		1.0		1.0		1.0	
Gas Line Config		Flow		Flow		Flow	
P1 Argon 500	sccm	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %
P2 Oxygen 1K	sccm	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %
P3 N2 100	sccm	0.0	± 5 %	0.0	± 5 %	0.0	± 5 %
P4 C4F8 500	sccm	300.0	300.0 ± 20 %	1.0	1.0 ± 0 %	1.0	1.0 ± 0 %
P5 SF6 720	sccm	1.0	1.0 ± 0 %	275.0	275.0 ± 20 %	300.0	300.0 ± 20 %
S1 Oxygen 300	sccm	0.0	± 5 %	0.0	± 5 %	0.0	± 5 %
S2 C4F8 500	sccm	0.0	± 5 %	0.0	± 5 %	0.0	± 5 %
S3 SF6 720	sccm	0.0	± 5 %	0.0	± 5 %	0.0	± 5 %

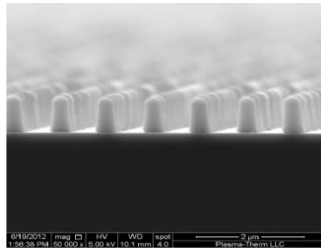
Module recipe name: *CNS1_Pillars*
 Sequence recipe name: *s_CNS1_Pillars*

Sequence Recipe

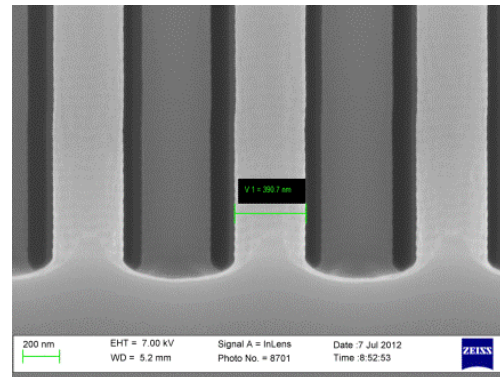
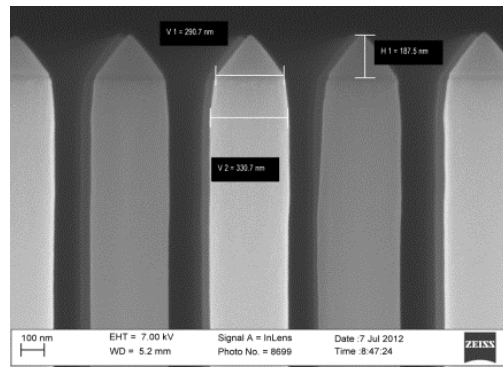
	Modules	Commands	Module Recipes	Wafer
1	RAP	READY	EQP_IDLE10	STANDARD
2	Transport	PUMP		STANDARD
3	RAP	PROCESS	IPC_PreLot_10C	STANDARD
4	Transport	LOAD		STANDARD
5	RAP	PROCESS	CNS1_Pillars	STANDARD
6	Transport	UNLOAD		STANDARD
7	Transport	VENT		STANDARD
8	RAP	PROCESS	IPC_10C	STANDARD
9	RAP	IDLE	EQP_IDLE10	STANDARD

Micro- & Nano- Pillar Etch Results

- Mask material: photo resist
- Thickness: 0.87 μm
- Diameter: 0.4 μm



Etching mask



Characteristic	Achieved
Etch profile	90 \pm 0.1 $^\circ$
Scallop depth	10 nm
CD Loss (nm)	-70 nm @top -90nm @bottom
Mask Undercut (nm)	0
Selectivity to resist	11:1
Etch rate	1.56
Uniformity for 6" wafers	2.5%
Depth (μm)	9.2 μm