

**NANO
LUND**

AT THE FOREFRONT
OF NANOSCIENCE



Lund Nano Lab

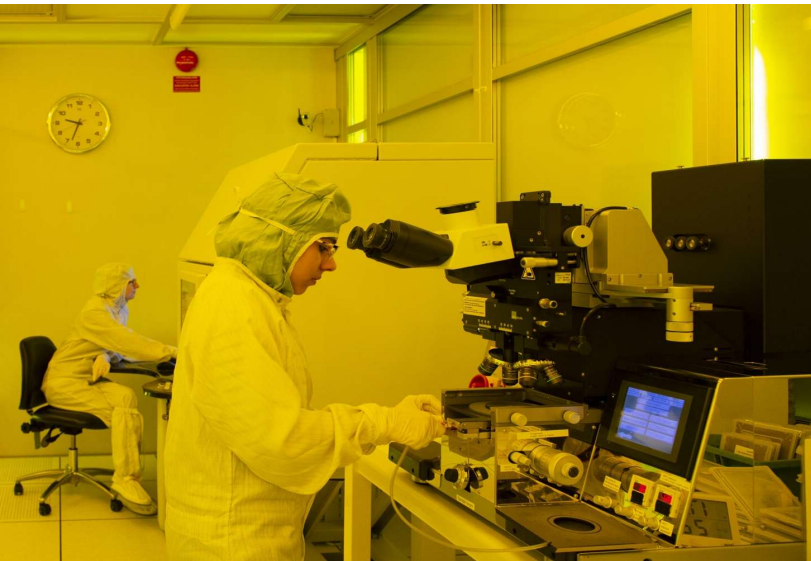
Lund Nano Lab

Introduction and Equipment Summary
2021-01-25

Lund Nano Lab (LNL)

- ISO 5/7 Class nanofabrication and metrology facility
- Part of National cleanroom infrastructure, Myfab
- Support from the university enables the lab to achieve the highest standards and maintain state-of-art equipment and for academic users to be subsidised
- Open access 24/7 for 140 active users (academic and commercial) booking 50 000 hours tool time each year
- All users are fully autonomous after completing a lab introduction and safety course and have acquired a tool specific license for operation
- 17 staff with expertise in equipment, IT, semi-conductor material fabrication and characterization of nano and micro structures





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1/25/2021

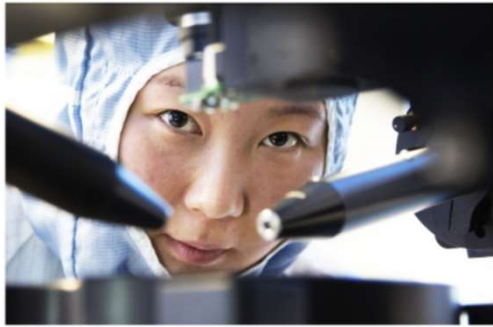
Lund Nano Lab

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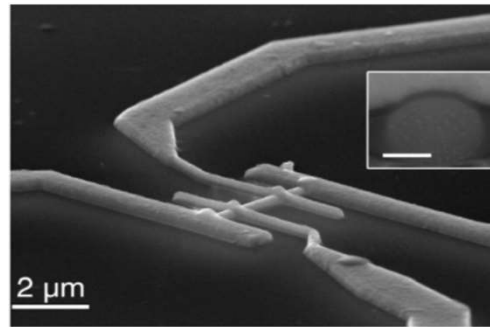


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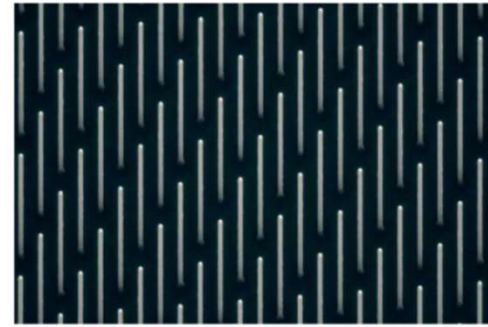
Lund Nano Lab Equipment Areas



