

MTLab capabilities

Overview

MTLab is structured in the following Areas:

- Microfabrication - carrying out **silicon and quartz 6" wafer** (having a thickness ranging from 300 um through 1000 um) processing and related technologies; it is divided in two adjacent clean rooms :
 - CR Detectors, a 560 m² in class 10 and 100 dedicated to clean processes and technologies
 - CR MEMS, a 180 m² in class 100 and 1000 dedicated for micromechanincs and polymer technologies
- Testing Lab, developing and executing both parametric and functional testing of manufactured devices as well as developing system prototypes
- Microsystems Integration Lab, developing solutions for advanced packaging and System engineering.

Each lab has a qualified staff with researchers, developing new processes and controlling standard technologies, and technicians, for equipment operation and maintenance and standard processing activities.

Following is a complete description of the equipments and processing details. This documentation is provided as a guide and may contain outdated information. Please contact us to further discuss your needs:

mtlab.fbk.eu



Microfabrication

- Lithography
 - Stepper Nikon Mod. NSR-2205i11D
 - 6" reticle
 - Resolution : 0.35 μ m
 - Mask aligner Mod. MA150BSA Single & double side wafer lithography:
 - proximity cass-to-cass with back side alignment (2.5 μ m resolution)
 - Track Mod. EVG150 e SVG8600
 - Positive Resist HIPR6512: 1.2 μ m thickness - 3nm 1 σ
 - Positive Resist HIPR6517HC: 2.1 μ m thickness - 6nm 1 σ
 - Lift off:
 - Negative resist MaN1420: 2.1 μ m thickness – 4nm 1 σ
 - Thick resist processing:
 - SU8 negative resist (from 5 μ m to 200 μ m thickness)
 - AZ4562 positive resist (thickness 6.7 μ m)
- Doped & undoped film deposition:
 - LPCVD (Centrotherm furnaces):
 - Undoped TEOS (718 °C , +/- 3% - 20 nm to 2 μ m)
 - P-doped TEOS (640 °C , +/- 3% - 20 nm to 2 μ m)
 - BPSG (640 °C , +/- 3% - 20 nm to 2 μ m)
 - Undoped Poly-Si (620 °C , +/- 4% - 20 nm to 1 μ m)
 - in situ P-doped Poly (580 °C , +/- 4% - 20 nm to 1 μ m)
 - Si Nitride (775 °C , +/- 3% - 20 nm to 0.3 μ m)
 - PECVD (STS equipment):
 - Si Oxide 250 - 300 C
 - Si Nitride 250 - 300 C
 - Stress ctrl Si Nitride (- 800 to + 500 MPa) 250 - 300 C
 - D Si Oxi-Nitride (SiON) 250 - 300 C
 - Si rich Oxide -
 - Amorphous Si 300 C
- Diffusion (Centrotherm furnaces):
 - Dry oxidation
 - Wet oxidation
 - Boron from BBr₃

- Phosphorus from POCl₃
- N₂ annealing
- 10% H₂ alloying/sintering
- Ion Implantation (Varian E220 medium current, energy range 40-180keV, uniformity 0.5%):
 - B⁺, BF₂⁺, P⁺, As⁺, Ar⁺
 - Min. dose : 2e12
 - Max dose: B 1e15; BF₂ 5e15; P 5e15; As 3e15; Ar 5e15
 - B⁺⁺, P⁺⁺
 - Min. dose : 2e12
 - Max dose : 5e13

- Metallization

- Sputtering MRC Eclipse, dep temp. RT-400 °C
 - Pure Aluminum (0.1-1.6 um)
 - 1% Si Aluminum (0.1-1.6 um)
 - Titanium (0.03-0.2 um)
 - Titanium nitride (0.03-0.2 um)
- Ulvac EBX-16C with e-gun Ferrotec EV S-6 (minimum thickness: 3 nm)
 - Gold
 - Chrome
 - Palladium
 - Aluminum
 - Titanium
 - Platinum
 - Silver
- Electrodeposition (Rena Wet bench)
 - Gold

