NANO@STANFORD

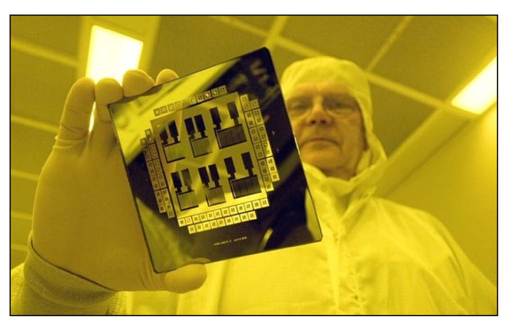
National Nanotechnology Coordinated Infrastructure Site

http://nanolabs.stanford.edu

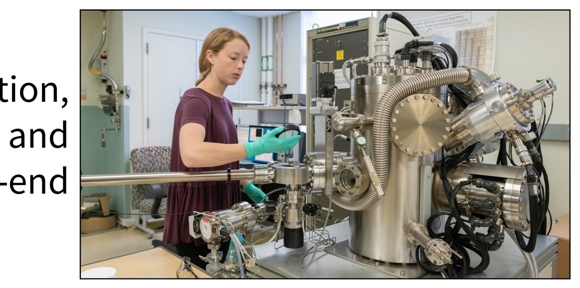
OVERVIEW

The science and technology of the nanoscale is one of the most promising areas in science and engineering today. The ability to create materials and devices at the scale of one-billionth of a meter will have applications in every area of life, from more effective medicines to ultrafast communications and cleaner fuels.

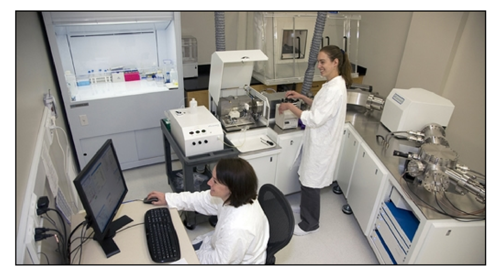
nano@stanford provides access to world-leading facilities and expertise in nanoscale science and engineering for internal users and for external users from academic, industrial, and government labs. Over 1,200 annual users take advantage of a comprehensive array of advanced nanofabrication and nanocharacterization tools available at the nano@stanford site.



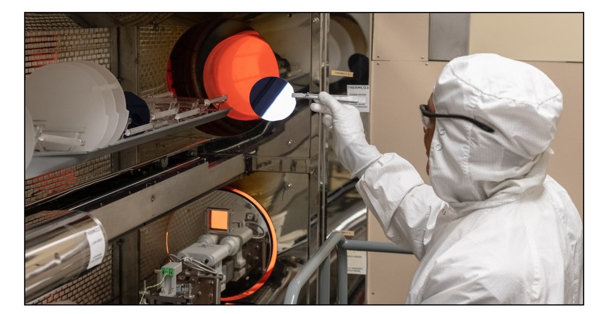
THE LABS



Stanford Nano Shared Facilities (SNSF)
SNSF is comprised of four core facilities: Nanofabrication, Electron & Ion Microscopy, X-Ray & Surface Analysis, and Soft & Hybrid Materials that encompass high-end fabrication and characterization methods.



Stanford ICP-MS/TIMS Facility
The ICPMS/TIMS Facility within Stanford University's School of Earth Sciences is a state-of-the-art facility for the analysis of isotopes and trace elements using mass spectrometry.



Stanford Nanofabrication Facility (SNF)
SNF consists of a 10,000 ft^2 cleanroom equipped to support electronic device fabrication, an MOCVD lab, and an Experimental Fabrication (ExFab) lab for methods beyond silicon electronics.

Stanford Microchemical Analysis Facility (MAF)
MAF is equipped with a state-of-the-art microprobe which measures the elemental compositions of solid samples by detecting the X-rays emitted on excitation by a focused electron beam.