Metrology/Characterization



Lithography



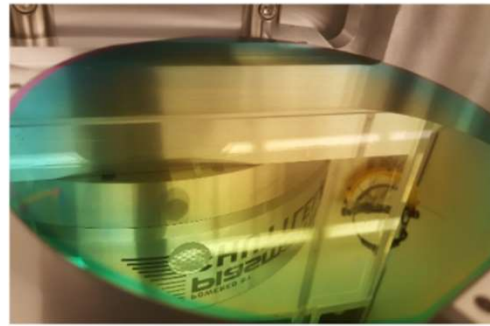
Growth



Special Equipment



Thin Films



Etching



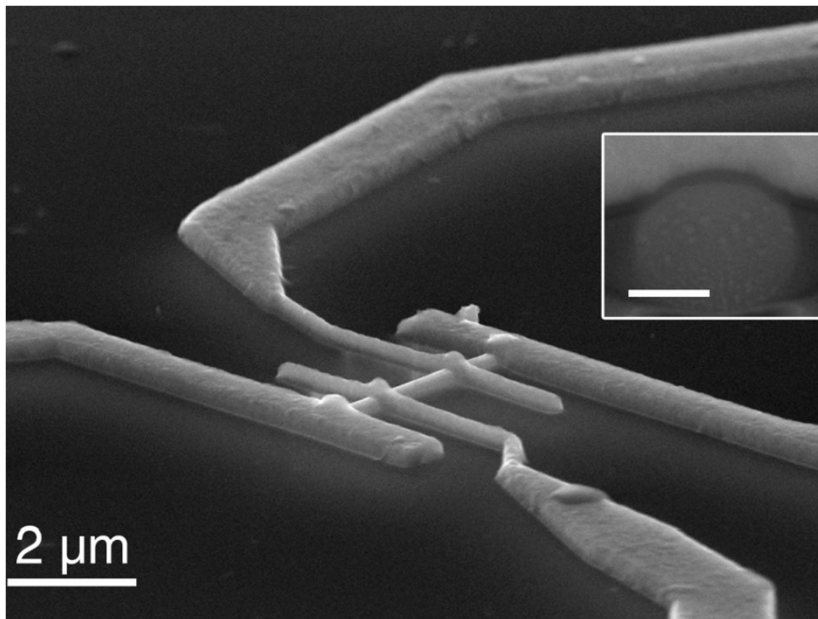
Chemical Processing



Facility

Equipment at Lund Nano Lab

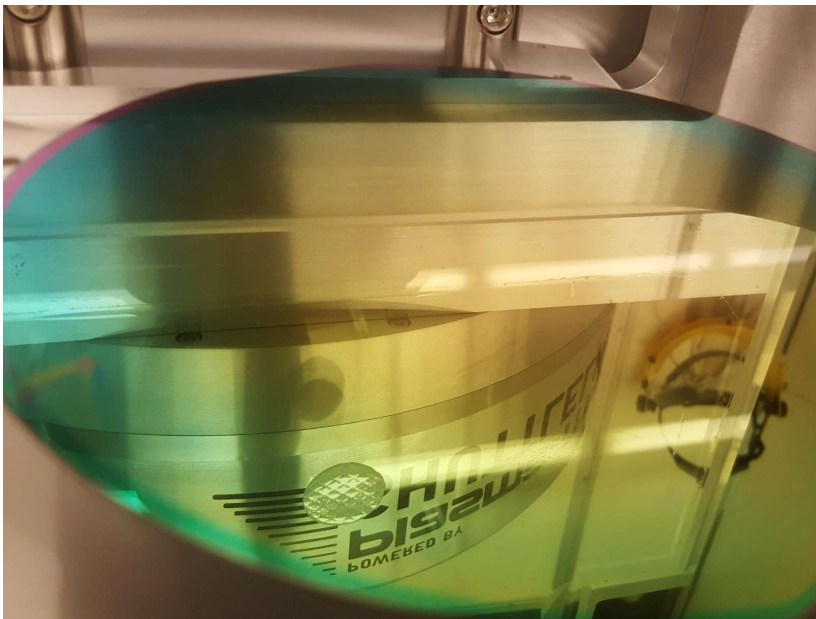
Lithography



- Raith Voyager EBL
- Raith 150 EBL
- Direct Laser Writer under Procurement
- Talbot Displacement Lithography (TDL)
 - Large area exposure by 3D diffraction by a repeated pattern on a phase shift mask
- Soft UV Mask Aligner
- Deep UV Mask Aligner
- Obducat Nano Imprint Lithography

Equipment at Lund Nano Lab

Etch



- APEX SLR Inductively Coupled Plasma Reactive Ion Etch (ICP RIE) – F based
 - Etching Si, SiO₂, Si₃N₄, W, Mo and resists
- APEX SLR ICP RIE – Cl based
 - Etching and atomic layer etching (ALE) of mostly III-V semiconductors
- Tepla Ion Wave 10 Plasma Asher
 - Isotropic etching of Si, SiO₂, and resists
- Moorfield NanoEtch
 - Low power residual resist removal
- Trion Reactive Ion Etch (RIE)
 - Etching Si, SiO₂, Si₃N₄, W, Mo and resists

