

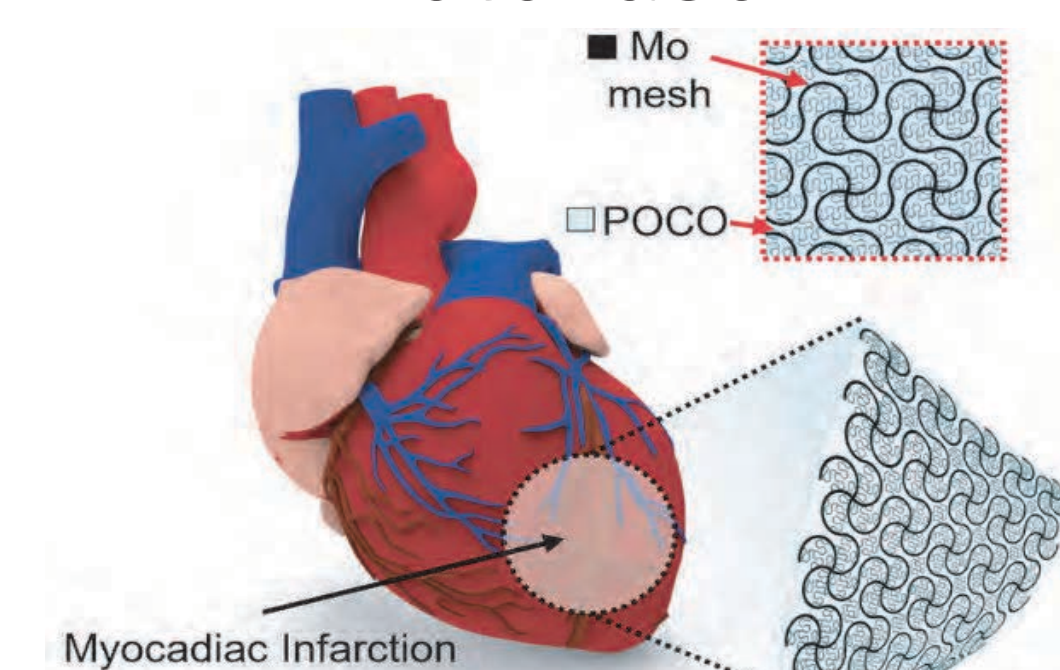
NUFAB Facility

NUFAB NORTHWESTERN UNIVERSITY MICRO/NANO FABRICATION FACILITY

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

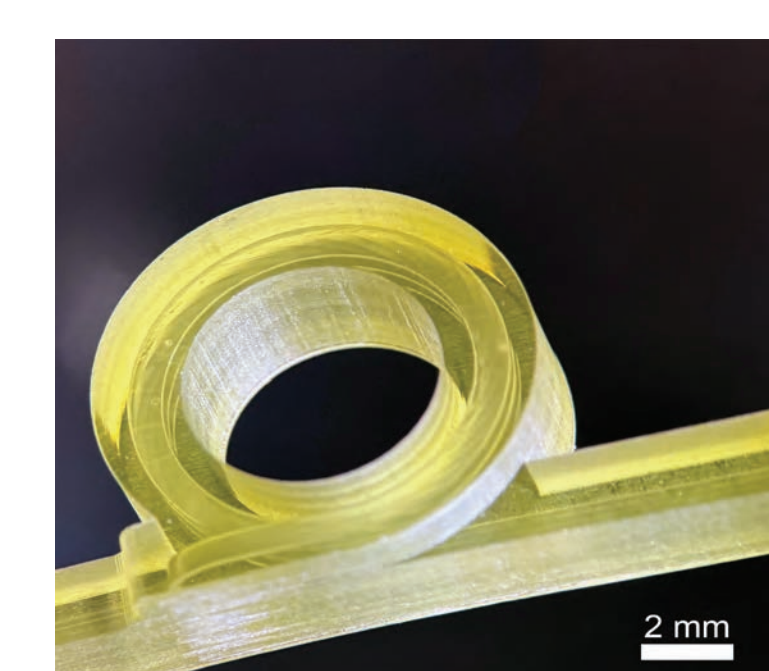
RAPID PROTOTYPING

Laser Cutter LPKF ProtoLaser R4



A bioresorbable, highly conductive, and elastic cardiac patch consists of a highly conductive bioresorbable Molybdenum mesh structure formed in an optimized filamentary serpentine geometry fabricated by LPKF Protolaser R4.