EDUCATION & OUTREACH

Education and outreach is an integral part of the nanofacilities. We support the education of students, educators, and researchers through tours, professional development programs, online educational materials, and outreach programs serving the local communities and beyond.

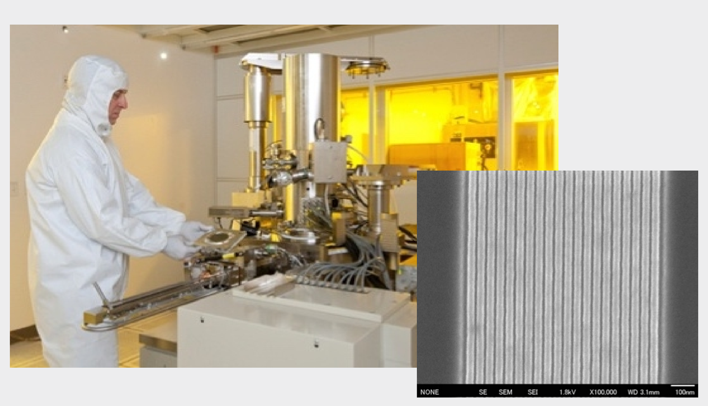




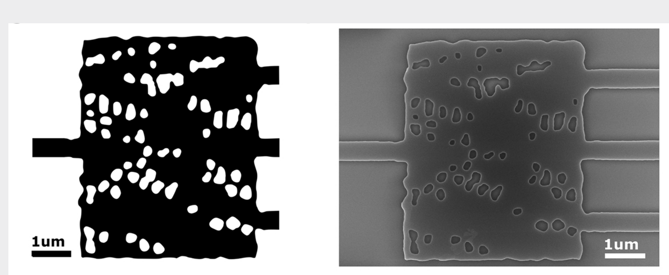

RESEARCH

nano@stanford supports a broad research portfolio spanning traditional nano-related areas as well as life science, medicine, and earth and environmental science.

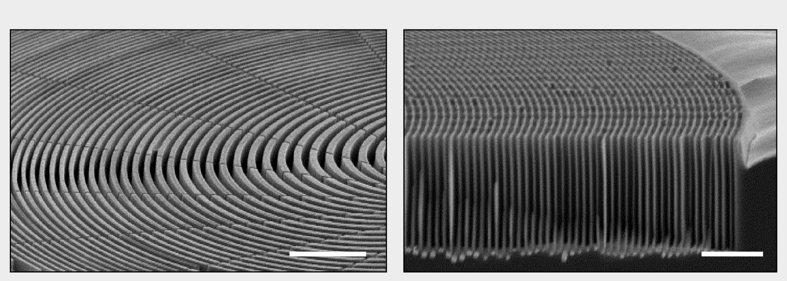
Optics



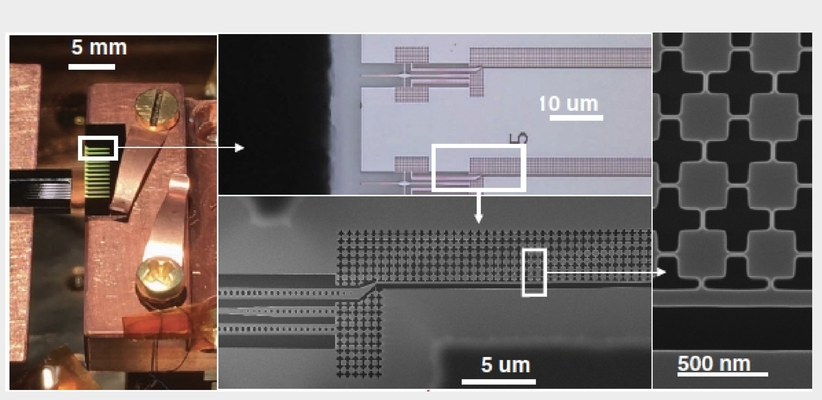
100 kV JEOL e-beam, 40 nm grating with ~ 8 nm lines. Low voltage SEM image of polymer resist. (Image by Linda Cicero, Stanford).



