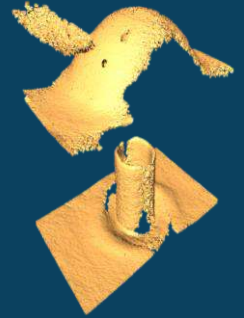
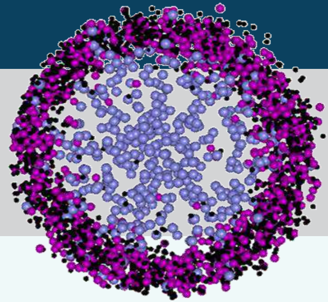
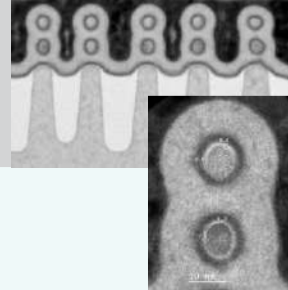
Workshop on

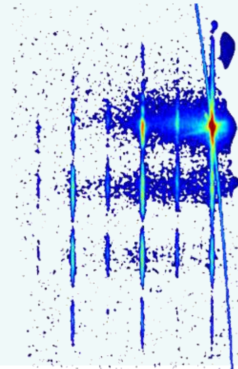
Characterization and Metrology for 3D CMOS





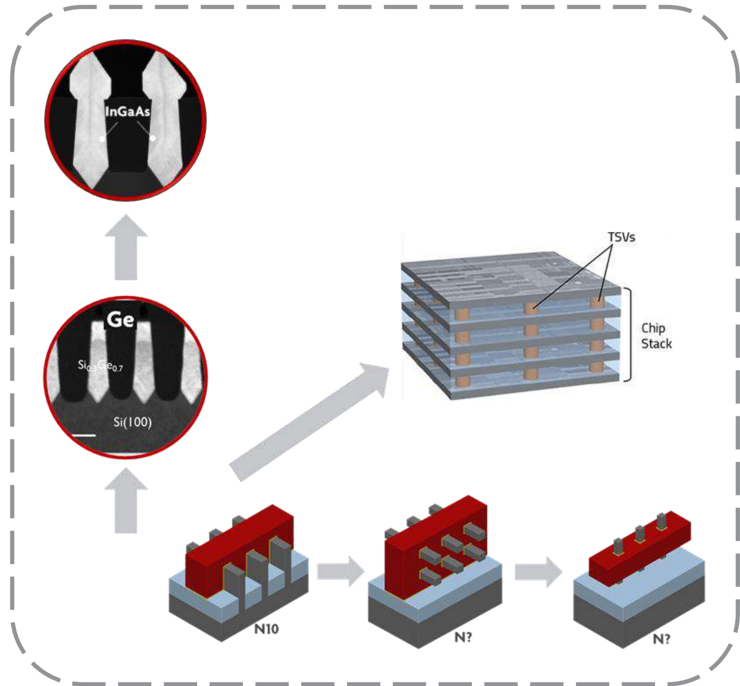
Andreas SCHULZE (imec) and Loek KWAKMAN (Thermo Fisher)

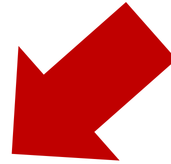




EU Funded Metrology R&D

3DAM and Metro4-3D

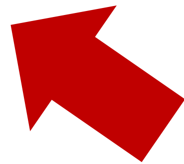




3DAM

"Pathfinding Project"

Lead: Thermo Fisher (F. de Jong)



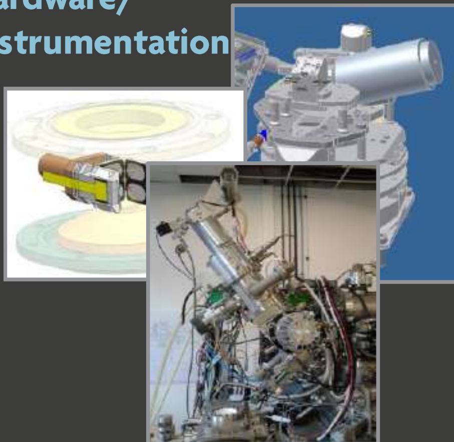
Metro4-3D

"Exploring and Assessing"