3D Printer BMF microArch D1025



Fully 3D-printed microfluidic separator with a helical channel.

Electronic Printer Fujifilm Dimatix DMP-2850

COOK CLEANROOM

- **F20 Thin-Film Analyzer**
- **Wafer Dicing System**
ADT 7122
- **Wire Bonder-Wedge**
- **AS Micro - RTP System**
- **E-Beam Evaporator**
Auto 306
- **E-Beam Evaporator**
Auto 500
- **Acid Hood**
- **Hall Effect / Resistivity / I-V Measurements System**
HMS 8404
- **Samco - RIE 10NR**
- **ALD - Savannah S100**
- **Photolithography Hood**
- **Mask Aligner - Q4000**
- **Mask Aligner - MABA6**
- **Sputter III - AJA-Niobium**
- **Quantum Deposition System - Plassys**
- **Automatic Wire Bonder**
TPT HB100
- **Oxide Etcher**
ULVAC NLD-570EXa

CHARACTERIZATION

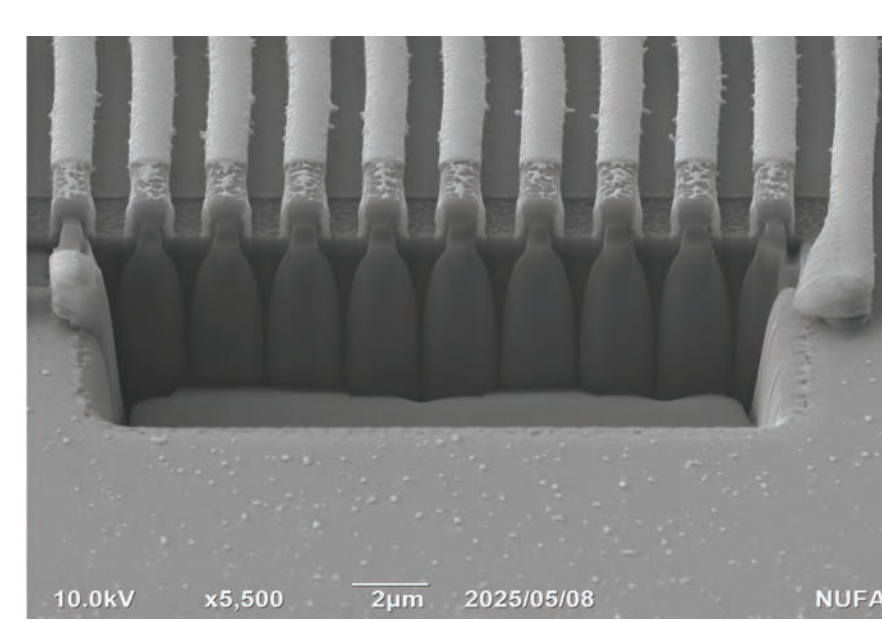


NUFAB's Characterization Bay allows for fine measurement of physical, electrical and optical properties of materials and devices.

- **Fluorescence/DIC Microscope**
Nikon LV150
- **Reflectometer**
Filmetrics F20
- **Stylus Profilometer**
Veeco Dektak-8
- **3D Optical Profilometer**
Zygo
- **IV/CV Probe Station**
- **Ball Bonder and Wedge Bonder**
- **Contact Angle Measurement**
VCA Optima XE
Bioline Attension
Theta Flow
- **Thin Film Stress Measurement**
Toho FLX-2320S
- **Ellipsometer**
J.A. Woollam alpha-SE

SEM with EDS and FIB JEOL JIB-4700F

- Resolution: 1.2 nm at 15.0 kV
- Element detection range:
Be(4) – Am(95)
- Gallium liquid metal ion source



