

+ **NCI**
Southwest

Join us for:

Strategies to Build Enrollments in Your Nanotechnology and STEM Programs

The webinar will begin
at 1 PM Eastern time

Hosted by: **ATE**CENTRAL

This Webinar Is Hosted By



ATE Central acts as an information Hub for the National Science
Foundation ATE Grantee Community

atecentral.net/webinars

Introductions



Mike
Lesiecki



Robert Ehrmann
Managing
Director, NACK
Network



Trevor Thornton
Professor,
Director NCI-SW

Presenters



Jared Ashcroft,
Pasadena City
College



Rick Vaughn,
Rio Salado
College



James
Schifley,
CA BOCES

Poll: How is it going?

A. Our Nano and STEM programs are full up, no worries

B. It is a constant challenge to recruit students into our programs

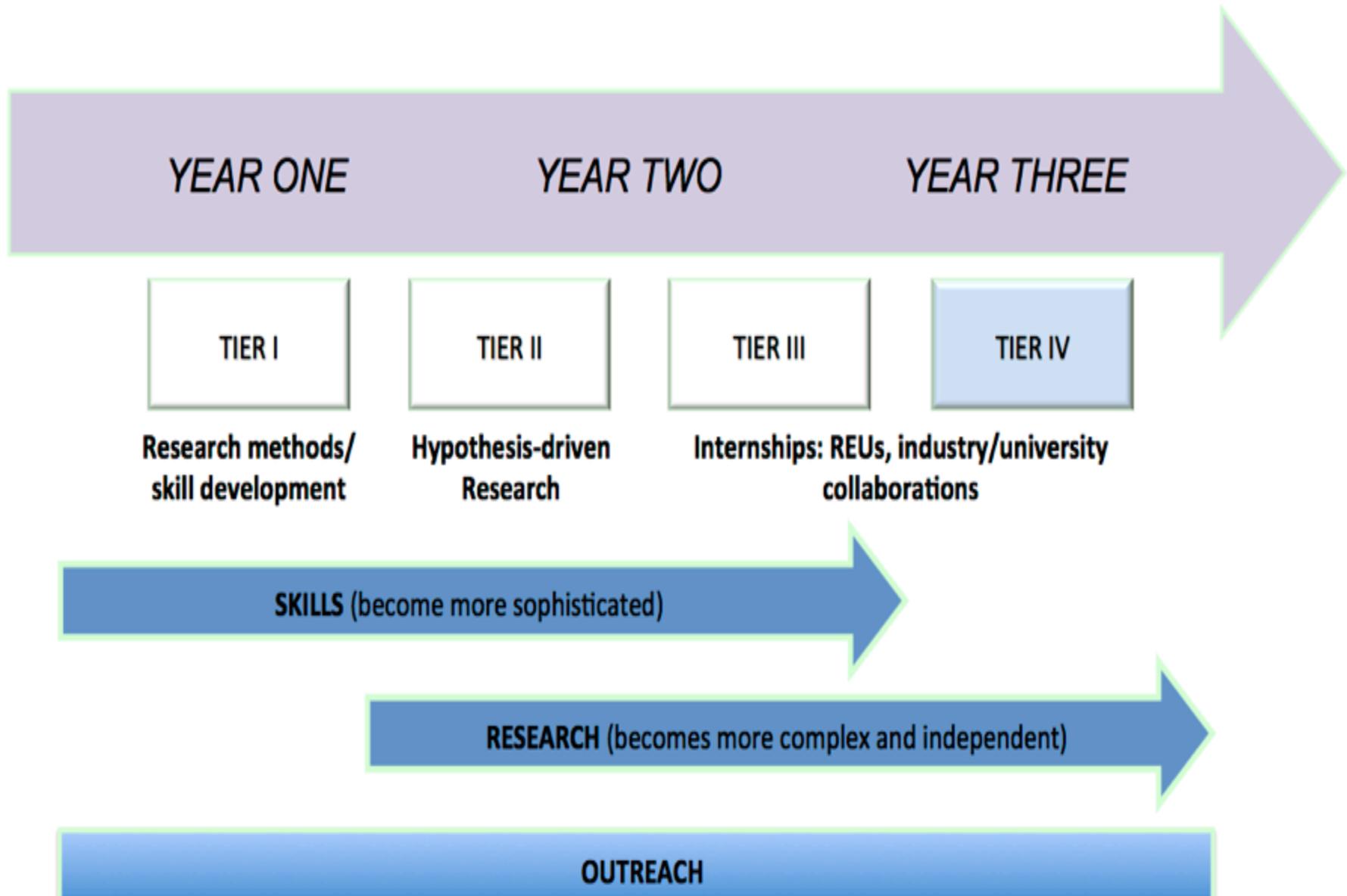
C. I know of a program that closed recently because of lack of enrollments



