

Northwestern University Micro/Nanofabrication Facility

—16 years of excellence

Facility Overview



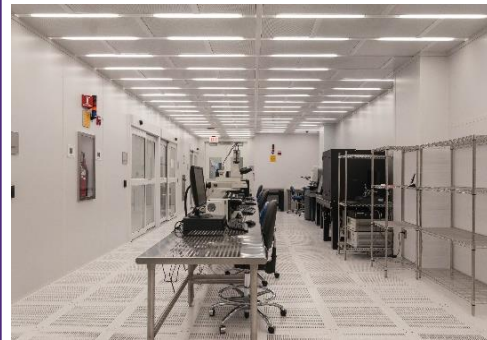
NUFAB is a central fabrication facility at Northwestern University. It provides the whole range of nanofabrication equipment and technical expertise to Northwestern as well as other academic and industrial researchers. We support research in all areas of science, engineering, medicine, and interdisciplinary fields.

Scan QR for video tour.

If you like in-person tour or have any questions, email us nufab@northwestern.edu



CHARACTERIZATION



NUFAB's Characterization Bay allows for fine measurement of physical, electrical and optical properties of materials and devices.

- Fluorescence/DIC Microscope

PHOTOLITHOGRAPHY



NUFAB's Photolithography Bay is configured for both mask and maskless lithography processes, including single micron scale optical lithography.

- Mask Aligners
Suss MABA6, Suss MJB4
- Laser Writer
Heidelberg MLA150, uPG 501
- Convection Ovens
Blue M DCC-146-C-ST350
- Microscope
Nikon LV150
- Spinner Hood
- Automatic Develop Hood
Osiris UNIXX
- Ultraviolet Flood Exposure System
Inpro Technologies F300S
- Ultrasonic and Megasonic Cleaners
- Vacuum Oven (YES)

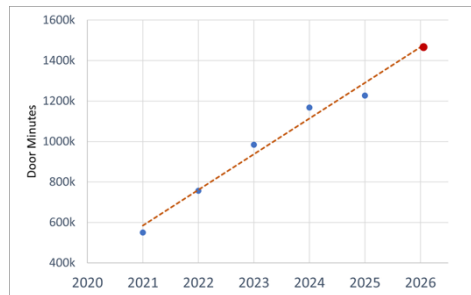
DEPOSITION & ETCH



NUFAB's Deposition Bay is suitable for a wide variety of deposition techniques, including both PVD and CVD methods.

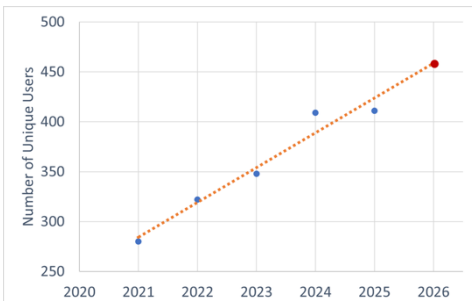
- Automatic Acid Etcher
- Annealing Tube Furnace
Lindberg/Blue M
- Plasma Enhanced Chemical Vapor Deposition-2
STS LpX CVD, Samco-PD220NL
- AJA E-Beam Evaporator
- Thermal Evaporator
Denton Vacuum Explorer 14
- Parylene Coater
- SCS Labcoter2 Parylene Deposition System
- Sputters
AJA Orion Sputter I & II
- Deep Reactive Ion Etcher (DRIE)-2
STS LpX Pegasus, Samco-400IPB
- Reactive Ion Etcher (RIE)
Samco RIE-10NR
- Xenon Difluoride Etcher
Xactix
- Rapid Thermal Processor (RTP)
AW-610
- P/N Doping Furnaces
- Tystar Low Pressure CVD
- Critical Point Dryer
Tousimis Automegasamdri – 915B, Series C

CLEANROOM USAGE



Extrapolated (red dot) for 2026, it will reach 1440K minutes (24,000 hours)

