

Panasonic 2 Nanoscale ICP etching of SiN using ZEP (resist) mask. Recipe designed to provide vertical profiles with no trenching in nanoscale features.

Bill Mitchell, UCSB Nanofabrication Facility

ZEP Lines as drawn and exposed in JEOL 6300FS writer:

ELECTRON DOSE (uC/cm2)	DESIGN LINE (nm)	Measurements		
		Bottom (nm)	Top (nm)	Height (nm)
300	100	125	120	360
	180	220	215	360
350	100	125	125	360
	180	230	215	360

Etch Conditions and Results:

CHF3/O2 : 40/10 sccm

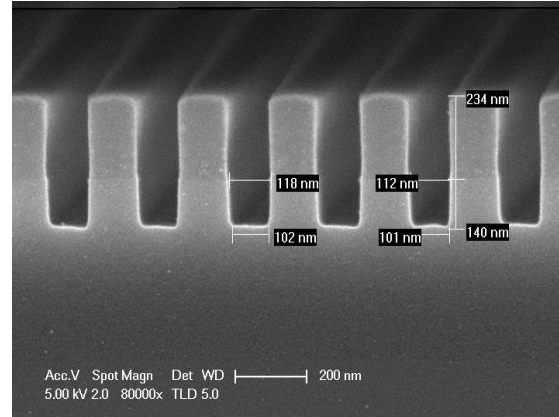
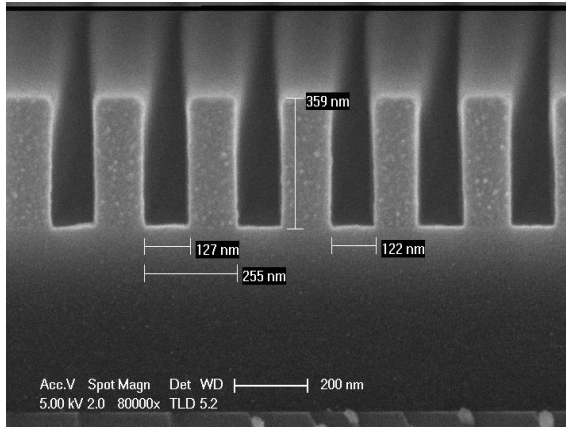
500W ICP / 50W Bias

Pressure 0.5Pa, Time 60s

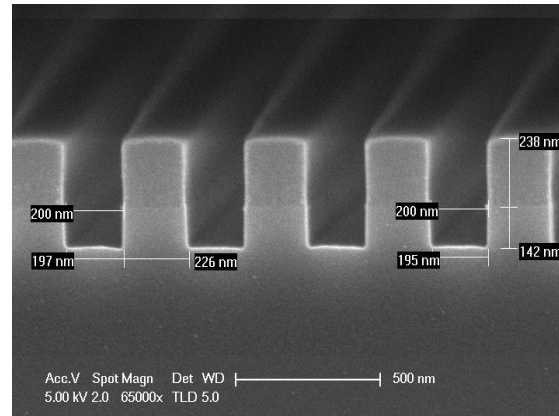
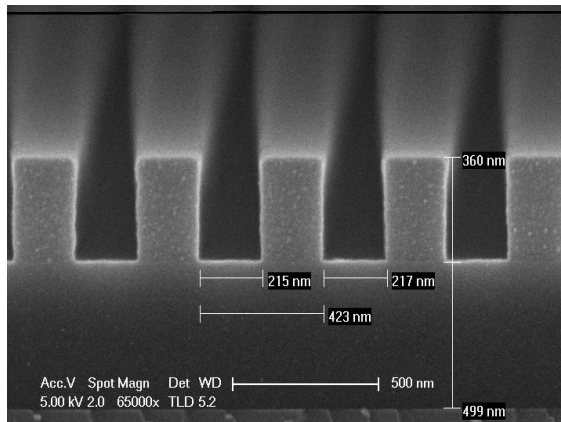
ZEP RESIST DATA				SiO _x SUBSTRATE DATA					
Dose (uC/cm2)	Design (nm)	Height (nm)	Etch Rate (nm/min)	Bottom (nm)	Top (nm)	Depth (nm)	Angle (deg)	Etch Rate (nm/min)	
300	100	235	125	100	115	140	86.9	140	
	180	240	120	195	200	40	89.0	40	
350	100	235	125	115	125	135	87.9	135	
	180	240	120	210	215	145	89.0	145	
			122.5						140

Selectivity of SiO₂ to PR = 1.14:1

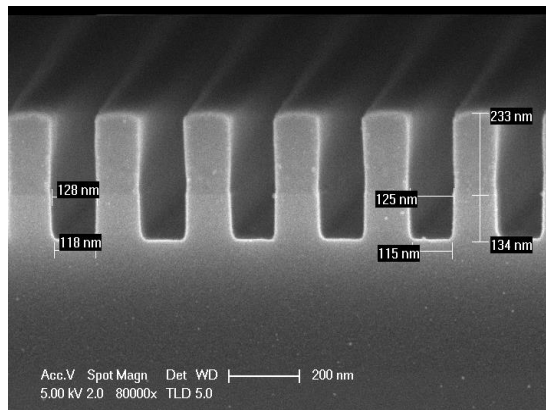
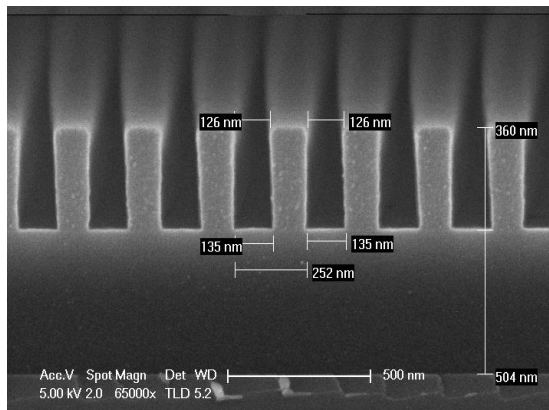
SEM Images : Before etch – After Etch



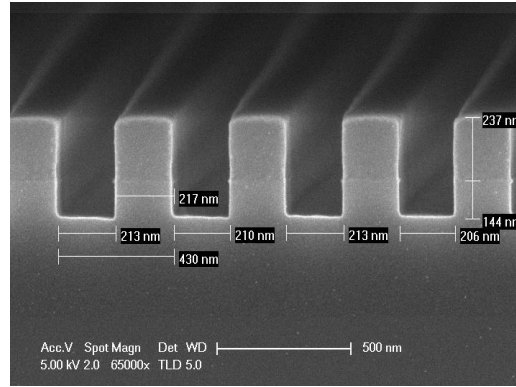
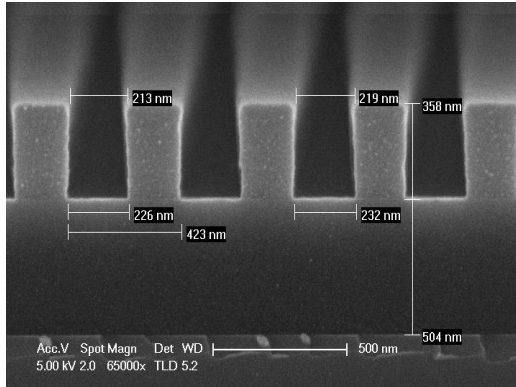
300uC, 100nm design



300uC, 180nm design



350uC, 100nm design



350uC, 100nm design