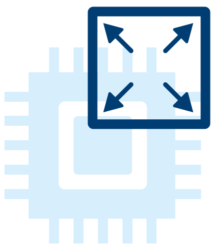
PHILIPS

MEMS & Micro Devices

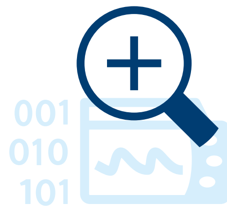
MEMS Foundry
Process capabilities

The foundry

We operate a 2650 m² state-of-the-art cleanroom of class 100-10,000 on the High Tech Campus in Eindhoven, The Netherlands.



2650 m²
state-of-the-art cleanroom of class 100-10,000



Large set of 150 mm and 200 mm **state-of-the-art tools**

Unmatched flexibility in materials

ranging from Ag to Zn, including 'CMOS-forbidden' materials, alloys, dielectrics, and polymers like Parylene

On different substrates and various shapes

Si, III/V, glass; square and round; up to 8"

1. Tool set

Cleaning/drying

Equipment	Comments
Semsysco	Spray process: O3, H2O, HF, HCL, NH3OH4
Wet cleaning	Piranha, 100% nitric acid (HNO3)
IPA vapor dryer	
CO2 dryer	Critical point dryer

CMP

Equipment	Comments
CMP	Avanti

Wet processing

Equipment	Comments
Wet etching dielectrics	HF, BOE, H3PO4
Wet etching silicon	KOH, TMAH
Wet etching metals	Al(-alloys), Cr, Mo, Ti, ITO, ..
HF vapor etch VPE200	Temperature controlled etching SiO2
Wet strip	Bulk photo resist stripper, polymer removal
Lift-off	Ultrasonic lift-off

Dry etching

Equipment	Comments
RIE	6-ICP based chambers with He backside cooling: - metals (e.g. Al, Cr, Ti, TiN, Ta, Mo, TiW) - non-metals (e.g. oxides, nitrides, dielectrics) - Si-etch - in-situ resist strip - automatic end-point detection
DRIE	Silicon etching (fluor based recipes) with high aspect ratio and high throughput
Barrel etchers	With O_2, CF_4
Dry strip	Resist strip --> precursors: O2, N2, N2+H2, CF4

Lithography

Equipment	Comments
I-line steppers	Min. CD: 0.5um with front to back-side alignment
Mask aligner	Contact and Proximity Capable CD ≥2µm Surface Conformal Imprint Lithography (SCIL) capability with 1um alignment
Resist tracks	High resolution i-line resist, 1.3 to 6um broadband resist, negative tone resist for lift-off
Spray coater	Suss Microtec Delta Altraspray
Several manual spinners	
Several primer ovens	

Furnace

Equipment	Comments
LPCVD	SiO2 (TEOS); SiN (stoichiometric, low stress); a-Si; SIPOS; poly-Si (Phosphorus doped)
Oxidation	Tmax: 1050C; dry & wet oxidation; Phosphorus doped process
Anneal	450C-900C (N2/N2-H2)

Deposition CVD

Equipment	Comments
PECVD	SiO2 (Silane or TEOS based), SiN, doped SiO2 (B/P doped TEOS)
PECVD	SiO2, SiN (low temperatures)
ALD	Thermal ALD: SiO2, Al2O3 (other processes possible)

Deposition PVD

Equipment	Comments
PVD/Sputter	2x Cluster tool with 6 sputter chambers and 2 load locks
PVD/Sputter	Batch deposition tool
	*Refer to page 4, 2. Targets

Evaporation

Equipment	Comments
Evaporation	Co-sputter system with 4 separate cathodes (no sputter etch) Refer to page 4, 2. Targets

Deposition special

Equipment	Comments
Polyimide (PI) coater	Polyimide coating (primer&PI spin coater with hot plate and oven cure)
Parylene coater	
Thick polymer coating	Resist or adhesive: BCB, TMMR (spin-coating, lamination and roller coater)

Wafer bonding

Equipment	Comments
Wafer bonders	Wafer bonder for anodic, fusion, adhesive, thermo compression and eutectic
Surface plasma activation	Surface plasma activation for fusion bonding

Metrology

Equipment	Comments
Several optical microscopes	
Several step height measurement tools	
SEM	Semi automatic scanning electron microscope (SEM) (FEI and JEOL)
Process control	- Automatic mapping for thickness (ellipsometry and spectroscopic reflectrometry) and resistivity (4-point probes) - Stress and bow measurement
Defectivity	Particle detection with surfscan (Tencor) and wafer inspection system (Orbot)
Electrical characterization	Automatic probe systems (Electroglass) for process control modules (PCM), (semi) automatic probe systems for 'end of line' electrical measurements (CV, IV, impedance)

Miscellaneous

Equipment	Comments
Nanowave printer SCIL	
Marking laser	Wafer numbering

Dicing/grinding

Equipment	Comments
Dicing	2 Dicing tools
Grinding	Different tools for coarse and fine/ultrafine grinding

2. Targets

Target	Sputtering	Evaporation
Ag	x	x
AgPd (1%)	x	
Al	x	x
Al2O3	x	
AlCNi	x	
AlCr	x	
AlCr (0.5wt%)	x	
AlCu	x	
AlCu (0.5wt%)	x	
AlCu (1wt%)	x	
AlGe	x	
AlSi (1wt%)	x	
AlSiCu	x	
Au	x	x
B	x	
C	x	
Co	x	
Cr	x	x
CrNiAl	x	
CrSi	x	
CrSiO	x	
Cu		x
Ge	x	x
Hf	x	x
In	x	x
ITO	x	

Target	Sputtering	Evaporation
Mo	x	x
MoCr (3wt%)	x	
MoSi2	x	x
Nb	x	x
Ni	x	x
NiCr (50/50)	x	
NiCrAl	x	
NiFe (80/20)	x	
NiV (93/7)	x	
Pt	x	
Ru	x	x
Si	x	x
Si (B-doped)	x	
SiC	x	
SiO2	x	x
Sn	x	x
Ta /N	x	x
Ta2O5	x	
Ti /N	x	x
TiO2	x	x
TiW (10/90)/N	x	
W	x	x
ZnO	x	
ZnOAl2O3	x	
Zr	x	x
ZrO2	x	x

Comment: targets not appearing on the list can also be processed upon new target acquisition, all reactive processes can be also deposited as Nitrides.

Contact

If you have any questions, feel free to contact us.

Robbert van der Waal
Sales director

robbert.van.der.waal@philips.com
+316 1101 8330

Contact me ›

© 2022 Koninklijke Philips N.V. All rights reserved.