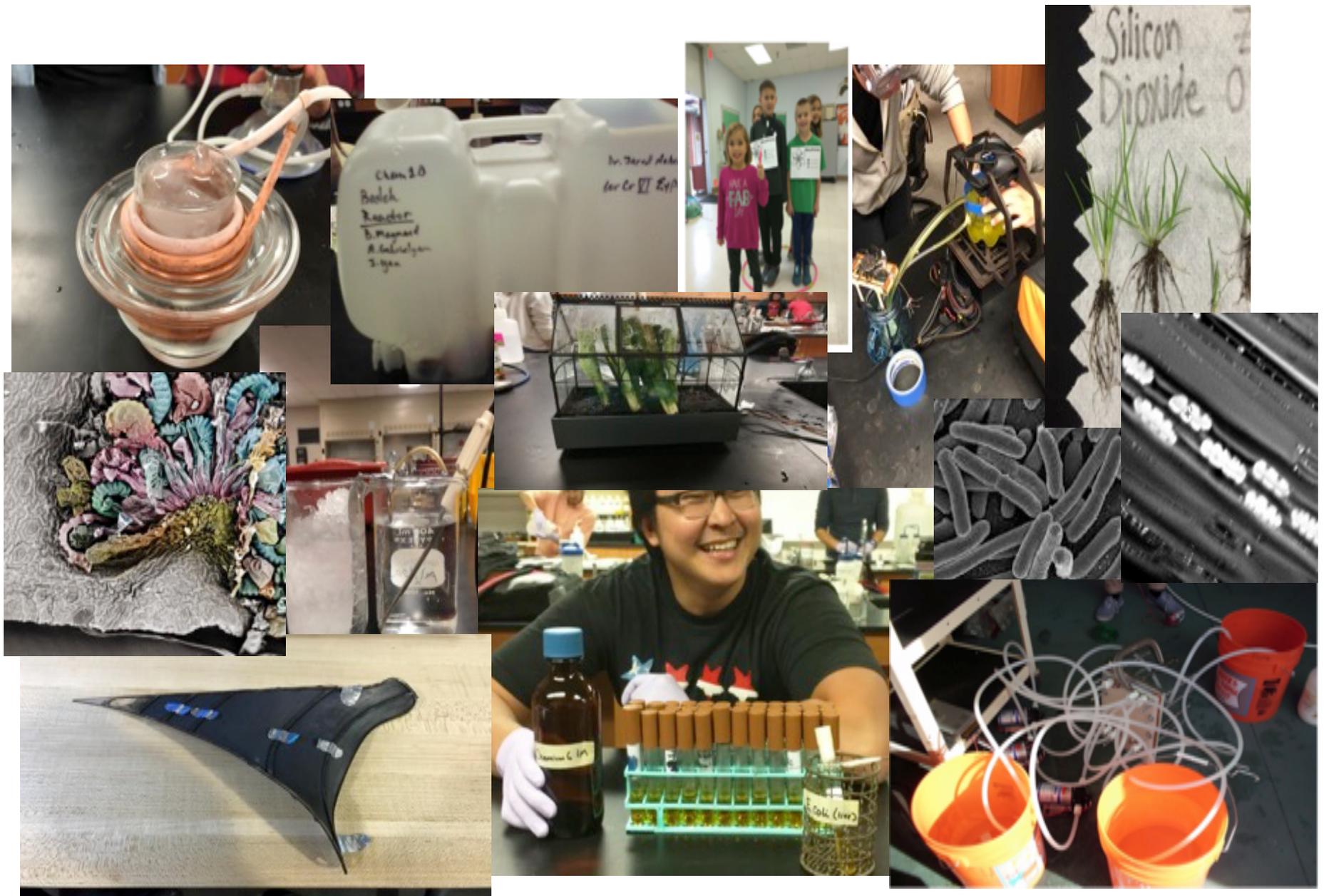
Using Undergraduate Research And Community Partnerships to Increase Student Recruitment in Nanotechnology

Jared Ashcroft

Design of Undergraduate Research Program: a tiered approach



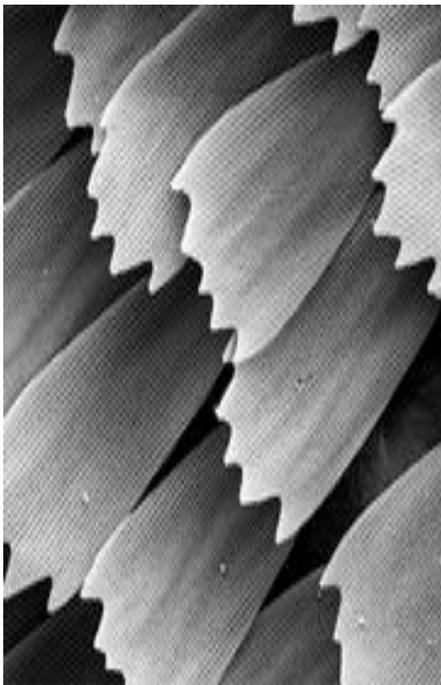
Research in Class



Designing PBL Lab With RAIN

Quantum Lab

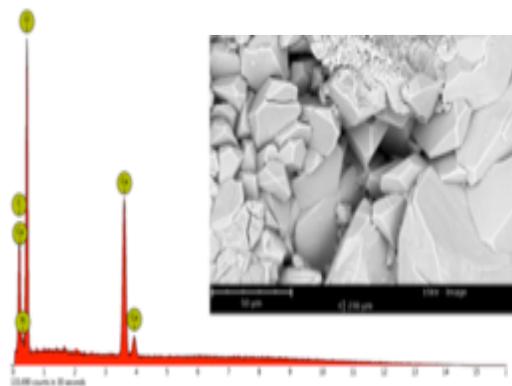
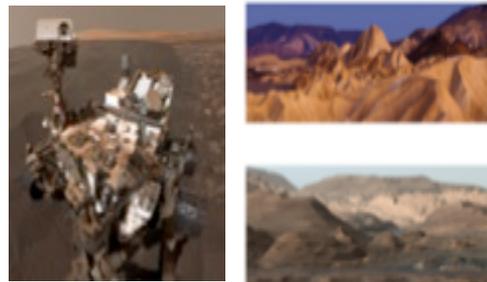
Objective: Gain a sense of scale.