Design (left) and fabrication of a three-channel wavelength demultiplexer with 40 nm spacing. Right, SEM image of device. Total footprint is 5.5 µm x 4.5 µm.
Prof. Vučković
DOI: 10.1021/acsphotonics.7b00987

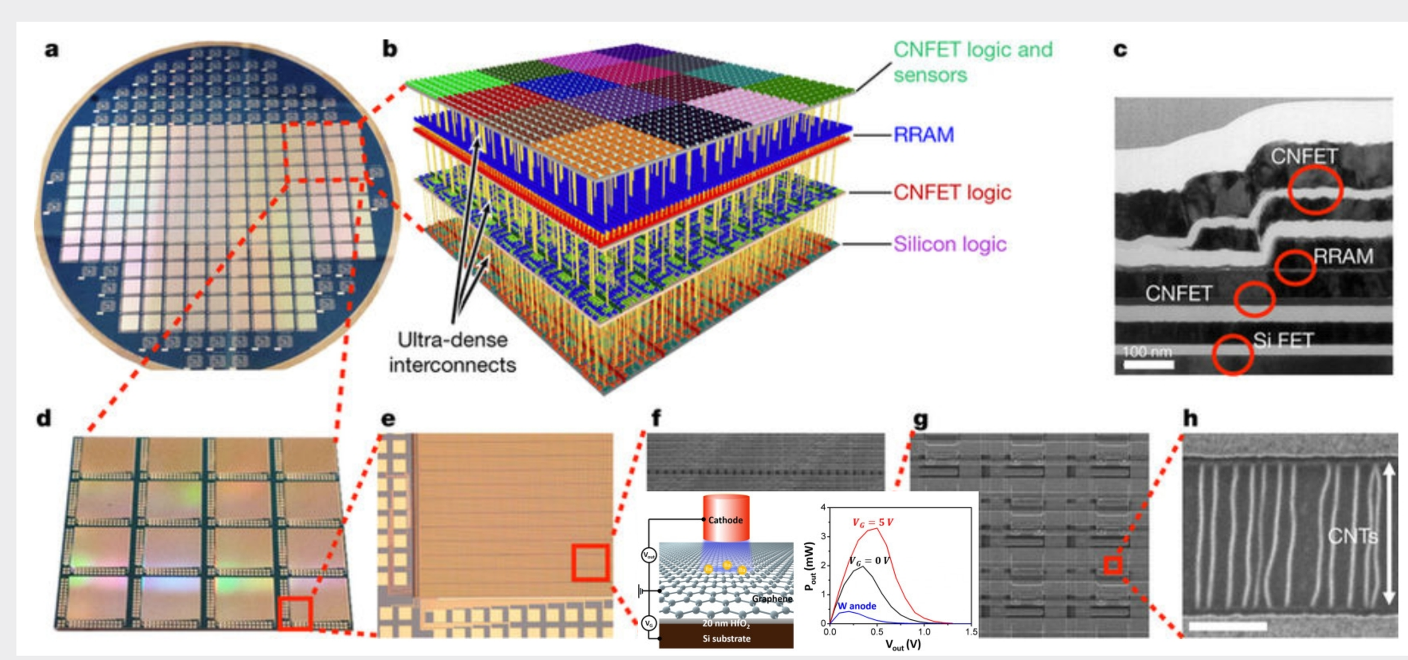


High aspect ratio zone plates for hard X-ray diffractive optics. The outermost widths of the zone plate are 100 nm. Scale bar is 2 µm.
Sakdinawat Group (SLAC)
DOI: 10.1038/ncomms5243

