

# NCI-SW Site Overview

The Nanotechnology Collaborative Infrastructure Southwest (NCI-SW) comprises six research facilities at ASU, in partnership with Science Foundation Arizona and Maricopa County Community College District

- ASU NanoFab
- Eyring Materials Center
- User Facility for the Social and Ethical Implications of Nanotechnology
- Center for the Lifecycle of Nanomaterials in the Environment
- Peptide Array Core Facility
- Solar Power Lab

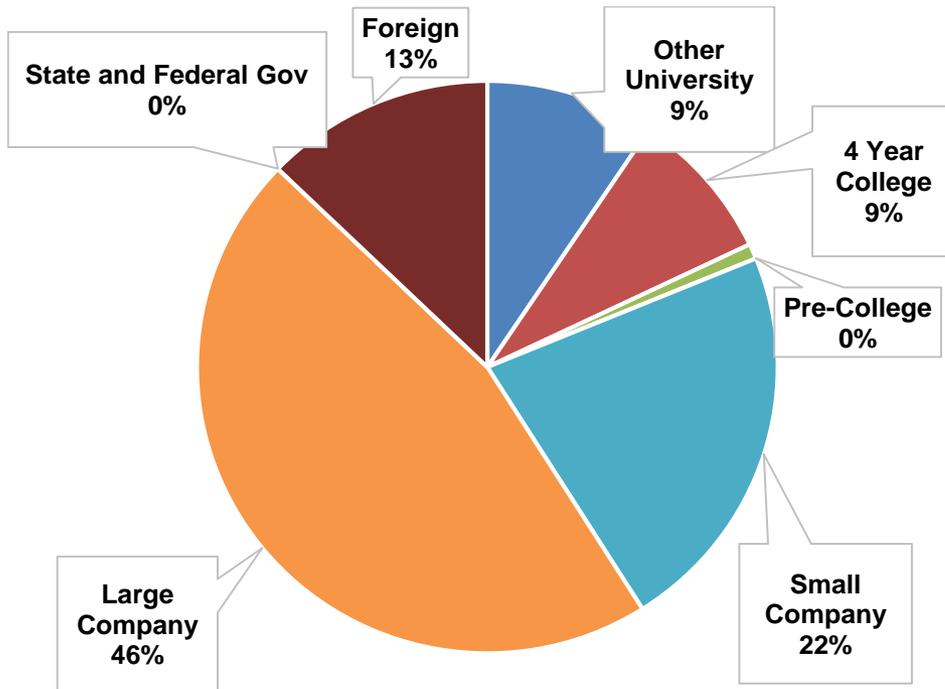


# NCI-SW User Data

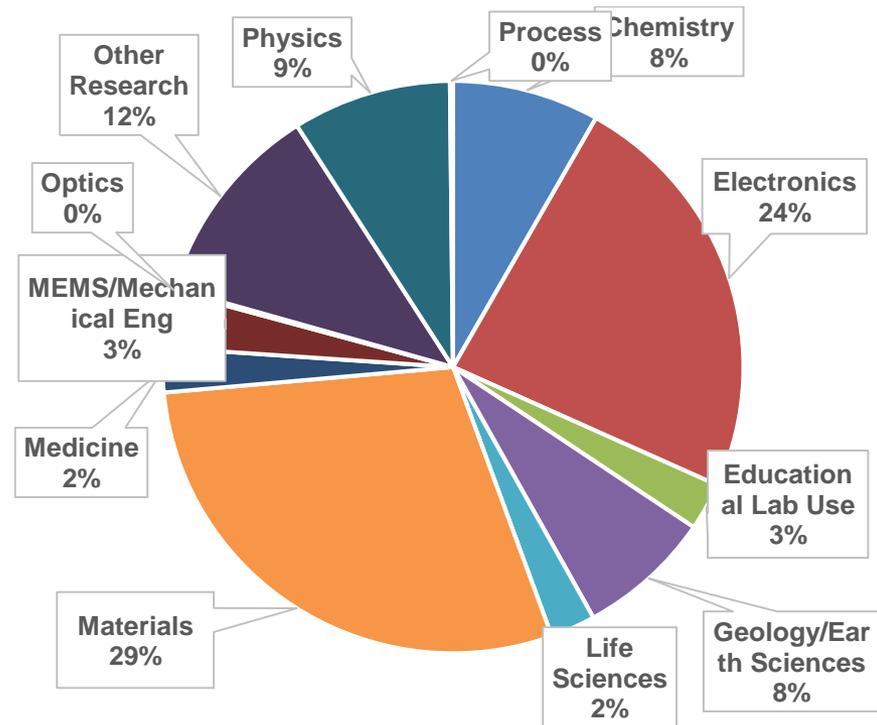
Yearly User Data Comparison			
	Year 1	Year 2	Year 3 (6 months)
<b>Total Users</b>	705	810	598
<b>Internal Users</b>	536	600	481
<b>External Users</b>	169 (24%)	210 (26%)	117 (20%)
<b>External Academic</b>	48	65	22
<b>External Industry</b>	107	132	80
<b>External Government</b>	9	3	0
<b>External Foreign</b>	5	10	15
<b>Total Hours</b>	43,098	49,370	20,681
<b>Internal Hours</b>	32,883	38,270	17,500
<b>External Hours</b>	10,215 (24%)	11,100 (22%)	3,181 (15%)
<b>Average Monthly Users</b>	271	313	283
<b>Average Ext. Monthly Users</b>	43 (16%)	49 (16%)	46 (16%)
<b>New Users Trained</b>	275	333	198
<b>New External Users Trained</b>	47 (17%)	53 (16%)	29 (15%)

