NNCI Director Meeting:
San Diego Nanotechnology Infrastructure (SDNI)

http://sdni.ucsd.edu

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Vision

1. Provide infrastructure that enables and facilitates transformative research and education, with emphasis in the areas of ***NanoBioMedicine, NanoPhotonics****, and* ***NanoMagnetism***.

2. Integration of UCSD nanotechnology resources, management and operation into the ***national network***.

3. Accelerate the ***translation*** of discoveries and new nanotechnologies to the ***marketplace***, thus increasing economic growths, competitiveness, and high-quality jobs for the nation.

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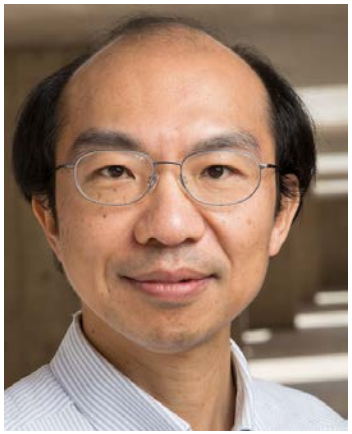
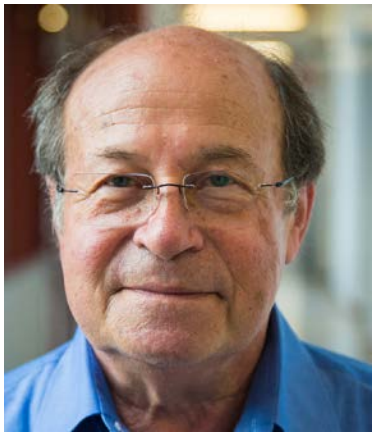
SDNI Management Team



Director



Deputy Director

Asso. Director
Operation

Asso. Director
Education/Outreach

Thrust Leader
(Nanomagnetics)

Thrust Leader
(Nanobiomedicine)

Coordinator
Education/Outreach

Business
Development

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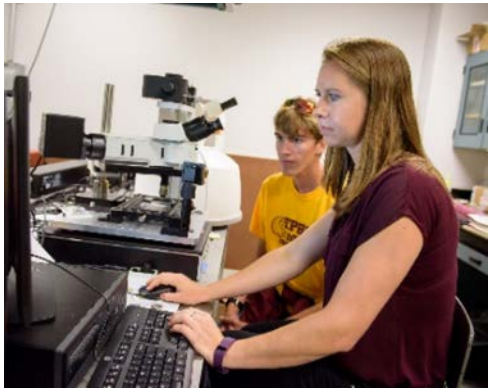
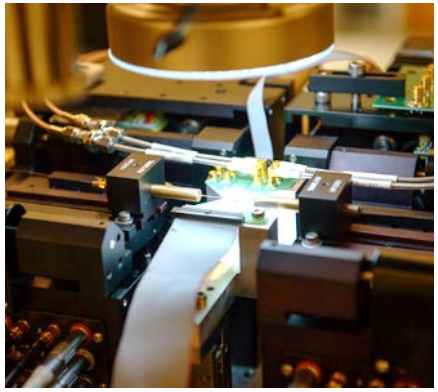
SDNI Operation

1) Nano3 (“Science, Engineering, Medicine”) (Primary Facility) (Fruhberger)
   Nano/micro-fabrication and materials characterization/analysis.
2) Chip-scale Photonics Testing Facility (Fainman)
   Unique tools for measurements of the electrical/optical response of photonic devices
3) In Transition: Magnetic Device Modelling/Processing/Test facilities (CMRR). (Fullerton)
   Magnetic characterization and high-performance modeling of magnetic devices. Received major industrial donations of tools.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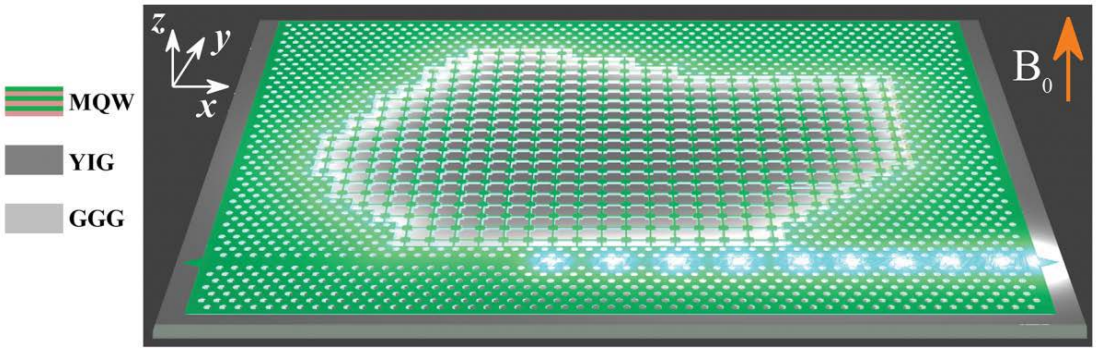
Fueling Scientific Breakthrough