Using Remotely Accessible Microscopy in the Elementary Classroom." *Frontiers in Education Technology*, 1, 2, 137-148, 2018 .

Geology Lab

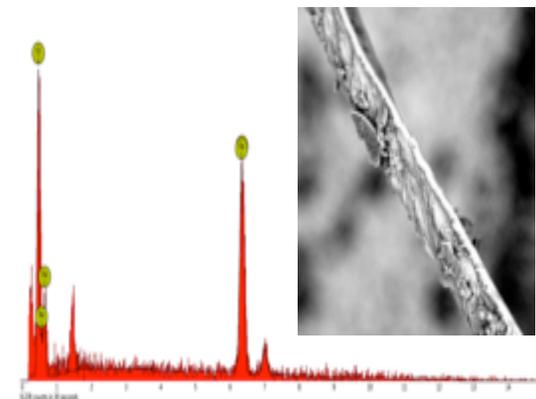
Objective: Identify an unknown mineral.



"Cultivating Mars: A Problem-Based Learning Lab Designing an Oxygen-Rich Environment on the Red Planet." *Journal of Laboratory Chemical Education*. 6, 1, 4-11, 2018.

Oxygen Lab

Objective: Design Mars Habitat

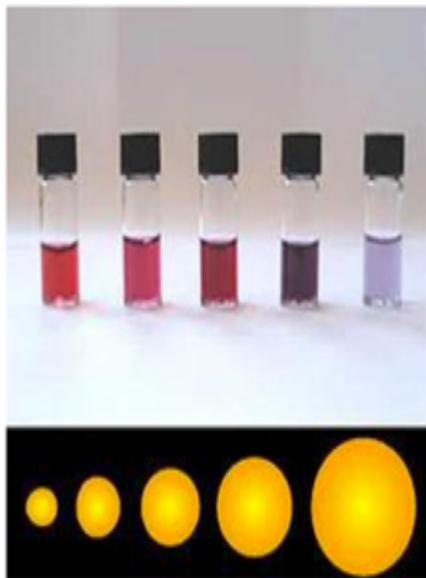


Bridging the Gap Between 'Rocks for Jocks' and the Mars Sample Return Program: Using NASA Resources and Remote Access to Promote Geology. *Science Scope*, 41, 8, 48-57.

RAIN Nano Labs

Gold NP Lab

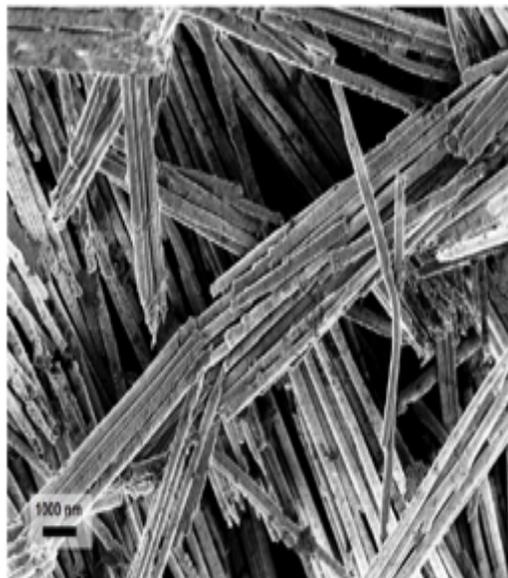
Objective: Synthesize and Characterize Nanoparticles



A.D. McFarland, C.L. Haynes, C.A. Mirkin, R.P. Van Duyne, H.A. Godwin, J. Chem. Educ. 81 (2004) 544A.

Nanowire Labs

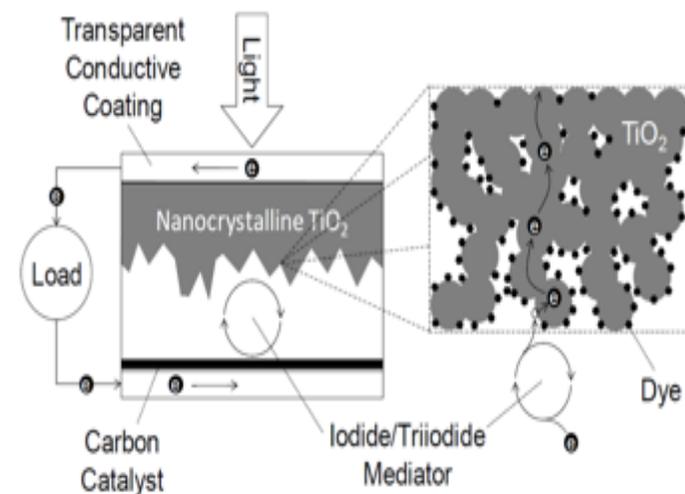
Objective: Understanding of Electrodeposition



J. Whitsett, et. Al. "[Template Synthesis and Magnetic Manipulation of Nickel Nanowires](#)," Journal of Chemical Education, 82, 765-768 (2005).