# NCI-SW User Data

## External User Affiliations



## All User Disciplines



# Facility Upgrades and New Tool Capabilities

- \$483k investment from ASU Office of Knowledge Enterprise and Development for purchase of workhorse tools



Semicore sputter  
deposition tool



Woollam Ellipsometer

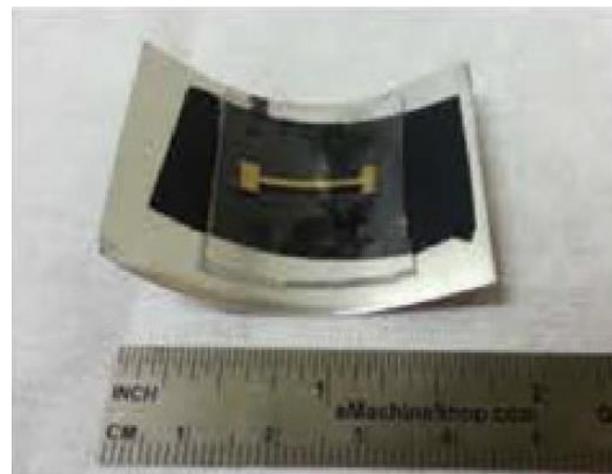
- Dan Thompson was recently hired to coordinate the sales and marketing of the EMC and NanoFab to external users.

# Research Highlights

## “Elastically Stretchable Metal Conductors for Sensor Applications”

Oliver Graudejus, BioMedical Sustainable Elastic Electronic Devices LLC,  
Tempe, AZ

Microcracked gold films on elastomeric substrates can function as stretchable and deformable interconnects and sensors. This research examines the change in resistance upon bending of a microcracked conductor and compares the results with stretching such a conductor. The resistance depends on the strain in the film. These results provide guidance for the design of interconnects for flexible and stretchable electronics and sensors.



*A bent microcracked gold conductor under moderate compression*

*Applied Physics Lett., vol. 110, pp. 221906-1 to 3 (2017)*

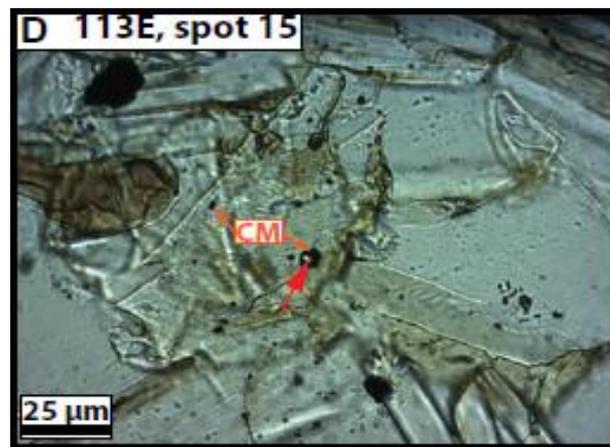
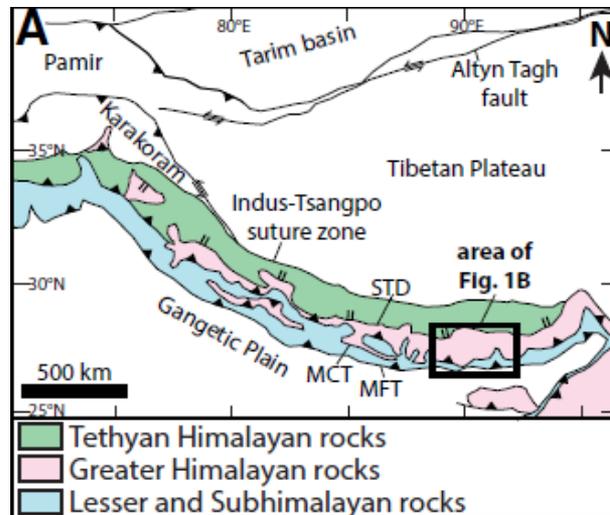
# Research Highlights

