Washington University in St. Louis Etching Capabilities

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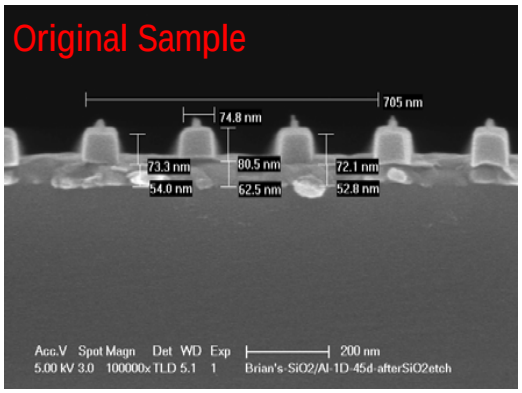
Oxford Plasmalab System 100- ICP180

Process chamber: ICP180 for **4" wafers**
Chamber heating: Yes
Lower electrode type: Clamped
ICP source: ICP180 2000W
Lower electrode power supply/automatch: 600W + vacuum cap automatch
Vacuum gauges: 100mT CM gauge + Penning
Pumping pipework/APC valve: 160mm + 200mm VAT
Toxic gas lines/MFCs: **20 NF_3, 100 BCl_3, 100 Cl_2**
Non-toxic gas lines/MFCs: **100CF_4, 100 O_2, 100 CHF_3, 100 Ar, 100 N_2, 100 He, 100SF_6**
Loadlock: Single wafer
Heater/chiller: Yes 10 to 90'C
Endpoint Detectors: **Integrated Laser Interferometer End Point Detector**
Chamber Pumps: Aclatel 500l/s magnetic turbo pump backed by Alcatel 2063 Wet Pump
Loadlock Pumps: From Process backing

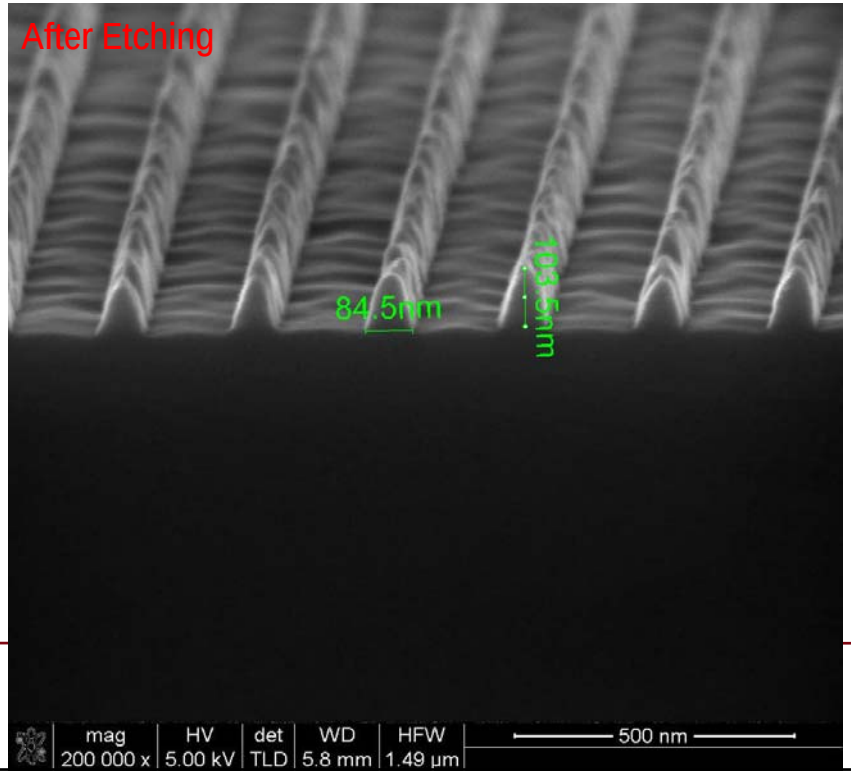
Gas	Application
CF4	
SF6	Si
CHF3	SiO2
NF3	Si, SiC
BCl3	Al
Cl2	III-V, Al
HBr	III-V
Ar	additive
O2	polymer
He	cooling
CH4	III-V
H2	III-V