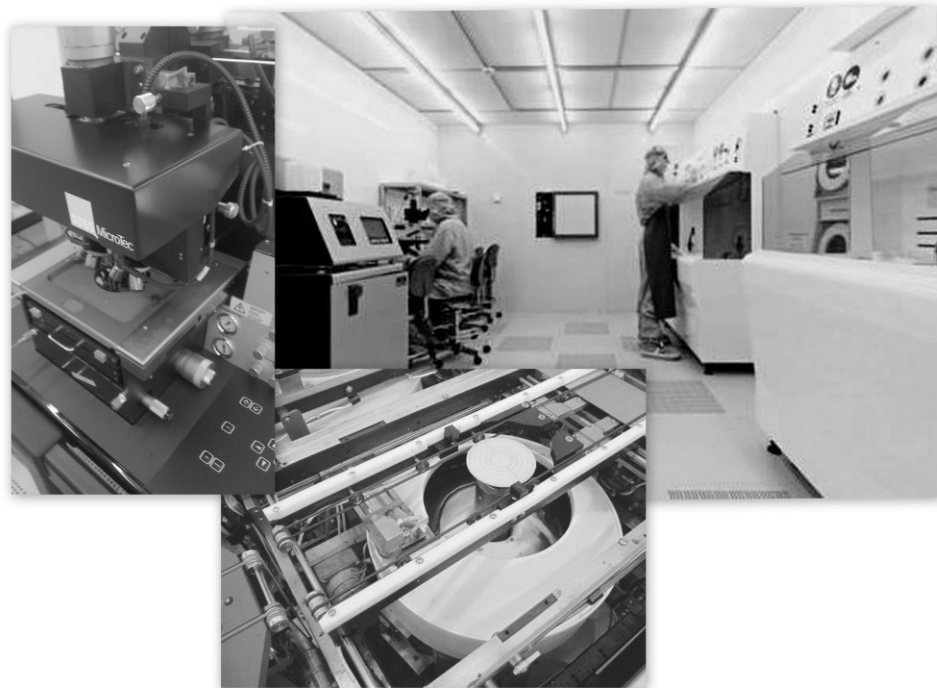
- Anisotropic dry etching:

	Sel.	Equipment	Etch rate (nm/min)	Uniformity (%)
○ Silicon Oxide	6:1	TEGAL 900 ACS	382	0.83 (thermal oxide)
○ Silicon Nitride	*	TEGAL 6510	528	
○ Poly Silicon	*	TEGAL 6510	207	
○ Aluminum 1% Si	2.4:1	TEGAL 6520	671	
○ Deep Silicon and Silicon Oxide Etch –DRIE (Alcatel AMS200)				

- Anisotropic wet etching:

- TMAH Bulk Si Wet

- Isotropic wet etching :
 - Silicon Oxide (no metal)
 - Silicon Oxide (metal)
 - Silicon Nitride
 - PolySilicon
 - Aluminum
- Resist stripping :
 - Photoresist Dry Matrix (single) 600 nm/min -
 - Photoresist Dry Tepla (batch) 40 nm/min
 - Photoresist Wet Etch (piranha)
- MEMS metrology main capabilities
 - Field Effect SEM JEOL JSM-7401F
 - Ellipsometry Jobin Yvon UVISEL 460 AGAS/RS
 - Inspection μ Scopes: Zeiss Axiotron, Leica INM100, Olympus MX50
 - Non contact profiling: Zygo NewView & Leica
 - 4 point probe
 - R. I. Measurement Metriton 2010 Prism Coupler



Testing Lab

- Automatic cass-to-cass Probe station (EG2001 + Agilent) x 1
 - Double side automatic testing
 - 4 channels I/V SMU (Source Monitor Units) 100Volts, 100mA
 - 2 channels I/V SMU (Source Monitor Units) 200Volts, 1A
 - 4 channels VS (voltage source)
 - 2 channels VM (voltage monitor) for high precision measures
 - 1 channel CMU (capacitance monitor Unit) 10KHz-2MHz bridge
 - 13 x 48 Switching matrix for 48 pin max probecard connection
 - 150 mm wafer testing

- Automatic cass-to-cass Probe station (ACCRETECH UF200 + Agilent) x 2
 - Double side automatic testing
 - 4 channels I/V SMU (Source Monitor Units) 100Volts, 100mA
 - 2 channels I/V SMU (Source Monitor Units) 200Volts, 1A
 - 4 channels VS (voltage source)
 - 2 channels VM (voltage monitor) for high precision measures
 - 1 channel CMU (capacitance monitor Unit) 10KHz-2MHz bridge
 - 8 x 48 Switching matrix for 48 pin max probecard connection
 - 100,125, 150, 200 mm wafer testing (automatic loading)

- Manual Probe station (Agilent) x 2
 - 4 channels I/V SMU (Source Monitor Units) 100volts ,100mA
 - 2 channels VS (voltage source)
 - 2 channels VM (voltage monitor) for high precision measures
 - 1 channel CMU (capacitance monitor Unit) 10Hz-25MHz bridge
 - 1 channel LCR meter 5Hz-13MHz bridge
 - 1 channel High Voltage SMU , 1100Volts, 100mA
 - 8 micro-manipolator

- Electro-optical (LWIR) test facility
 - Low temperature Blackbody sources 20 - 90 C
 - 150 x 150 x 800 motorized precision XYZ stage
 - Keithley 2636 dual channel Picoammeter
 - Signal recovery 7265 Lock-in
 - NIR-LWIR monochromator Jobin-Yvon HR250
 - LWIR calibrated detectors (pyro-electric)

- Full E-O device characterization SW
- Automatic power measurement set-up
- Automatic spectral measurement set-up

Microsystems integration lab:

- Wafer bonding AML:
 - Si fusion bonding
 - Anodic bonding
 - Au-Si eutectic bonding
 - Glas frit bonding
 - Adhesive bonding
- Screen Printer (AurelVS1520A)
- Wafer dicing: Disco DAD 2H/6T
- Assembly Station Tresky