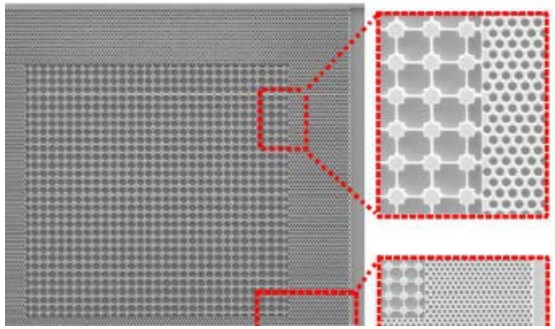
Nonreciprocal lasing in topological cavities of arbitrary geometries

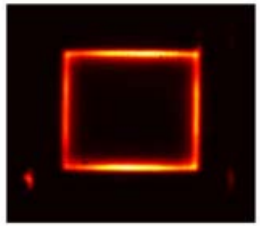
Feature article: Science, Oct. 12, 2017

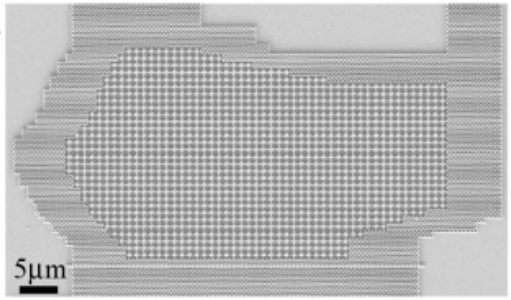


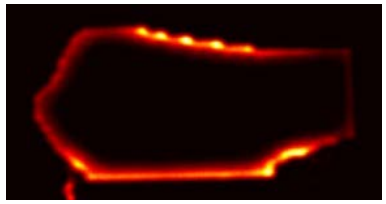
Prof. Boubacar Kante

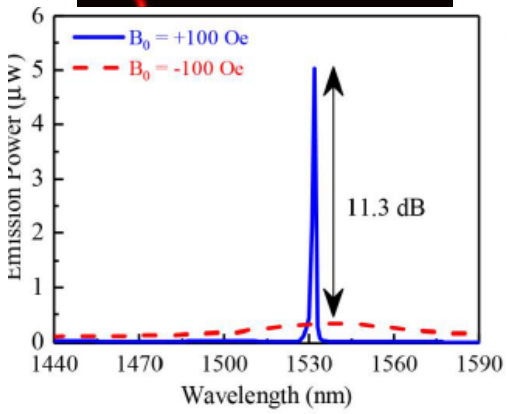
Arbitrarily-shaped and integrated topological











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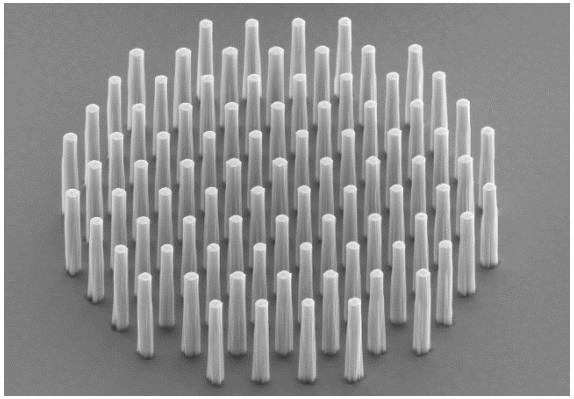
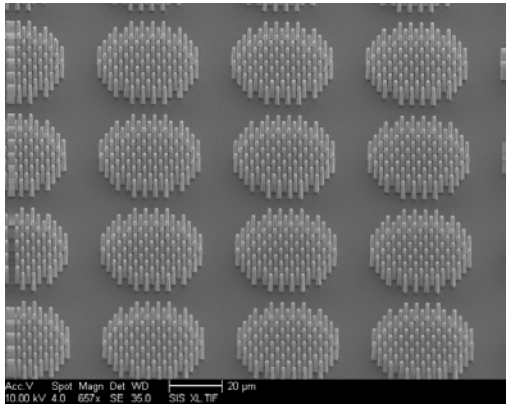
Translation of Nanotechnology to Improve Human Health

nanovision

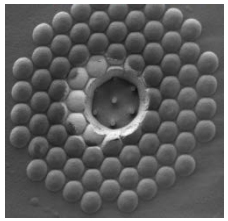
Use Semiconductor Nanowire Retinal Prosthesis to restore human vision