Lead: imec (T. Conard)

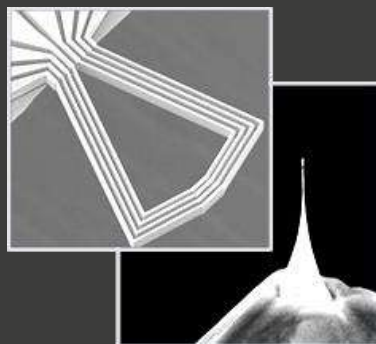
Scope

Hardware/ Instrumentation



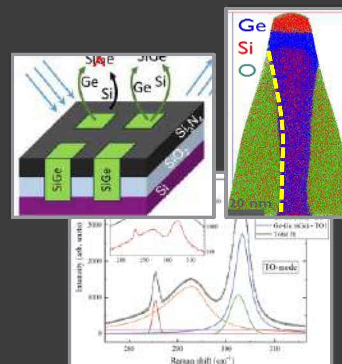
- Ion Column
- Integrated EDX detectors
- TERS
- …

Key Components



- Micro multipoint probes
- HAR AFM probes
- …

Novel and Improved Concepts



- APT, M4PP, Raman, SF-SIMS, SSRM, TEM, XRD,
- …

Members of 3DAM and Metro4-3D Consortia

3DAM and Metro4-3D Partners

SIMS	imec, LETI, iontof, Cameca
APT	imec, LETI, Cameca
XRD	imec, Bruker
TEM-based (tomo, EDX, EELS, PED)	FEI, LETI
Raman	imec, LETI, Semilab
MBIR	Semilab
3D-AFM, probes	imec, TNO, Adama
OCD	Nova
XCT	FEI, LETI
GHz SAM	Fraunhofer IMWS, imec, MCL, PVA Tepla
Cathodoluminescence	Attolight, LETI
Second Harmonic Generation	TU Eindhoven
(3D-)SSRM	imec
M4PP	Capres, DTU, imec
THz	DTU, Capres

Program

Morning Sessions

9:10	**Keynote:** Materials Innovation for Technology Scaling and the Implications to Metrology	Zhiyong Ma	Intel
9:55	**Keynote:** Metrology Challenges and Needs for Scaled 3D Devices and Architectures	Ajey Jacob	GlobalFoundries
10:40	Coffee Break		
11:10	**Invited:** Automated Nearline Process Control Workflows for 3D NAND and FinFET	Ozan Ugurlu	Thermo Fisher
11:45	2D & 3D Advanced TEM for Semiconductor Characterization	Vincent Delaye	LETI
12:05	Advanced Micro Probes for Semiconductor Metrology	Andrea Casci Ceccacci	Capres
12:25	Lunch		

Program

Afternoon Sessions

1:30	**Invited:** YieldStar Metrology System Applications for Advanced Process Control	Paul Hinnen	ASML
2:05	AFM-based Metrology for Advanced Patterning	Alain Moussa	imec
2:25	3DSEM Measurements of Stacked-NW Transistors Using New eTilt Metrology Algorithm	Remi Le Tiec	Applied Materials
2:45	Coffee Break		
3:15	**Invited:** Characterization Requirements of the CMOS Industry	Paul Van der Heide	imec
3:50	Atom Probe Tomography Simulation of a Cross Section ABA Structure	David J. Larson	Cameca
4:10	Raman and Second-Harmonic Generation Spectroscopy For Probing The Orientation and Charge Density of MoS_2	Andrea Casci Ceccacci	Capres
4:30	Reception		

Acknowledgements

- Paul Van der Heide
- Matty Caymax
- Frank De Jong
- Fred Loosen
- Kathleen Vanderheyden

- ECSEL-JU & H2020
- All Speakers

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