Nano Solar Cell

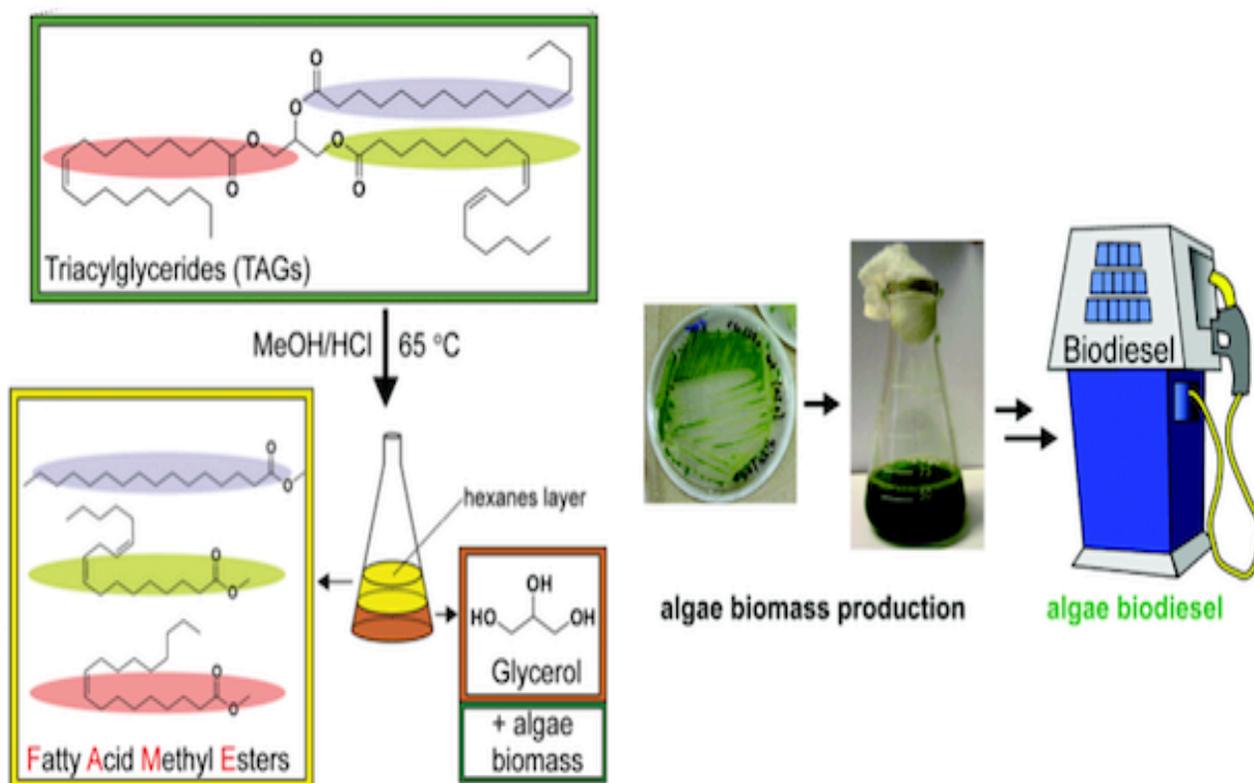
Objective: Understanding of Solar Cells



Greg P. Smestad and Michael Grätzel, "Demonstrating Electron Transfer and Nanotechnology: A Natural Dye-Sensitized Nanocrystalline Energy Converter," J. Chem. Ed. 1998, 75(6), 752.

Year 2: Join Research Group

Research Project 1 – Algae Biofuels for Renewable Energy



Principle Investigator:
Dr. Jillian Blatti, PCC, eCURE advisor



Dr. J and Jennifer Portillo extracting synthesized algae biodiesel

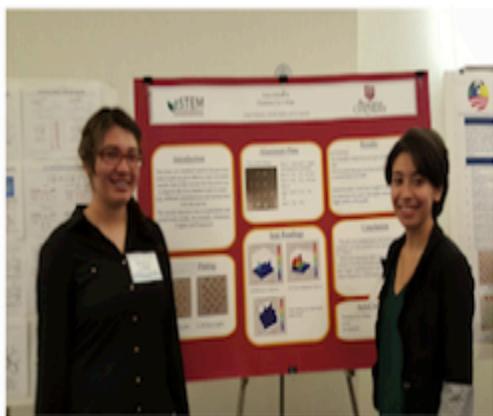
TRANSESTERIFICATION OF ALGAL LIPIDS TO SYNTHESIZE BIODIESEL

Year 2: Join Research Group

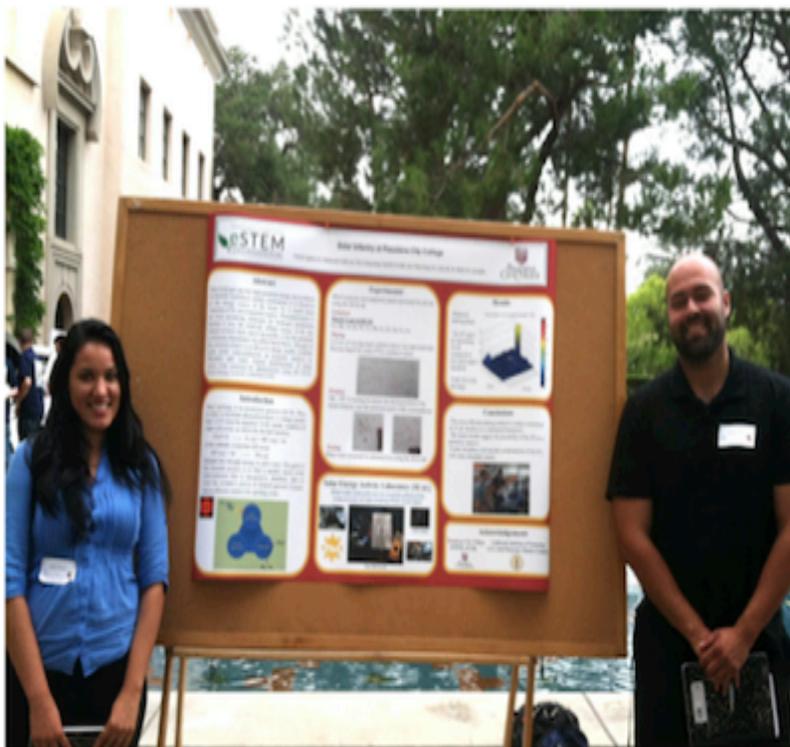
Research Project 2 – Solar Energy Activity Lab with CalTech