Equipment at Lund Nano Lab

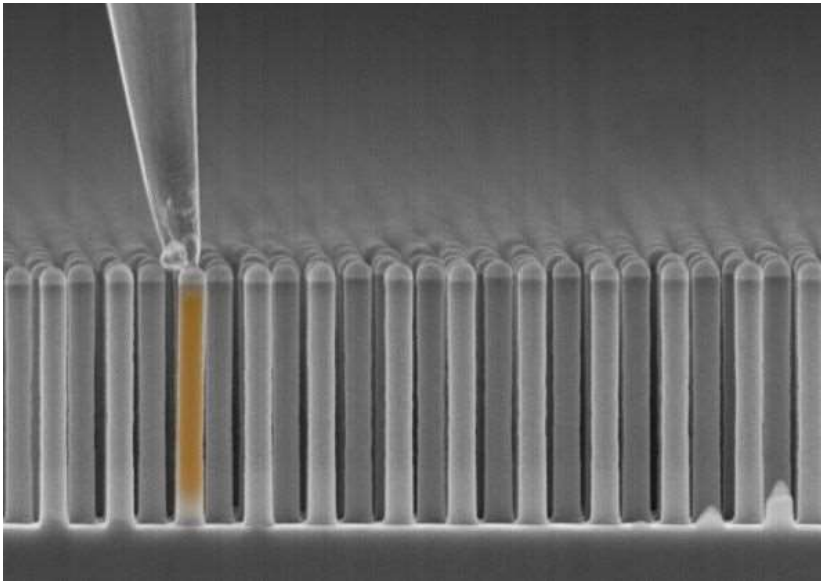
Thin Films



- Temescal E-Beam Evaporator: Au, Ti, Ni, Al, Cr, Pd..
- AVAC Thermal Evaporator: Au, Al, Ni, NiCr, Pd, Zn..
- AJA RF/DC Sputter: ITO, TiN, Au, W, Ni, Ti, Al, Si
- Cambridge Analytical Savannah 100 Atomic Layer Deposition (ALD): AlO_x , HfO_x
- Cambridge Analytical Fiji 100 ALD: TiN, SiO_x , AlO_x
- Picosun ALD: ZrO_x , HfO_x , AlO_x in N_2 glovebox
- ALD for High k-dielectric under procurement
- Microsys Plasma Enhanced Chemical Vapour Deposition (PECVD): SiN_x and SiO_x deposition

Equipment at Lund Nano Lab

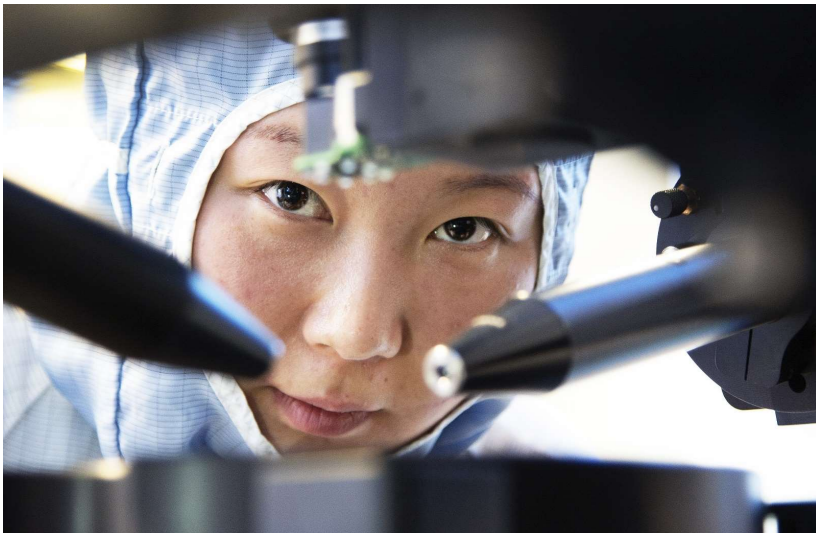
Growth



- Aixtron 200/4: Metal-Organic Vapor Phase Epitaxy (MOVPE)
 - III-V growth: arsenides, phosphides, and antimonides
- Aixtron CCS: MOVPE
 - III-V growth: arsenides
- Thomas Swan Nitride MOVPE
 - GaN, InGaN, AlGaN growth
- Epiquip MOVPE
 - III-V growth: arsenides and phosphides
- New MOVPE funding from Myfab

Equipment at Lund Nano Lab

Metrology / Characterisation



- Bruker XRD:
 - High-angle, Reflectivity, Grazing incidence
- FEI NanoLab 600 FIB-SEM (Ga FIB)
- LEO SEM: General purpose imaging
- Hitachi SU8010 SEM:
 - General purpose imaging and in-situ electrical measurements
- Woollam Ellipsometer RC2
 - 210-2500 nm
 - Mapping capability with up to 200 mm sample
- Bruker Dektak stylus Profilometer:
 - 55 x 55 mm scan area, 2 μ m stylus
- Sun Simulator, Probe station and Quantum Efficiency (QUE)

