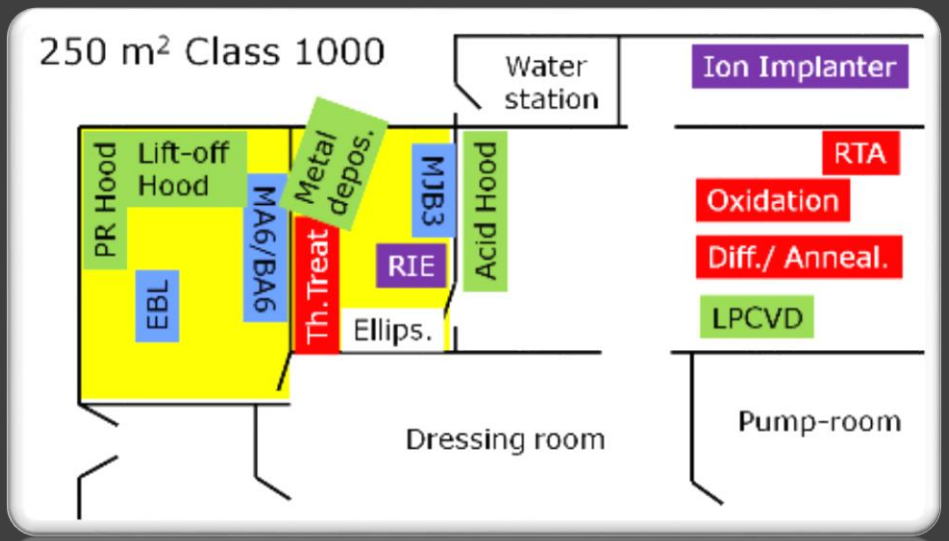
Nanotechnology & Microsystems Lab Overview



Infrastructure

- ISO 6 / ISO 5
- 250 m^2 – 70m^2 expansion scheduled for 1H23
- Fully Equipped CMOS Compatible Line
- ISO 8 Satellite labs supporting non CMOS compatible processes
- **Satellite labs of Plasma Etching, CVD, MBE, Organic electronics, characterization…..**

Our Aim is to

- Promote Semiconductors processing and manufacturing technologies
- Support industry with high added value products and production processes
- Support industry in realizing their technology roadmap and participate in European and globally funded Research projects
- Develop human potential by education and training activities in cutting edge technologies

What we offer

- Production of cutting edge technology prototypes
- Process troubleshooting, improvement and new process development based on customer requirements
- Full support of process transfer to production site
- Electrical characterization of semiconductor devices
- Structural characterization and microscopy
- Utilize existing channels for incorporating research and development activities in EU-funded projects

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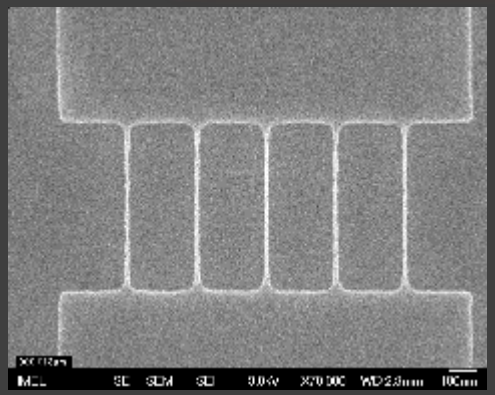
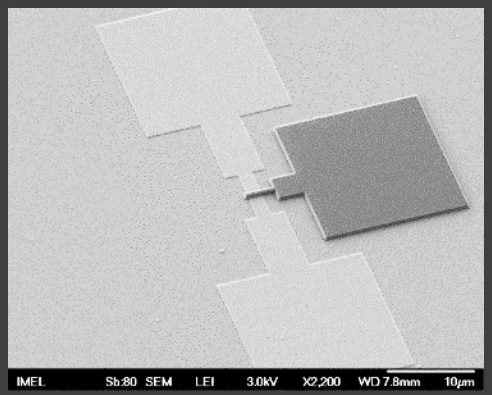
Nanotechnology & Microsystems Lab
Processes & Characterization



13nm Nanowire MOSFET



Si FinFET 30nm

Processes

- Optical Mask Aligner (SUSS Microtech with back side alignment
- Electron Beam Patern Generator (RAITH EBPG 5000 plus)
- Dry (plasma) Etcher (RIE, ICP)
- Ion Implanter Eaton NV-3204
- Thermal Processes (Atmospheric, LPCVD, RTA, RTP)
- Electrical Characterization:
  - RF Characterization
  - 2-port Vector Network Analyzer with Frequency Range 40 MHz-40 GHz
  - DC Current – Voltage Characterization
  - DC Characterization LCR Meter
  - DC / AC Pulse Generator
  - Variable Temperature Wafer Prober
- Several Characterization Techniques and supporting satellite labs

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Nanotechnology & Microsystems Lab
Future Expansion

- 75m^2 of Clean Room Class 100 will be added within the 1st Half of 2023
- 1 Atomic Layer Etching Tool with RIE / ICP Capabilities
- 1 e-Gun Evaporation tool for metals with capability of depositing alloys
- 1 Thermal evaporator tool with capability of depositing organic layers
- All systems will be operational in 2nd Half of 2023