Principle Investigator:

Dr. Veronica Jaramillo, PCC, eCURE advisor



CCI Solar Fuels Annual Meeting 2016



Jennifer Portillo and Vincent Aguirre Jr. present the results of their research at Cal Tech SEAL Conference May 2014.



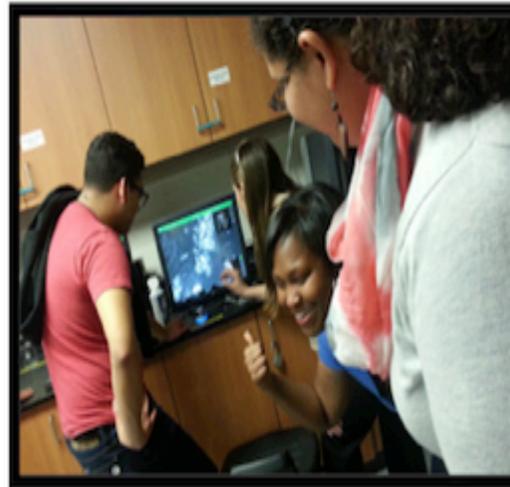
SEAL Conference May 2015



Year 2: Join Research Group

Research Project 3 – *nanotechnology: applications and environmental impact*

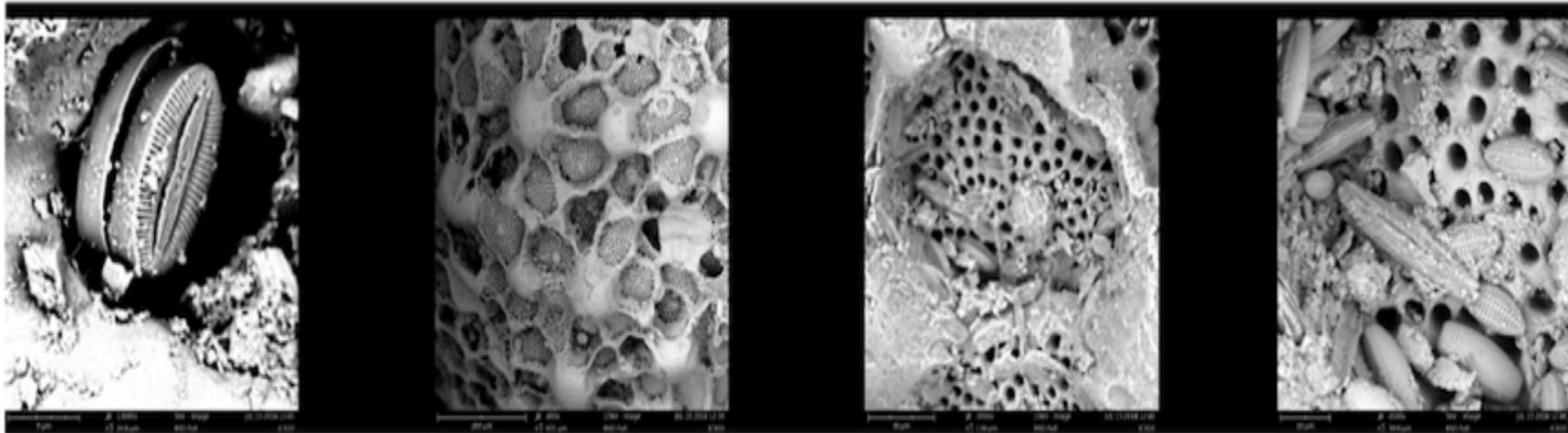
Collaborators:
UCLA, UC Riverside,
Cal State Long Beach



Principle Investigator:
Dr. Jared Ashcroft, PCC, eCURE advisor

Scanning Electron Microscope at PCC
Students analyze an unknown algae sample collected from Long Beach (left)

SEM images taken at PCC (below)