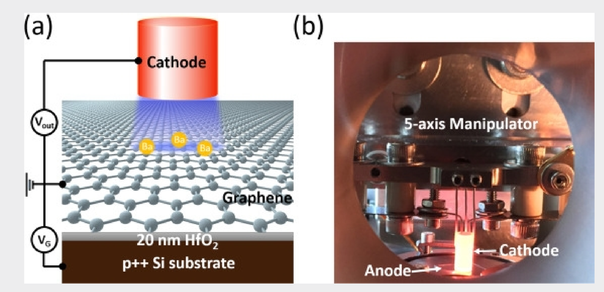


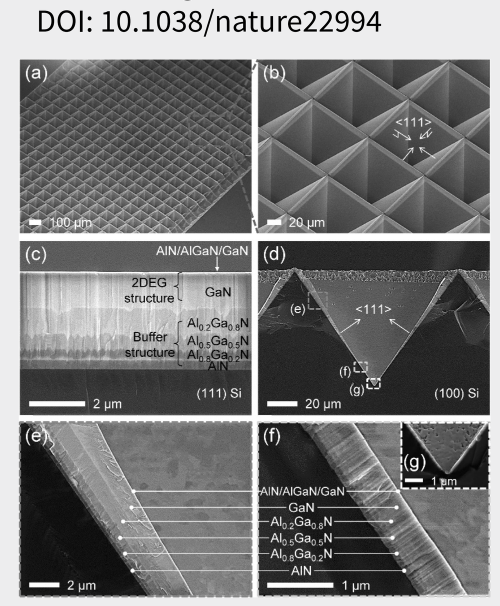
Design and experimental demonstration of wires for phonons by patterning the surface of a silicon chip. The phononic wire enables new ways to manipulate information and energy on a chip. The cryostat setup, a laser confocal image of the device, and two SEM images.
Prof. Safavi-Naeini
DOI: 10.1103/PhysRevLett.121.040501

Novel Devices



Three-dimensional (3D) nanosystems approach is based on the Nano-Engineered Computing Systems Technology approach. The specific technologies focuses on energy-efficient digital logic using carbon nanotube field-effect transistors (CNFETs).
Profs. Wong, Howe, Saraswat, and Mitra
DOI: 10.1038/nature22994

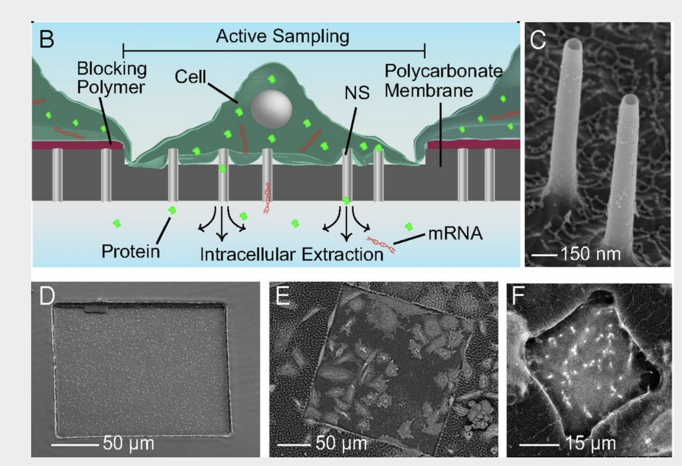




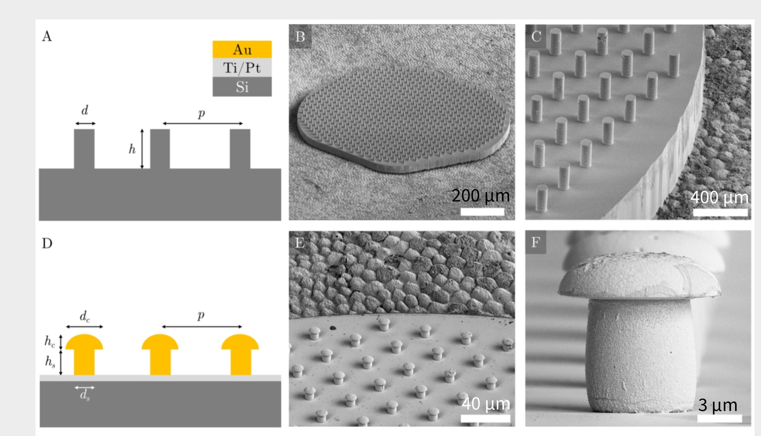
Top: Prototype of a thermionic energy converter with a back-gated graphene anode is demonstrated, showing 67% enhancement to the efficiency.
Profs. Howe and Melosh
DOI: 10.1016/j.nanoen.2016.12.027