- The project is funded by the Hellenic Foundation for Research and Innovation (ELIDEK) under contract number 34666/17.3.21

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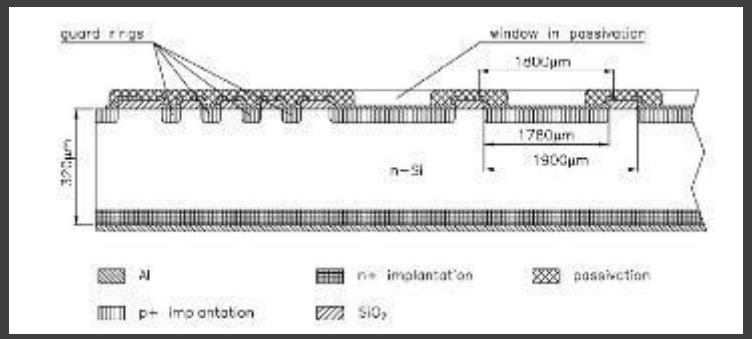
Nanotechnology & Microsystems Lab Achievements: Si Sensors for the CMS Preshower Detector

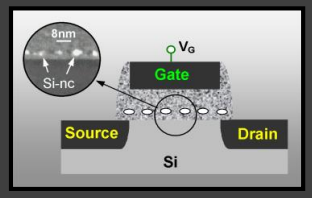


- NML worked 20 years ago on the development of the prototypes
- Designed especially for the preshower detector to separate the photons from the neutral pions (γ/π^0)
- Silicon based sensors are fast and have a linear response even in harsh environments
- Some characteristics:
  - Wafer size: 4′′, F-Z
  - Wafer thickness: 320μm±2μm (optimal for low leakage currents)
  - Resistivity: 3 – 4kΩ.cm
  - Number of strips: 32
  - Total area: 63×63cm^2

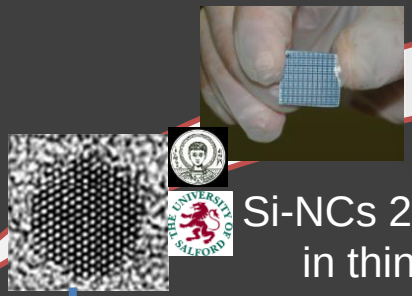
Nanotechnology & Microsystems Lab Achievements: Nanoelectronics

Si NanoCrystal Memories by Low-Energy Ion-Beam-Synthesis (A Long Story)

Development of Non-Volatile Memories
- From Materials to Devices
- Technology Transfer to Industry

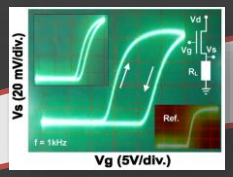


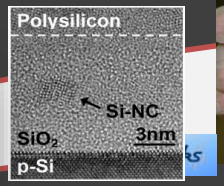
1996-2000



Si-NCs 2D-arrays in thin SiO_2

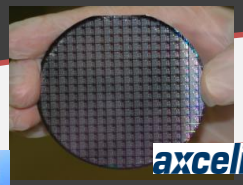
2001-2003

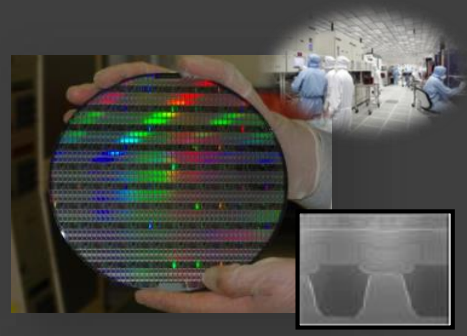




Laboratory Si-NCMs
(2 μm n-MOS Technology)

2004-2006

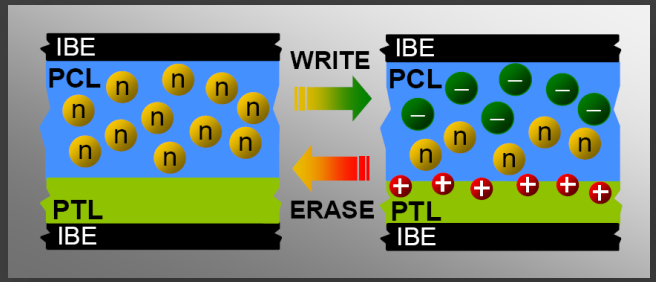


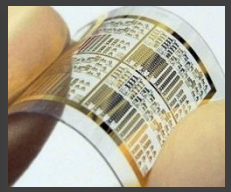


Si-NCM Manufacturing
(STMicroelectronics 0.15 μm Flash Memory Technology)

Towards Reprogrammable Non-Volatile Organic Memories

2008: Introduction of the Concept of Non-Volatile Proton Organic Memory





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Nanotechnology & Microsystems Lab
What we can offer to CERN

- Prototype development of sensors, micro / nano systems, devices (electronics / opto-electronics)
- Small production of custom designed semiconductor devices
- Characterization of devices / sensors
- Training on the production and characterization technologies of semiconductor devices

Nanotechnology & Microsystems Lab

Thank you for your attention

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