Augmented Reality in Chemistry

Coming Soon: John Muir High School MNTech Center

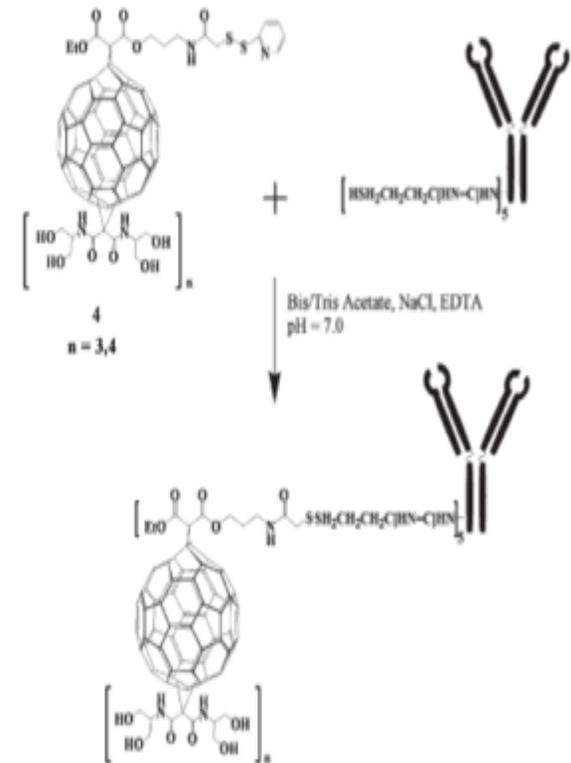
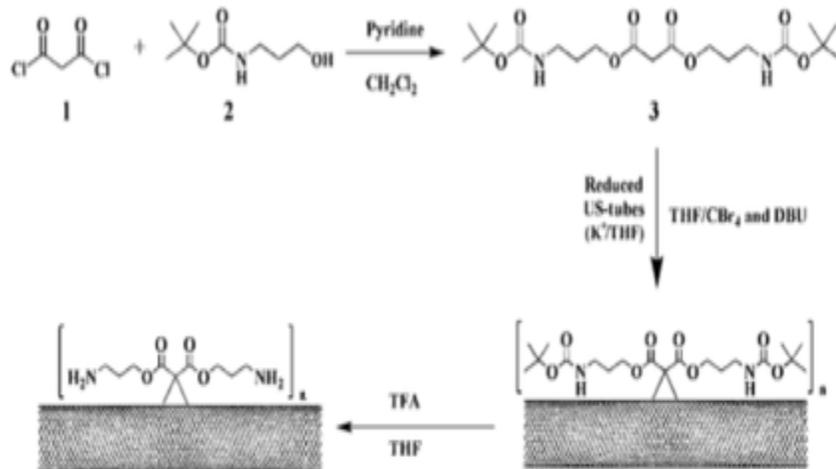
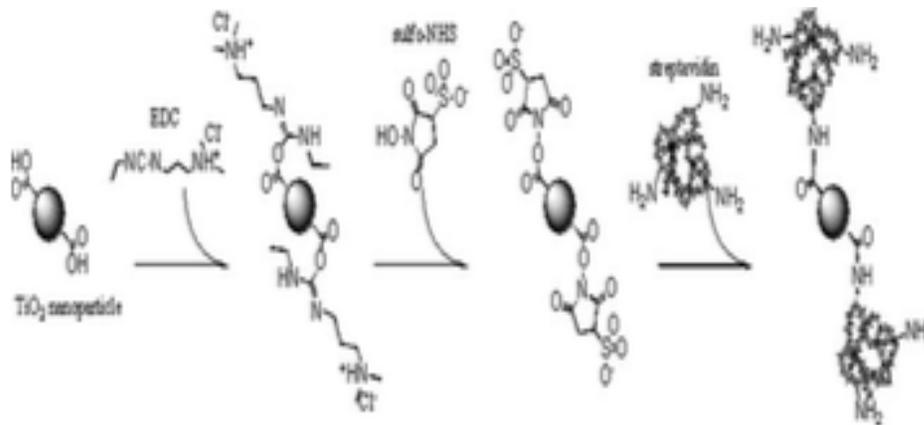


https://youtu.be/Mv_W-sWWz6o

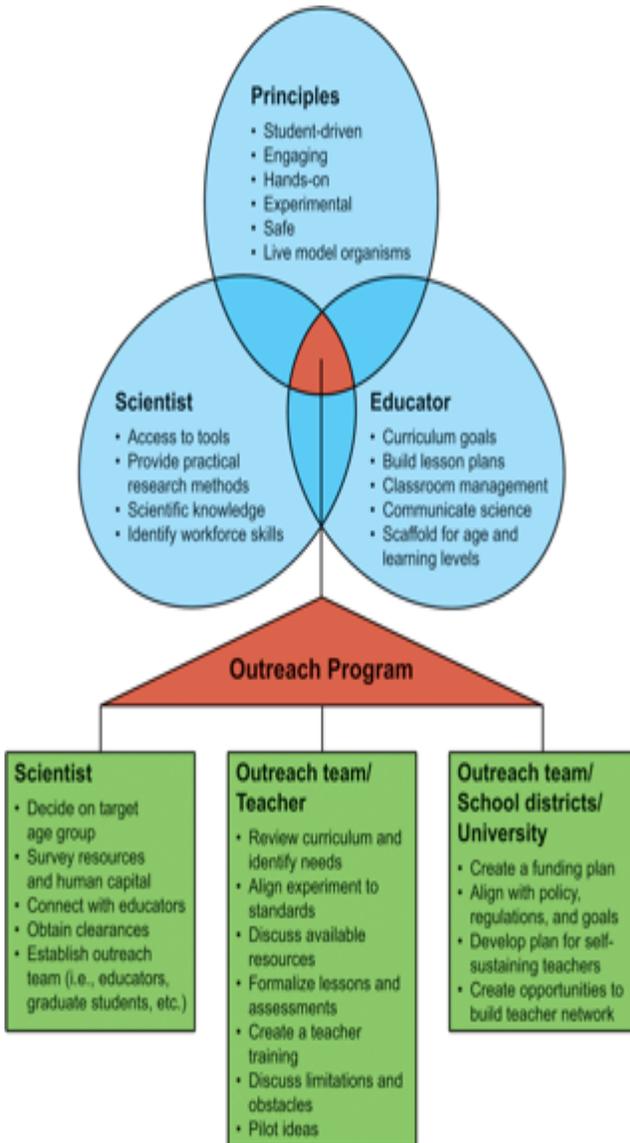
<https://www.youtube.com/watch?v=0bkpyqtyFBs>