Left: AlGaN/GaN heterojunction grown on 3D Si substrate using MOCVD for realize low-power and reliable power electronics.
Prof. Senesky
DOI: 10.1063/1.4939509

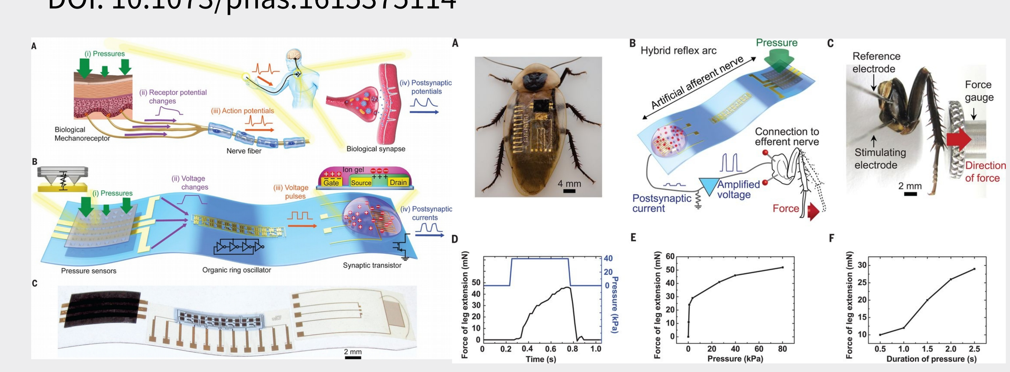
Biological & Medical Applications



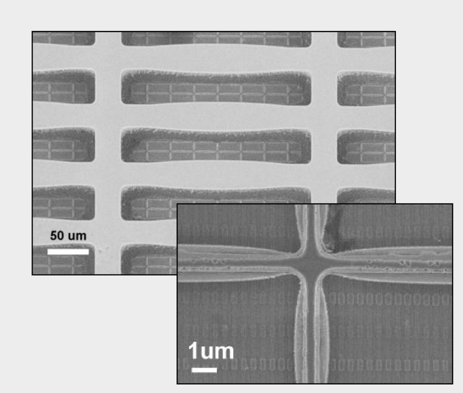
Nondestructive cell content analysis of proteins and mRNA through 150 nm diameter nanostraws.
Profs. Santiago, Wu, Melosh
DOI: 10.1073/pnas.1615375114

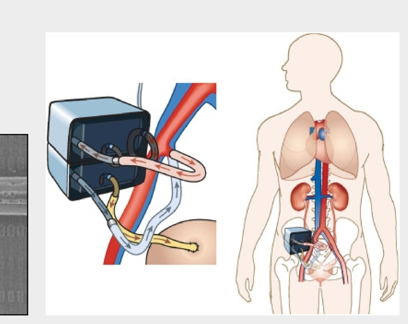


Optimization of pillar electrodes in subretinal prosthesis for enhanced proximity to target neurons. Fabrication and tissue integration testing.
Prof. Palanker
DOI: 10.1088/1741-2552/aaac39



Design and fabrication of flexible organic electronics to mimic the functions of a sensory nerve. Potential applications in neurorobotics and neuroprosthetics.
Prof. Bao
DOI: 10.1126/science.aao0098





Fabrication of nanoporous membrane similar to the structure of kidney tissue for an implantable bio-artificial kidney.
Prof. Roy (UCSF)
DOI: 10.1016/j.memsci.2017.04.030

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nano@stanford is supported by the National Science Foundation as part of the National Nanotechnology Coordinated Infrastructure under award ECCS-1542152.

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