

Fraunhofer IPMS

200 mm MEMS cleanroom toolpark

LITHOGRAPHY		
Exposure	DUV for 130 nm l/s	NSR-S210D | Nikon
	i-Line for 400 nm l/s	NSR-2205i 14E2 | Nikon
Coating	Spin Coating and Development	SK-80EX | dns & TEL ACT8 | tel
	Spin Coating	Basixx ST20+ | Osiris
	Spin and Spray Coating	VARIXX 806 | Osiris
	Spray Coating and Development	Gamma80 | Süss
Contact, Proximity	Double-side Mask Aligner	MA 200 GEN 3 | Süss
Preparation	SpinMask	300 WB-08304 | ap&s
DEPOSITION		
ALD	SiO_2, Al_2O_3	P-300 | Picosun
	FDTS for Anti-Stiction	MVD 300 Batch Reactor | SPTS
PE-CVD	Silicon Oxide as ILD and Sacrifcial Layers	Centura | Applied Materials
	a-Si:H as Sacrifcial Layers	
	Silicon Nitride for Passivation / Membrane	
	HDP Oxide as ILD and Sacrifcial Layers	
	Tungsten for Plugs and TSVs	
LP-CVD	Poly-silicon for Trench Fill / Sacrifcial Layer	E1550 HT 320-4 | Centroterm
	Silicon Oxide for Insulator, Membranes	
PVD Sputtering	Interconnects (Al, AlSiCu, Ti, TiN)	Sigma 204 | SPTS
	Chemical Sensors and Barriers (Ta, Ta_2O_5, Nb, Nb_2O_5)	CS400S | von Ardenne
	Mirrors and Hinges (Al, TiAl, Al alloys, Al_2O_3)	
Evaporation	Al, SiO_2, TiO_2	Evatec BAK 761
Oxidation	POCl3	LDS200-2 | Inotherm
	Thermal, SiO_2 (vertical)	Alpha 8SE | TEL
	SiC High Temperature Furnace up to 1200°C	E1550 HT 320-4 | Centroterm
Oxidation / Tempering	Dry / wet oxidation 600 °C - 1050 °C	E1550-310-5 | Centroterm
Tempering	H_2 tempering (horizontal)	LDS200-2 | Inotherm
	Tempering (horizontal)	
Rapid Thermal Annealing	Annealing	Heatpuls 8800 | OEMgroup
Chemical Mechanical Polishing	Si, SiO_2, Al_2O_3, Si_3N_4	DESICA | Applied Materials
Grinding	SOI preparation	DGP8761 | DISCO Corp.

ETCHING AND CLEANING		
Dry Etch	Metal etch (Al / Al alloys)	ALLIANCE 9600PTX | LAM
	Dielectrics & Poly Etch (SiO_2, Si_3N_4, PolySi, a-Si)	Omega fxP | SPTS
	Deep silicon etch	
Gas Phase Release Techniques	HF-GPE for SiO_2	Monarch | KLA
	XeF_2 for a-Si X-SYS-3B:6	Xetch X3B | KLA
Ashing	Ashing resist	GIGAbatch 380M | tfd
	Ashing resist	NEO2232 | Trymax
Wet Etch	Silicon Oxide (NH_4F-buffered HF)	Manual wet bench I AP&S
	Silicon Nitride (Phosphoric Acid)	
	Aluminum (Phosphoric & Acetic Acid)	
	Anisotropic Si Etch for Grooves, Membranes (TMAH)	
	Spray Acid Tool (Titan-Salicide-Process)	Trident SAT | ClassOne Technology
Cleaning	Wafer Cleaning (SC1, SC2, DHF, RCA)	GigaStep I AP&S
	Scrubber	SS-80BW-AVR | Screen
	Wet Strip (EKC clean)	Cintillio SST | OEMgroup
BONDING & ASSEMBLY		
Wafer Bonding	Direct Si / SiO_2 and Adhesive Bonding	SB8 & XB8 | SUSS
	Bond Aligner FEOL	BA8 Gen3 | SUSS
	Bond Aligner BEOL	
Wafer Dicing	Dicing of Glass-Silicon-Compound	DAD 651 | DISCO Corp.
Wafer Packaging	Pick & Place for Chip Assembly	VICO Xtec / Laser | Häcker Automation
	Fineplacer	FEMTO | Finetech
	AOI for chip inspection	IL2000 | Ficontec
Laser Marking	Laser marking of various materials	MD-U1000 | Keysight
Material Test	Material and shear test system	2.5kN Zwicki | Zwick / Roell
Laser Scanning Microscope	Surface Topology	VK-X200 | Keyence
METROLOGY & INSPECTION		
Film Thickness Measurement	Optical Thickness Measurement of Standard Materials	Lambda Ace RE-3300 | Screen
	Inline Reflectance measurement	n & k Olympian
Scanning Electron Microscope	3D Inspection	JSM-6700F | JEOL
	Analysis SEM with FIB cut	Helios Nanolab 660 | FEI
CD-SEM	CD Measurement	Verity Lite | Applied Materials
Atomic Force Microscope	Surface Topology	Nanoscope D3100 | Veeco
	Surface Topology with automated handling	NX-Wafer | Park Systems
Surface Characterization	Contact angle measurement	DSA100W | Krüss
Ellipsometer	n&k Measurement, Optical Properties	V-VASE (190 … 1700 nm) | Woollam
White Light Interferometer	Surface Topology	NT8000 | Veeco
Wafer Inspection	Bright Light Optical Inspection	Axiospect 302 | HSEB
Defect Measurement	Defect Classifcation	FAaST 230 | Semilab
	Defect Classification	INS3000 | Leica
	Defect Inspection	Compass Pro | Applied Materials
Profilometer	Step height, mapping, 3D imaging of surfaces	surface Profiler P16+ | KLA Tencor
4-point measuring station	Sheet resistance	CDE ResMap168 | veonis technologies
Stress measurement	Wafer bow, wafer stress, temperature dependent	FSM500-TC-R | Frontier Semiconductor
Wafer measurement	Wafer thickness, stress, Bow, trench depths, layer thickness measurements	SemDex M2 | sentronics metrology
X-ray diffractometer	XRR, XRD	Siemens D5000 | Siemens