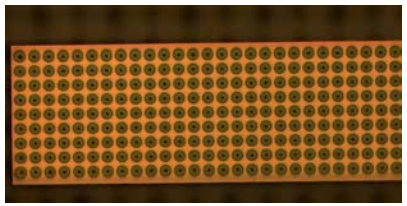




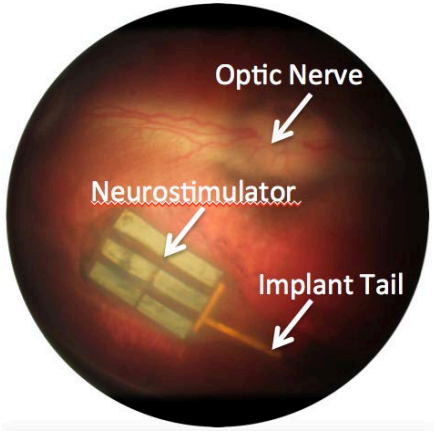
Semiconductor nanowire detectors for neural stimulation

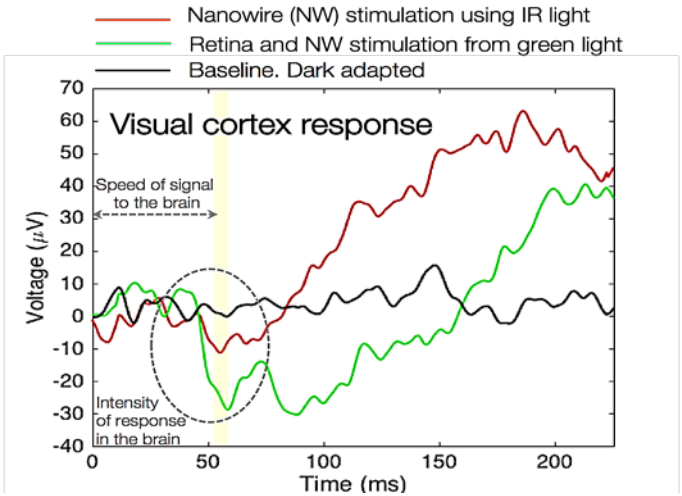
Surgical implant to animal





Nanowire array detectors for subretinal implant





Visual Evoked Potential (VEP) signal

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Redefining Traditional Users

Traditional users before 2015 (pre-NNCI): Any fields/industries using the functionality and unique properties of ***nanoscale materials or structures*** that are formed by ***engineering processes***.

Users by sectors: semiconductor, electronics, MEMS, sensors, storage, photonics, magnetics, energy, subfields of biotechniques (e.g. genomics, drug delivery, tissue engineering), novel materials (2D materials, metamaterials, etc.).

Expanding the definition of "Traditional users" today:

1. Users that use tools to investigate natural or synthetic nanostructures (e.g. microscopy for single molecules) and fields that reach the stage to benefit nanotechnologies (e.g. neural sciences and engineering, medical devices, nanorobots, swarm robots, etc.)

2. Users that do ***not*** intend to use the facilities physically, but want to take advantage of the features of nanotechnologies (i.e. contracted services, outsourced users). This is the fastest growing area of "users". They can be in almost any areas (e.g. tool developers, chemical developers, medicine, food processing, etc.)

Education and Outreach

Introduce nanotechnologies to K-12, minorities, and STEM activities: *52 Weeks of Science Program*
(Reach over 1000 K-12 students)

Research Experiences for Undergraduates (REU)

- Support 12 REU students (70% women and minority) across the country to conduct 10 week nanotechnology research mentored by professors and gradate students.
- Organize summer research conference.

Research Experiences for Teachers (RET)

- Support 3 high school science teachers to develop science curricula and hands-on labs each year. The developed curricula met the Next Generation Science Standards (NGSS) and will be delivered to thousands of high school students.

Remote electron microscopy courses to high school science classes

- We started the pilot program of offering remote SEM lab sessions and "***remote hands-on***" experiment to high school science classes.

