

# High Aspect Ratio Grating Etch

## Module Recipe

Step Name		5		6		7	
		D2		E2a		E2b	
Process Time	Secs	1.5	1.5	1.3	1.5	2.0	2.4
Process Pressure	mTorr	40.0	40.0 ± 40 %	15.0	15.0 ± 60 %	30.0	30.0 ± 30 %
APC Setpoint Position	%	100.0		100.0		100.0	
APC Mode		Automatic		Automatic		Automatic	
Source power	Watts	2200.0	2200.0 ± 50 %	1500.0	1500.0 ± 50 %	2200.0	2200.0 ± 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 ± 0 %	120.0	170.0 ± 30 %	0.0	0.0 ± 60 %
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	%	45		45		45	
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	0.0	± 5 %	0.0	± 5 %	0.0	± 5 %
Loop destination		0		0		5	
Number of loops		0		0		400	
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	1.0	1.0 ± 0 %	100.0	100.0 ± 20 %	1.0	1.0 ± 0 %
P3 N2 100	sccm	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %
P4 C4F8 500	sccm	330.0	290.0 ± 20 %	1.0	1.0 ± 0 %	1.0	1.0 ± 0 %
P5 SF6 720	sccm	1.0	1.0 ± 0 %	1.0	1.0 ± 0 %	220.0	220.0 ± 20 %
S1 Oxygen 300	sccm	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %
S2 C4F8 500	sccm	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %
S3 SF6 720	sccm	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %	0.0	0.0 ± 5 %

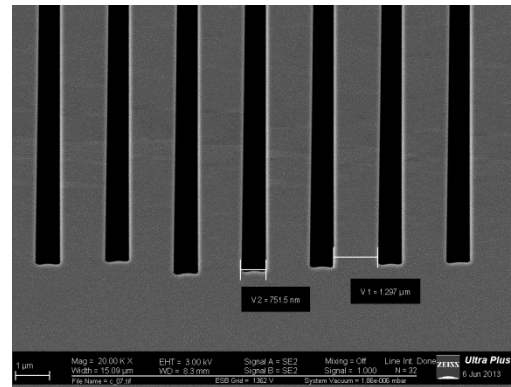
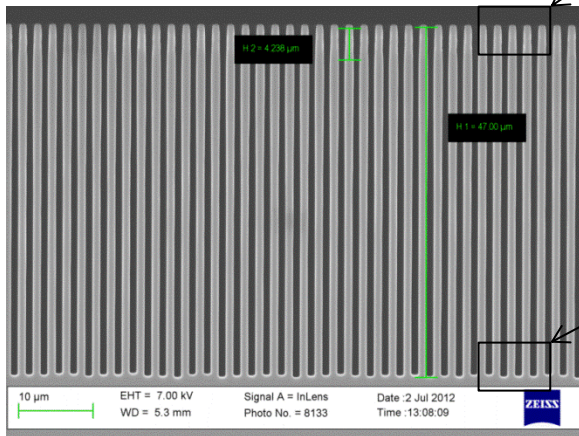
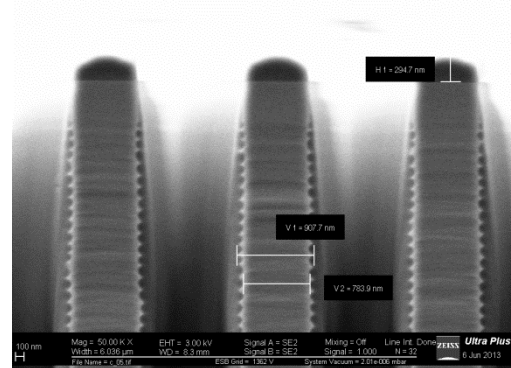
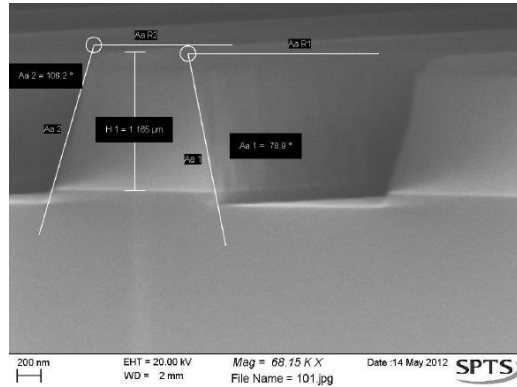
Module recipe name: *CNS3\_Grating*  
 Sequence recipe name: *s\_CNS3-Grating*

## Sequence Recipe

	Modules	Commands	Module Recipes	Wafer
1	RAP	READY	EQP_IDLE-13	STANDARD
2	Transport	PUMP		STANDARD
3	RAP	PROCESS	IPC_PreLot_-13C	STANDARD
4	Transport	LOAD		STANDARD
5	RAP	PROCESS	CNS3_Grating	STANDARD
6	Transport	UNLOAD		STANDARD
7	Transport	VENT		STANDARD
8	RAP	PROCESS	IPC_-13C	STANDARD
9	RAP	PROCESS	EQP_IDLE-13	STANDARD

# High Aspect Ratio Grating Etch Results

1.0 μm thick thermal silicon oxide etch mask



Characteristic	Results
Etch profile angle	90±0.1°
Scallop depth	38nm @ top
CD Loss (nm)	30nm
Mask Undercut (nm)	0
Selectivity to thermal oxide	53:1
Etch rate	1.27
Uniformity	1.3%
Depth (μm)	47 μm