## “Using Raman Spectroscopy to Study Shear and Flattening in Himalayan Rocks”

Sean Long, Washington State University,  
and Stacia Gordon, University of Nevada

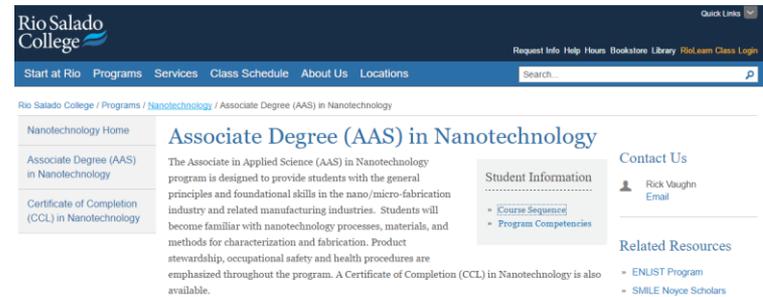
Raman spectroscopy of micron-scale carbonaceous material in metamorphic rocks from the South Tibetan Himalayas shows that the peak temperatures decrease from 600 - 700°C to 400 - 500°C moving upwards through an 11km thick structural transect. This trend of gradual, upward cooling is in contradiction to current tectonic models for the formation of the Himalayas.

*Lithosphere, vol. 9 pp. 774 - 795 (2017)*



# Education & Outreach Activities

- Hosting advanced laboratory curriculum for the 2-year AAS degree in Nanotechnology from Rio Salado College
- The AAS degree is being aggressively marketed by RSC with professional on-line YouTube videos
- 22 students enrolled since April 2017 and **3 have graduated** and are applying for jobs at Nanoscience Instruments, Medtronic and Lawrence Livermore



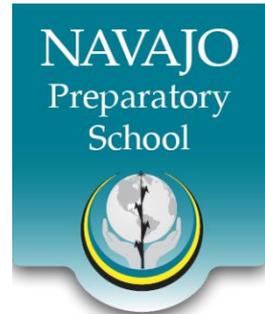
# Education & Outreach Activities



Nathan Tohtsoni



A MARICOPA COMMUNITY COLLEGE



# Impact of Education & Outreach Activities

- REU and RET Programs
- Intro. to Nanotechnology Workshop for grade school and CC faculty
- Webinar Series and Newsletter
- Remote Access to SEM (RAIN)

*A visitor to Geeks' Night Out operating the remote scanning electron microscope*



NCI-SW 2017-2018 E&O Events		
	Participants	%
K-12 Students	160	14%
Nanotechnology Workshop	15	1%
REU Program	4	< 1%
RET Program	2	< 1%
ASU Open Door	760	67%
Remote Access SEM	120	11%
Webinars	77	7%
<b>Total</b>	<b>1,138</b>	

***As a result of attending this webinar, I anticipate (n=47)***

**Jan, 2018  
Cryo-TEM**

Updating existing or adding new instructional materials in my courses

46%

Creating or suggesting research project or research directions for my students

19%

Suggesting my students watch a recorded version of this webinar

31%

# NNCI Cooperative Network Activities

## Network-Wide

- Dr. Ray Tsui of the NCI-SW is the Chair of the Workforce Development & Community Colleges Working Group (WDCC-WG). Outcomes included:
  - documenting the extent of community college interactions across the NNCI
  - distributing an industry survey developed by ASU and Georgia tech
- Dr Tsui and Dr. Mary White are members of the Evaluation & Assessment Working Group
- Thornton is a member of the Commercialization Committee
- The NCI-SW supported 4 REU students to attend the convocation at RTTN