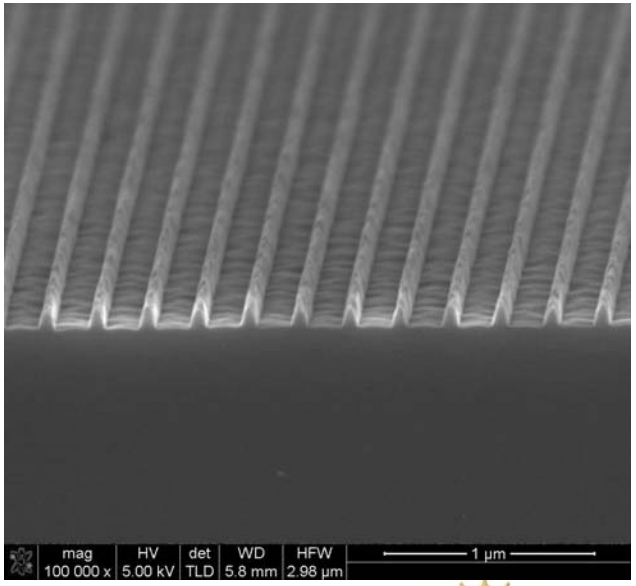
Aluminum Etching



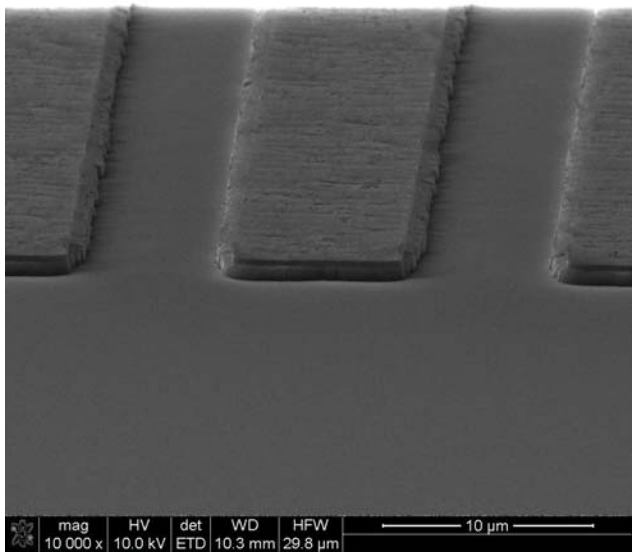
Sample: Aluminum film (80-nm thick) on silicon wafer, masked with SiO2 patterns (75-nm lines, 70-nm thick)

Recipe: 20sccm Cl2, 5mTorr, 200W, 1000W, 10Torr He, 80C, 10sec
20sccm HBr, 2mTorr, 100W, 800W, 10Torr He, 80C, 40sec