NUMBER OF USERS



The number of unique users has been increasing by ~50 every year since COVID



Dr. Andrew Ott
Director of Core Facilities
Faculty Director
NUFAB



Dr. Nasir Basit
Managing Director



Dr. Ying Jia
Equipment Manager



Dr. Serkan Butun
Equipment Manager



Dr. Shaoning Lu
Equipment Manager



Dr. Anil Dhote
Equipment Manager



Diego Santiago De La Vega
Equipment Engineer

NUFAB New Additions

LPKF protoLaser R4

- Laser wavelength: 515 nm
- Max. laser power: 8 W
- Laser pulse frequency: 50 – 500 kHz
- Diameter of focused laser beam: $15 \pm 2 \mu\text{m}$ ($0.59 \pm 0.08 \text{ mil}$)
- Structuring speed: 5.5 cm²/min (0.9 in²/min) on laminated substrates 18 μm Cu
- Laser pulse length: 1.5 ps



JEOL 4700F FIB-SEM



- High resolution SEM 1.6 nm at 1 kV
- High resolution FIB 4 nm at 30 kV
- Up to 90 nA large ion probe current
- Vector scan system
- 3 deposition cartridges (C, W and Pt)
- Oxford Symmetry EBSD Detector
- Oxford Ultimex EDS detector
- In-situ lift-out system (Omniprobe 400)

DIMATIX Materials Printer



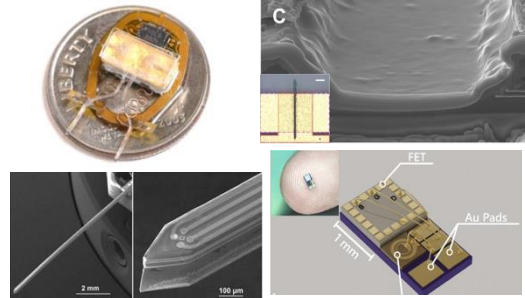
Direct ink-jet material deposition on various substrates, Position accuracy: 25 μm

ULVAC NLD Exa-570 Oxide Etcher

- Neutral network DRIE for SiO₂ and LiNbO₃ etch;
- Blanket SiO₂ etch rate >500nm/min



Research at NUFAB



Upper left: Optofluidic micro-systems for optogenetics and photopharmacology
Rogers Group, Northwestern

Lower left: Brain-Implantable multifunctional probe for simultaneous detection of glutamate and GABA neurotransmitters, N. Moldovan, Alcorix Co

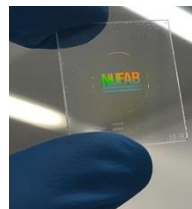
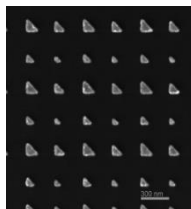
Upper right: Ambipolar inverters based on cofacial vertical organic electrochemical transistor pairs for biosignal amplification – Rivney Group, Northwestern

Lower right: A 3 pJ/bit free space optical interlink platform for self-powered sensing and opto-spintronic RF-to-optical transduction- Mohseni Group, Northwestern

Electron Beam Lithography

Raith Voyager 100

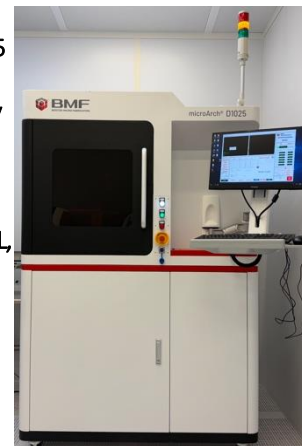
- <10 nm structures
- cm scale exposure
- High speed pattern generator
- 50 kV



nano-medicine, photonics, telecommunication, semiconductors, material science and more...

BMF 3D Printer

MicroArch D1025
Micro Stereolithography
High resolution 10 μm
UV405nm
Resins include HTL, BIO



TPT HB100 Automatic Wirebonder



- Capable of Ball, Wedge, Bump & Ribbon bonding, SKU HB100
- Capable of Bonding Gold, Silver, Aluminum, & Copper Wire
- Motorized X- Y- Z-Axis & Rotatable Bondhead
- 90mm X- & Y-Axis Travel / 0.1 μm resolution
- 100mm Z-Axis Travel / 0.5 μm Resolution

- A real Office of Research survey comment: **Definitely one of the best fab facilities in the world!**
- Same rate for internal, external academic and non-profit users!