

<p>Bimorph Cantilever</p> <p>TPFab</p> <p>Responsible: chenxiang.zhang</p> <p>Project: Practical Training for Bachelor students</p> <p>Created: 1999-11-01 Last revision : 2024-02-5 (Arnaud Bertsch)</p> <p>Substrates: Si Test wafer, <100>, 4", 525um, single sided</p> <p>Masks: Layer 1 Metal, Layer 2 Oxide</p>						
Step No.	Description	Wafers	Equipment	Parameter	Target	Remarks
1 WAFER PREPARATION						
1.1	Stock out				Done by CMI	00:10
1.2	Check				Done by CMI	00:10
1.3	Clean RCA				Done by CMI	02:00
1.4	Oxidation	Centrotherm	1100°C, Wet	1.5um	Done by CMI. Cr deposition needs to be performed immediately after taking the wafers out of the oxidation tubes.	03:00
2 METAL DEPOSITION						
2.1	Cr deposition	Alcatel EVA 760, Z4	Parameters for EVA 600: 5A/s, target thickness 500nm	500nm	Done by CMI. Cr deposition needs to be performed immediately after taking the wafers out of the oxidation tubes.	02:20
TP A2: definition of the Cr tracks						
Prepare beforehand the wet bench for Cr etch + switch on the Hg lamp on the MJB4 + check temperature of the softbake hotplate (100°C)						
3 Photolithography 1						Intro: show the students the process flow and the CMI website for the different steps of photoresist processing. General materials: tweezers, wafer box, paper, tissue
3.1	NO HMDS ON CHROME!!!	HMDS hotplate, Z13	T=135°C ; 15min from RT; 1min cooling at RT		selection-Dehydrate TP A-automatic-(put wafer on chuck)-init-start; clean chuck at the end	01:05
3.2	Coating AZ1512	Sawatec SM-200 coater line, Z13	Coat for 1.5um @ 2800rpm for 45s	1.5um	Materials: AZ1512 bottle, plastic pipette Take enough resist (use at least 3mL resist), avoid bubbles; If it fails, use a new wafer + clean the bad one at the end with acetone -> IPA -> DI water Place cooled down wafer on biggest chuck Test vacuum should be around -0.8 select-TPFAB-automatic-init-start	00:10 Q2
3.3	Softbake	Hotplate next to spin coater/Ceram Hotplate, Z13	100°C for 75 sec (values for automatic coaters:112°C, 90sec)		Materials: timer Use 2 tweezers to manipulate the wafer without pinching it	00:05
3.4	Expo AZ1512 UV	MJB4, Z13	20mW/cm2, for 50mJ/cm2--> 2.5s can use 2.6s to be safe depending on design		Materials: mask LAYER 1 METAL Use 'align and expose' with 'hard contact' mode Check WEC pressure to be at 0.1MPa Before pressing WEC settings put circular height knob on 0.0 then follow instructions on CMI help sheet (1 graduation =1um)	00:15 Q3 Q4 Q5
3.5	Development AZ1512	Base wet bench, Z13	CD26=AZ726 MIF, 1min20sec-1min30sec. ; 1min Rinse with DIW ; Dry with N gun		Materials: 1 glass beaker of CD26 or AZ726 MIF (Careful TMAH!!!), 1 glass beaker of DIW, timer	00:10 Q6 Q7
3.6	Check	Microscopes Z13				00:10 Q8
Safety advice (chemicals, unknown liquids, cleaning, eye wash, shower, alarm)						
4 Cr wet etching						01:15
4.1	Etch Cr	Acid wet bench, Z14	~10min (needs to be checked after 5min) Rinse 2x 3 min with the DIW Rinse directly wafer under DIW gun Dry with N2 gun		Materials: papers, tissue, timer, tweezers, white nitrile gloves, long chemical gloves, apron, face shield, 2 glass beakers of 2L for the rinsing with DIW, Cr etch waste bottles are below the fume hood, use funnel to fill the waste bottle; A) use single wafer plastic container for the CR etch (orange solution in the top left cupboard), 2x single wafer holder (arrows) : etch the two wafers separately or B) use common CR etch bath (orange bath to the left side), 2x single wafer carrier (arrows): etch the two wafers at the same time with a few minutes delay between them. Visual detection of end of CR etching: Dark blue spread from border to center (12-13 min) ; Add 30s when green of oxide (SiO2) seen everywhere	00:25 Q9 Q10 Q11
4.2	Check	Microscope, Z13 or stereoscope Z14				00:10
4.3	Remove AZ1512	Lift-off bench Z13	TechniStrip P1316 ; agitate at room temperature for 6 min ; Rinse in DI water (2 beakers) ; Dry N2 gun		Materials: paper, tissue, Technistrip bottle, 3 glass beakers, 1 waste bottle, spider (two wafers can be stripped simultaneously, maybe increase slightly the time)	00:10
4.4	Check and take images	Microscope, Z13 + Z15				00:10 Q12 Q13
4.5	Measure resistance of Cr tracks	MPI TS150 Prober station, Z11	4 points vs 2 points measurements			00:20 Q14 Q15
TP A3: definition of the SiO2 beams						
Prepare beforehand the wet bench for SiO2 etch + switch on the Hg lamp on the MJB4 + check temperature of the softbake hotplate (100°C)						
5 Photolithography 2						01:10
5.1	Vapor HMDS on mix SiO2&Cr	SB20 HMDS hotplate, Z13	Standard 135°C; 1min cooling at RT Check whether wafer is hydrophobic		selection-HMDS standard-automatic-init-start	00:15 Q16
5.2	Coating AZ1512	Sawatec SM-200 coater line, Z13	Coat for 1.5um @ 2800rpm for 45s	1.5um	Materials: AZ1512 bottle, plastic pipette Take enough resist (use at least 3mL resist), avoid bubbles; If it fails, use a new wafer + clean the bad one at the end with acetone -> IPA -> DI water Place cooled down wafer on biggest chuck Test vacuum should be around -0.8 select-TPFAB-automatic-init-start	00:10 Q17
5.3	Softbake	Ceram Hotplate, Z13	100°C for 75 sec (values for automatic coaters:112°C, 90sec)		Materials: timer Use 2 tweezers to manipulate the wafer without pinching it	00:05