PHOTOLITHOGRAPHY



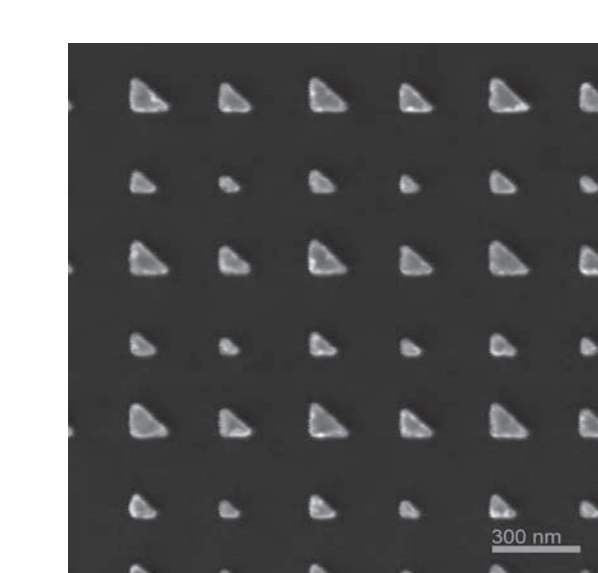
NUFAB's Photolithography Bay is configured for both mask and maskless lithography processes, including single micron scale optical lithography.