Nano-bio Conjugates

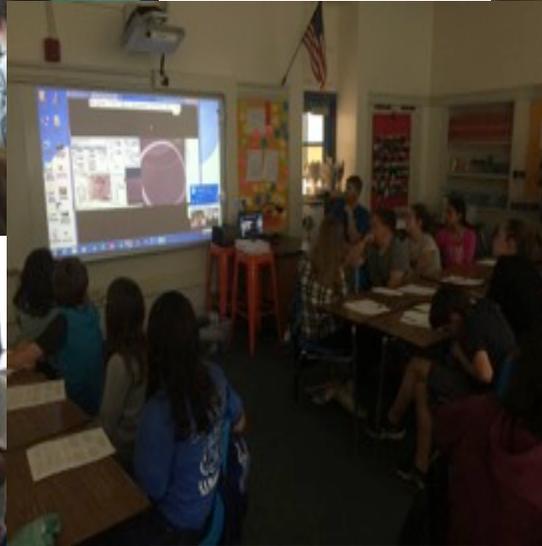
Project in Collaboration with Oak Crest Institute of Science and UC Riverside and CSU Northridge



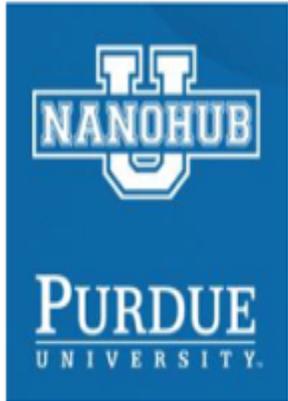
Participate in Outreach



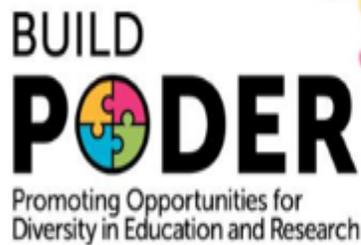
Outreach to K-12 Classrooms



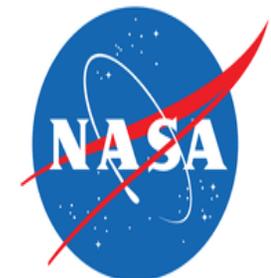
Year 3: Internships



CAL POLY POMONA



<http://www.csun.edu/build-poder>



Jet Propulsion Laboratory
California Institute of Technology

Finding Organizations to Work With



NASA Education
Dr. Brandon Rodriguez

Outcomes since 2015

- 1. Five peer reviewed publications (two more in review and three more in preparation) with 12 PCC student authors.**
- 2. 21 student presentations at conferences**
- 3. 15 faculty presentations at conferences**
- 4. 12 student summer internships
(9 Purdue, Nebraska, HMRI, Oak Crest)**
- 5. 90% success and retention rate, no achievement gap
80% transfer rate**





Rio Salado - Where Nano Knows No Limits

Rick Vaughn, Ph.D.
Rio Salado College

MICRO NANO TECHNOLOGY WITHOUT WALLS

Presented by Shannon.Corona@riosalado.edu,
Rick.Vaughn@riosalado.edu &
John.Jensen@riosalado.edu

MISSION

- The College Within Everyone's Reach
- Founded in 1978 to challenge the limits of tradition
- Customized, High Quality Learning Design
- Core Practices: Learning, Innovating, Partnering

CURRICULUM

- Two-year STEM Core: Calculus, Physics, Chemistry
- Redesign entry level Engineering and Physics
- ECE112 Principles of Nanotechnology
- ECE106 Survey of Nanotechnology

WHO WE ARE

- One of the Maricopa Community Colleges
- FY10-11 Total Unduplicated Headcount: 69,619 with 40,760 distance students
- Geographically diverse student population
- Fastest Growing online Community College

Rio Salado College



APPROACH TO MICRO & NANO TECHNOLOGY

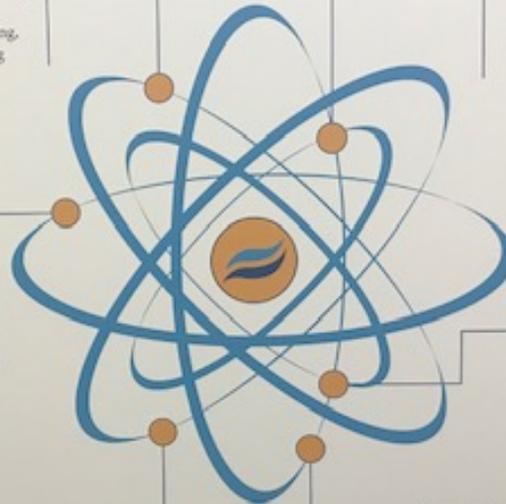
- Multidisciplinary
- Academic and Workforce Training

COMMUNITY NETWORKS

- Arizona Nanocluster
- Arizona STEM Network
- Arizona Science Center
- Science Foundation Arizona