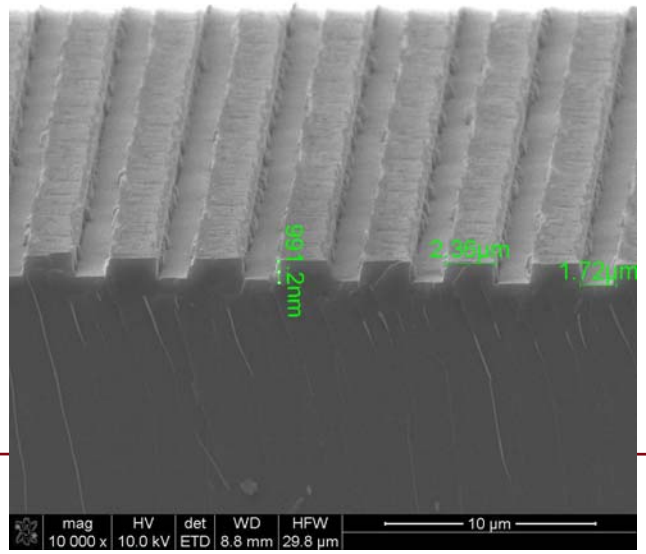
Silicon Etching

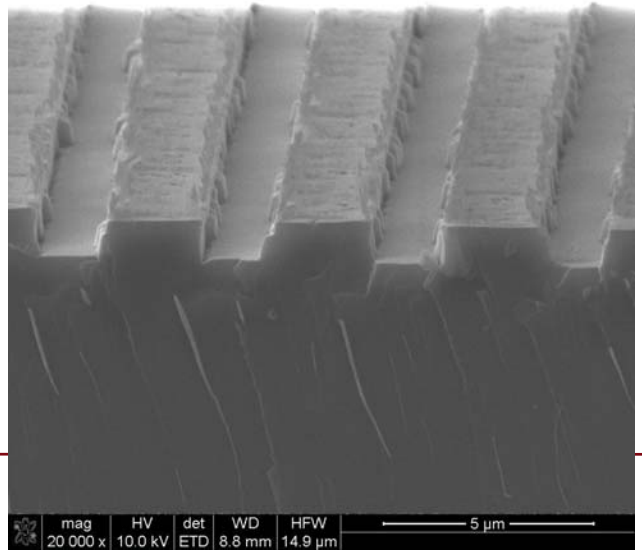


Sample: silicon wafer, masked with AZ5214 patterns (2-um lines, 10-um lines, etc.)

Recipe: 50sccm HBr, 7mTorr, 50W, 750W, 10Torr He, 50C, 5min

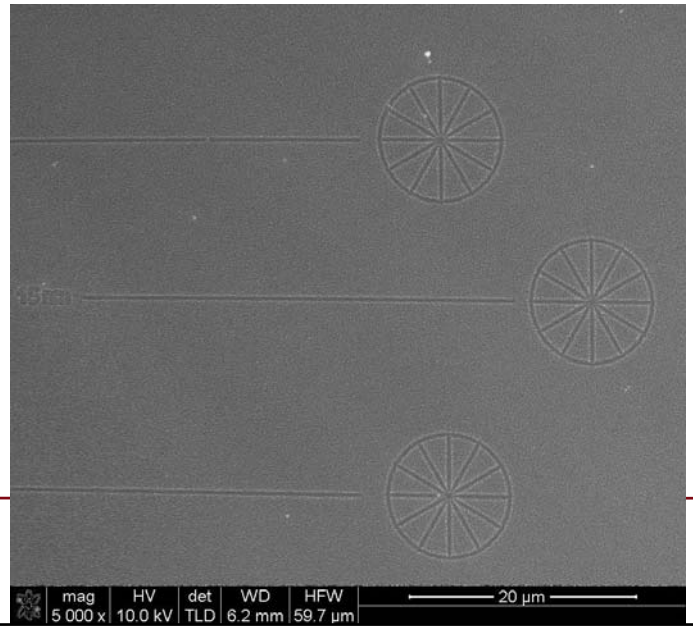
Note: the roughness of silicon ribbon edges was transferred from AZ patterns.

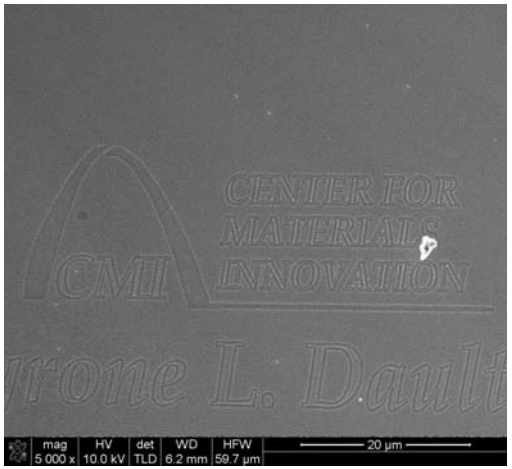




GaAs Etching

Sample: GaAs wafer, masked with PMMA patterns (e-beam lithography)
Recipe: 50sccm BrCl3, 5mTorr, 200W, 600W, 10Torr He, 10C, 30sec
30sccm BCl3, 80sccm Cl2, 7mTorr, 115W, 600W, 10mTorr He, 10C, 15sec
Etch rate: ~ 1µm/min
Selectivity to resist: ~ 5-15:1
Selectivity to oxide: ~ 15-30:1
Profile: Anisotropic





Chamber Conditioning

- 15 minute O_2 after each run
- 1 hour clean each month
- User discretion for additional conditioing based on previous runs

Future Plans

- No new tool acquisitions
- Development of new baselines, recipes, and SOPs
- Development of new maintenance strategies

Questions?

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