## Multi-Site

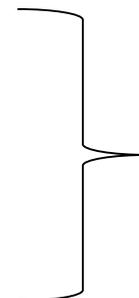
- The NCI-SW led a joint RET Site proposal with SENIC, MINIC, KY MMNIN, NNF. Program goals include:
  - grow a multi-site cohort of educators across the country
  - build upon the library of NNIN educational materials and classroom activities
  - highlight the work of NNCI teachers in a yearly Professional Development Workshop.
  - support participants interested in presenting their research in journals/conferences.
- The NCI-SW LCnano center participated in the NSF workshop focused on nanomaterials in the environment and hosted by NanoEarth. The goal is to prepare a review paper for Science

# SEI Activities

## Local SEI Activities

- The NCI-SW SEI User facility works one-on-one with visiting scholars and facilitates workshops
- Christopher Scott, Associate Director of the Center for Medical Ethics and Health Policy at Baylor College of Medicine worked with the ASU SEI user facility to involve stakeholders in thinking about the future of genome editing
- His visit convinced him of **the importance of the methods developed at ASU and he asked three SEI faculty to be included on an R01 NIH grant**

- Science Outside the Lab
- Winter School on Responsible Innovation and Social Studies of Emerging Technologies.



Breakout Session 2:  
SEI (Jamey Wetmore)  
11:15 Friday 9/14

NanoES 291

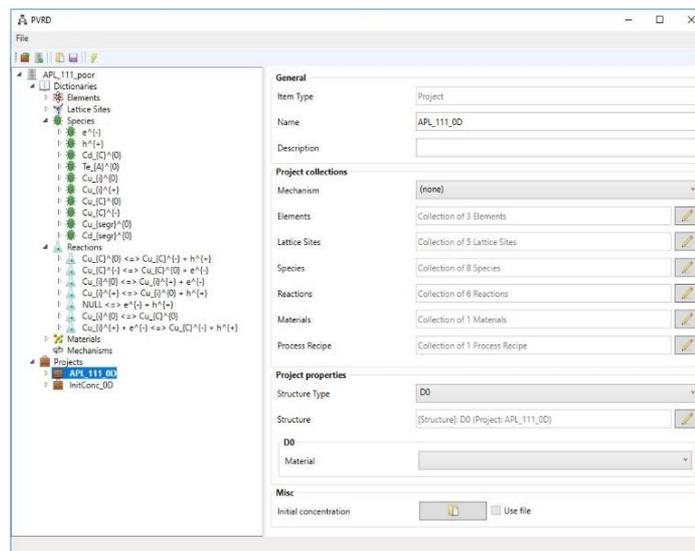
# Computational Activities

- Dragica Vasliqueska directs the computational activities of the NCI-SW and is a long-time contributor to the NCN nanoHUB
- She has tallied 7,150 new simulation users on nanoHUB for CY 2017 and her content material has been accessed by 104,178 users in the last 12 months.
- 2D diffusion-reaction solver for modeling CdTe solar cells, and implemented a graphical user interface (GUI) for the tool that will be deployed on nanoHUB.org
- **A collaboration with First Solar Inc. to understand the anomalous diffusion of copper in thin films of CdHgTe**

“Self-consistent simulation of CdTe solar cells with active defects”

J. Appl. Phys. Vol. 118, 035704 (2015)

DOI: 10.1063/1.4927155



GUI for the user to setup a CdHgTe simulation problem

# Workforce Development

- The Workforce Development & Community Colleges Working Group has communicated via conference calls and emails under the direction of Dr. Ray Tsui.
- A Dropbox site has been established for sites to share their activities, using a common format for record-keeping and documentation.
- The NCI-SW is working with the Greater Phoenix Economic Council to update the industry needs survey and email contact list.
- The updated survey will be shared across all NNCI sites

## 1. Your contact information

Company name \_\_\_\_\_  
Your name \_\_\_\_\_  
Your job title \_\_\_\_\_  
Street address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
Telephone no. \_\_\_\_\_ Email \_\_\_\_\_

**For companies with multiple locations, we are asking facility-level managers to complete this survey just for their facility.**

## 2. How large is your company/facility?

49 or less people       50-499 people       500 or more people

## 3. General information

a) What products/parts/services are provided by your company/facility? In other words, which industry industry segment is your company/facility providing these products/parts/services for? (Check all that apply)

Aerospace/Defense       Agriculture/Food       Automotive