ELECTRICAL TEST		
Mixed Signal Testing	72 digital pins (200 MHz), 32 analog pins, 6 × 52 V / 0.2 A supply, 51 V / 5 A supply, various digitizers & generators, wafer size 4”, 5”, 6”, 8”, 12”; temperature: -40 … +125°C	M3650 / EG4090µ / UF3000EX | Advantest
	176 digital pins (200 MHz), 24 analog pins, 8 HV bus pins, 6 × 52 V / 0.2 A supply, 2 × 80 V / 20 A supply, various digitizers & generators, wafer size 4”, 5”, 6”, 8”, 12”; temperature: -40 … +125°C	M3670-Falcon / EG4090µ+ / PA300 | Advantest
	512 digital pins (200 Mbit/s), 32 analog pins +80V ±200mA, 8 HV Pins 60V/10A, various digitizers & generators, wafer size 4", 5", 6", 8", 12"; temperature: -40 ... +125 °C	V93000 SmartScale / EG4090µ / UF3000EX | Advantest & Cascade Microtech
Parametric Test System	48 channels, wafer size 4”, 5”, 6”, 8”, 12”; temperature: -40 … +125°C	B1500 / EG4090µ / UF3000EX | Keysight
	Matrix up to 72 channels, wafer size 6 … 8”, temperature: -40 … +125°C	S530 basic EG4090µ | Keithley
Electro-Optical Test System for Micro Displays and Sensors	Color & luminance measurements, DUT images up to 16 Mpix wafer size up to 12”; capabilities for bare dies or modules, temperature: -40 … +125°C	F1600C Pike Camera, 20 Mpix IDS Color Camera Spectrometer Jeti Specbos 1211UV PA300 | Formfactor
Sensor Actor Test System for MEMS / MOEMS	Wafer size 8”, temperature: 15 … 125°C, SMU, laser light barriers, frequency counter, switch matrix, up to 72 channels	AP200 | Formfactor, changeable chuck-addons for MEMS probing
Optical Inspection	Manual or fully automated image processing	PA200 | Formfactor
Non-Electrical Test	Up to 20 channels, configurable set points -45°C … 145°C @ (1.4 deg / min) rH controlled 300 N sine; up to 5000 g pulse	pH Sensor Tester | Fraunhofer IPMS Thermal Callibration Feutron ESPEC Shock and Vibration LDS | Endevco
CV Analysis	Oxide thickness, flat band voltage, effective oxide charge, average bulk dop., threshold voltage, Debye length, interface trap density	B1500, HP4294A, HP4295A, K590 | Keithley, Keysight
	Relaxation time, minority carrier lifetime, surface scan velocity	HP4294A, HP4295A, K590 und K595 (TVS) | Keithley, Keysight
Characterization of Insulator Integrity and Reliability	Breakdown field, Weibull plot, Time / charge to breakdown (Eramp and Econst (TDDB))	K236, K237 und K238 | Keithley

About our 200 mm MEMS cleanroom

Features at a glance

- Class 10 (ISO 4) on 1,500 m²
- Low volume & high mix
- Operation 24/5 in 3 shifts
- 45 engineers + 45 operators and maintenance technicians
- ~1,000 wafer starts per month
- Full CMOS compatibility
- ISO 9001:2015 certification
- MES for planning, traceability and documentation
- i-line (400nm L&S) and DUV cluster (130nm L&S)

Contact

Jörg Amelung
Engineering, Manufacturing & Test
Tel. +49 351 8823-4691
joerg.amelung@ipms.fraunhofer.de

Fraunhofer Institute for
Photonic Microsystems IPMS
Maria-Reiche-Strasse 2
01109 Dresden, Germany
www.ipms.fraunhofer.de

Want to learn more?

Take a virtual tour of our cleanroom!

https://www.mems-technologies.com/

Quality Management
ISO 9001
www.dekra-seal.com

0721003BR_EMT_Cleanroom-Toolpark_EN_2024-10