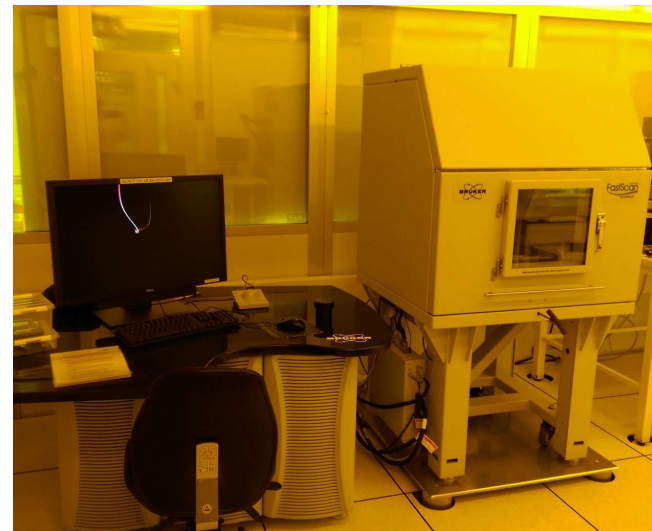
Equipment at Lund Nano Lab

Metrology / Characterisation



ZEISS GeminiSEM 500:

- High resolution imaging
- Energy-dispersive X-ray spectroscopy (EDS)
- Electron backscatter diffraction (EBSD)
- Back Scatter Electron Detection (BSD)
- Scanning Transmission Electron Detection (STEM)



Bruker Icon AFM:

- Topography
- Electrical properties (conductivity, potential, capacitance)
- Mechanical properties

Equipment at Lund Nano Lab

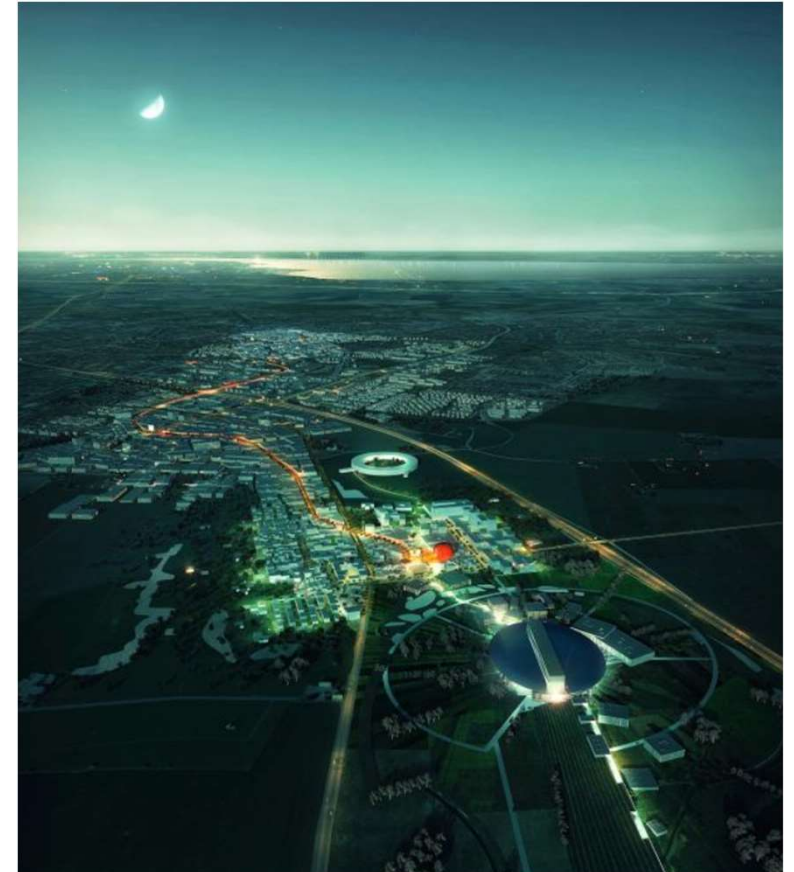
Special Equipment



- Flash Lamp Annealer
 - 800C with 10 ms pulse duration
- Bondtech bonding Machine
 - Au or Al wire
- Logitek Chemical Mechanical Planariser
 - Under procurement
- Disco Dicer: Wafer dicer
- Rapid Thermal Processing oven
 - 150C /s in N₂, O₂ or N₂/H₂ mix

Lund Nano Lab (LNL)

- In 2020, the Dean of LTH initiated the procurement of a 1400 M² clean room to be located at Science Village
- Nano Lab Science Village (NLSV) is a strategic action of the NanoLund strategic plan
- Together with ESS and Max IV, the new Nano Lab at Science Village will form a third major infrastructure at Brunnskög
- The donor relationship group has a fund raising strategy in place for NLSV and has identified potential donors. The board of LU views this as a highly prioritised project.



Supporting Lund Nano Lab



Vetenskapsrådet



STIFTELSEN för
STRATEGISK FORSKNING

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