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

ELECTRON BEAM LITHOGRAPHY

Raith Voyager 100

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



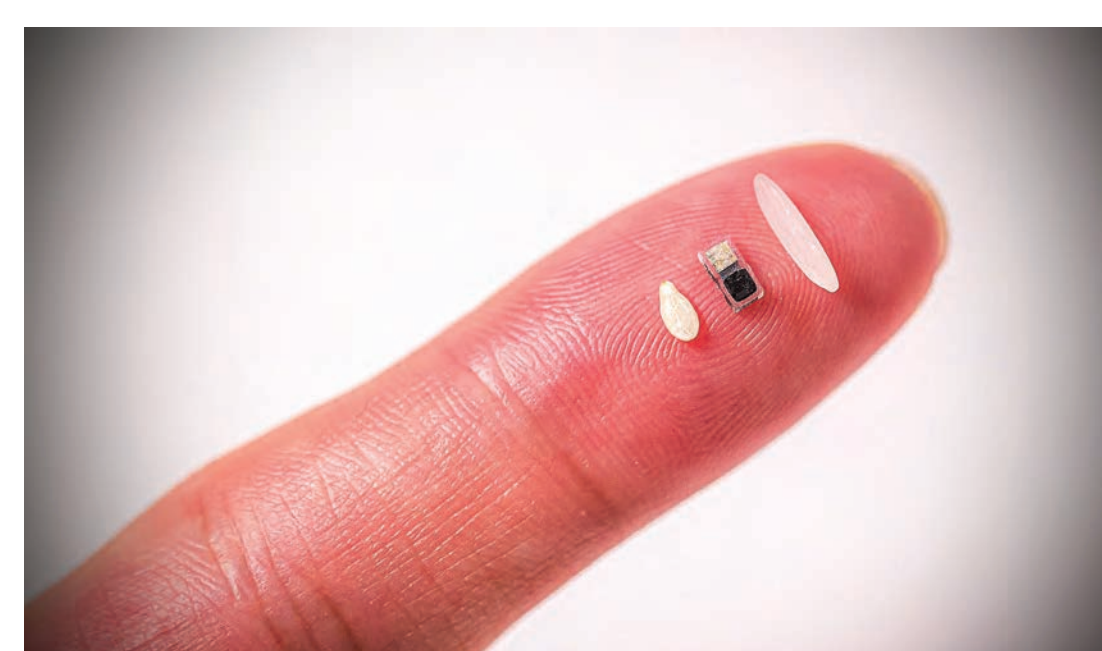
DEPOSITION & ETCH



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**
STS LpX CVD
SAMCO PD-220NL
- **AJA E-Beam Evaporator**
- **Atomic Layer Deposition**
Arradiance GEMStar XT-P
- **Thermal Evaporator**
Denton Vacuum Explorer 14
- **Parylene Coater**
SCS Labcoter2 Parylene Deposition System
- **Sputters**
AJA Orion Sputter I & II
- **Deep Reactive Ion Etcher (DRIE)**
STS LpX Pegasus
SAMCO RIE-400IPB
- **Reactive Ion Etcher (RIE)**
Samco RIE-10NR
- **Xenon Difluoride Etcher**
Xactix
- **Rapid Thermal Processor (RTP)**
AW-610
- **P/N Doping Furnaces**
- **General purpose annealing furnace**
- **Tystar Low Pressure CVD**
- **Critical Point Dryer**
Tousimis Automegasamdri – 915B, Series C
- **Tystar wet/dry oxidation furnace**
- **Plasma Cleaner**
SAMCO PC-300

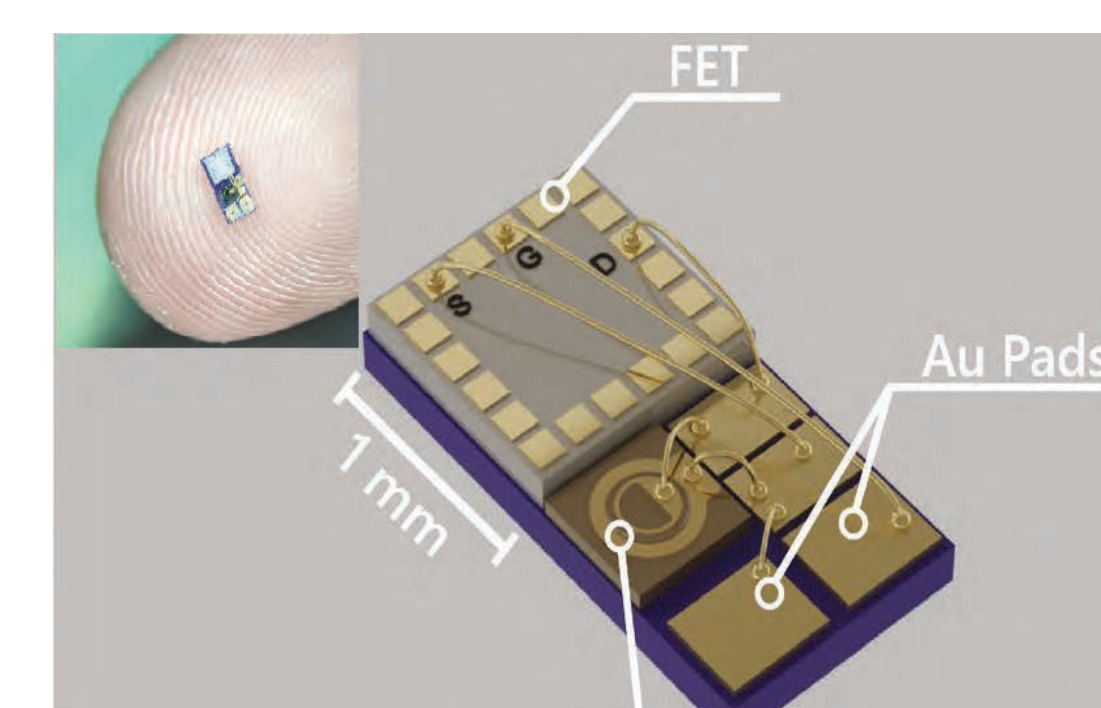
RESEARCH at NUFAB



*This work was partially performed in NUFAB

The Rogers group have developed the world's smallest pacemaker that is activated by light. The pacemaker is so tiny that it can fit inside the tip of a syringe and be non-invasively injected into the body, then dissolves after it's no longer needed.

- Rogers Group, Northwestern



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

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Dr. Nathan Dvorak Postdoctoral Scholar



Dr. Ying Jia Equipment Manager



Dr. Shaoning Lu Equipment Manager



Diego Santiago De La Vega Equipment Engineer