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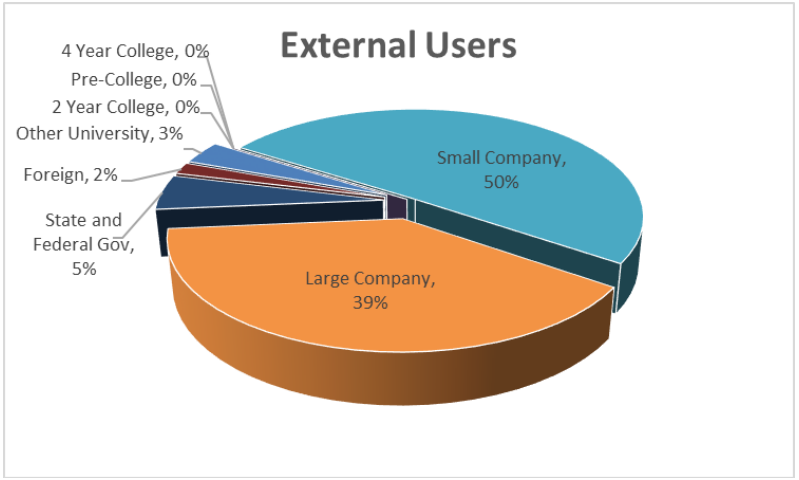
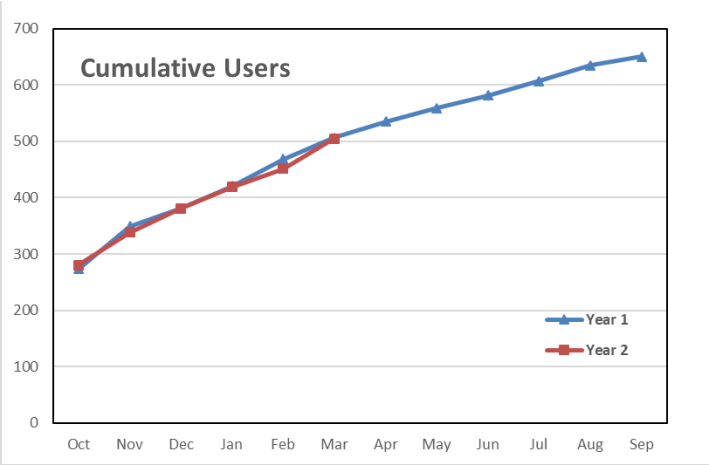
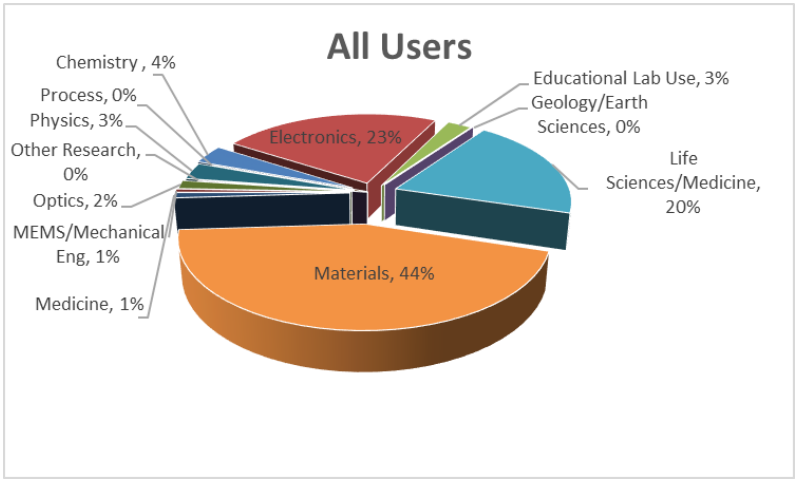
Site User Data: SDNI

Yearly User Data Comparison		
	Year 1(12 months)	Year 2 (6 months)
Total Users	650	282
Internal Users	495	232
External Users	155 (24%)	50 (18%)
Total Hours	47,893	22,895
Internal Hours	40,890	17,738
External Hours	7,003 (15%)	5,157 (23%)
Average Monthly Users	290	282
Average External Monthly Users	49 (17%)	50 (18%)
New Users	183	111
New External Users	35 (19%)	22 (20%)







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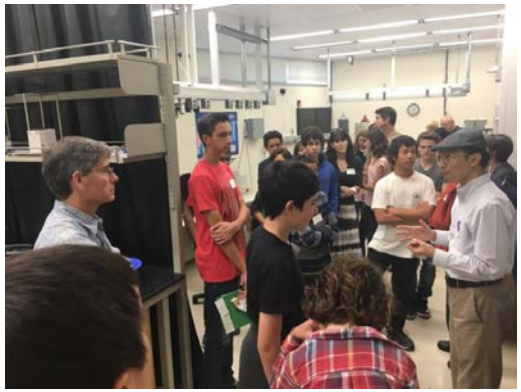
Summary of Annual Growth

- 5% increase in on-site user hours (50,343 hrs).
- >100% growth for "remote" use via direct services (173 remote users).
- ~40% increase in small company users (34 small companies, 7144 hours) (14% decrease in large company users, 17 large companies, 3728 hours).
- >300% increase in usage hours by small companies (~4% increase in usage hours for large companies).
- ~45% increase in hourly utilization for life sciences.
- 30% increase in total revenue ($2.6M user fees).
- 15% increase in users trained (210 new users trained).

Community Outreach

52 Weeks of Sciences
Envision Outreach
UCSD Enspire Middle School Outreach
Comienza Con un Sueno (STEM for Hispanic Families)
COSMOS
Talented Youth Program with Johns Hopkins
Science at Barrio Logan



Early Academic Outreach Program
Society of Women Engineers
San Diego Hispanic Society

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