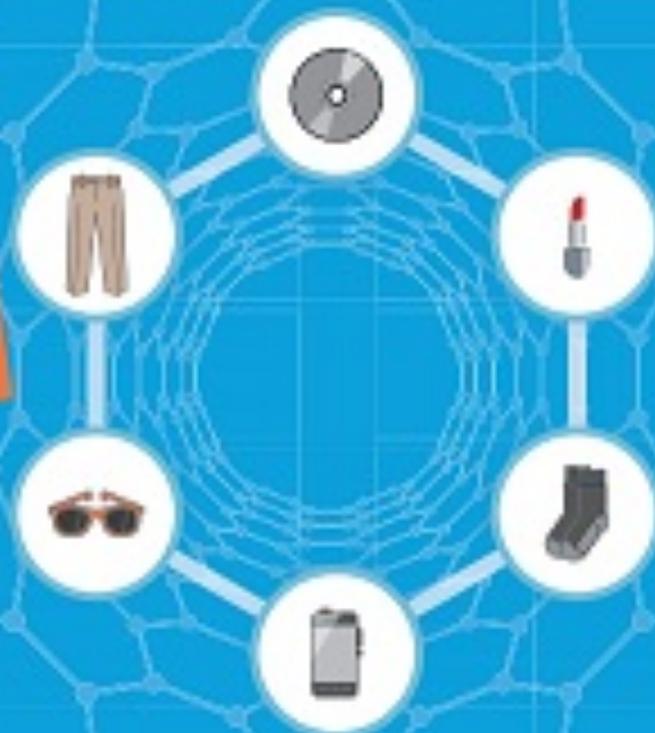
OUTCOMES

- Increase STEM completers
- Meet demand for high tech workforce
- Generate interest in STEM careers among K-12 students



Where Nano Leads to Big Things!

Certificate & Degree in Nanotechnology



Jobs!

Nanotechnology has the potential to create many new jobs across a variety of sectors. While some jobs, will require an advanced degree, a 2014 study funded by the National Science Foundation points out that 2-yr and 4-yr training with access to continuing and technical education will be sufficient for many of the future positions in nanotechnology, nanomanufacturing, and beyond.

Previous estimates stated that 6 million nanotechnology jobs will be needed by 2020, with 2 million of those jobs in the United States ([Roco, Mirkin, and Hersam 2010](#)). According to the [U.S. News/Raytheon analysis](#), the number of STEM jobs increased 20 percent between 2000 and 2014. Looking ahead, the U.S. Bureau of Labor Statistics (BLS) projects that between 2012 and 2022, employment in occupations that NSF classifies as science and engineering (S&E) will increase 15 percent. To find out about nanotechnology programs at college and graduate levels, see [College and Graduate Programs](#). If you are interested in 2-year degrees or training programs, see [Associate Degrees, Certificates, & Job Info](#).

And its not just potential

Manufacturing Technician (all shifts - Arizona)

Intel [3,154 reviews](#) -

Job Description

Intel's state-of-the-art processes and products give you the opportunity to learn a variety of technical and manufacturing skills from operations to equipment repair and troubleshooting in a demanding and challenging production environment.

Qualifications

Any one of the following will be considered:

Associate of Science degree or Certification in a STEM program (i.e Microelectronics, Electronic Engineering Technology, or Computer Electronic Engineering Technology, avionics repair), or a Bachelor of Science degree in Engineering, Chemistry, Physics, or Biology.

Candidates with 2 or more years of military electronic/avionic technician training ...



Manufacturing Technician Careers at Intel

Intel is currently hiring hundreds of Manufacturing Technicians and Specialists in Hillsboro OR, Rio Rancho NM, and Ocotillo AZ.

Manufacturing technicians and specialists are at the heart of Intel's mission to build the world's best processors. They work at our high-tech fabrication facilities worldwide using the most advanced manufacturing processes and tools. If you want to work with the latest technology in a rewarding, fast-paced environment, a career in manufacturing at Intel may be for you.

What You'll Do

Intel's state-of-the-art processes and products give you the opportunity to learn a variety of technical and manufacturing skills, from operations to equipment repair and troubleshooting in a demanding and challenging production environment. As a manufacturing technician or specialist you will operate, maintain, and repair specialized processing equipment in a clean room environment to keep output high without compromising safety or quality.

What we're looking for

Our manufacturing technicians require certificates, a two-year or four-year technical degrees in STEM related fields like electronic engineering, manufacturing, computer, mechanical, semiconductor, equipment and control, or facilities technology, or military training and experience.

A Day in the Life ...

<https://www.youtube.com/watch?v=xM4lee7ghxs>



At Rio Salado College



RIO SALADO COLLEGE
A MARICOPA COMMUNITY COLLEGE

CALL 480-384-9988

CONTACT AN ADVISOR

NANO KNOWS NO LIMITS.

See how far Nanotechnology can take your career.

www.riosalado.edu/nano



https://www.youtube.com/watch?time_continue=41&v=gNVIRAEexYU

Enrollment

- 2016: 0
- 2017: 18

This is a $\frac{18-0}{0}$ percent growth.

Now since we can't divide by zero, we instead use a little Calculus $\lim_{n \rightarrow 0} \frac{18}{n}$

Which of course is ...

Enrollment Update

∞ % Growth Rate

In other words ...

**NANO KNOWS
NO LIMITS**

Enrollment Update – Post Marketing

- 2017: 18
- 2018 (to date): 71

And 3 Graduates!



Questions?

RIO SALADO COLLEGE
A MARICOPA COMMUNITY COLLEGE

RICK VAUGHN, PH.D.

RIO SALADO COLLEGE

Faculty Chair - STEM Initiatives

2323 West 14th Street Tempe, AZ 85281

[\(480\) 517-8661](tel:4805178661) | [\(480\) 517-8289](tel:4805178289)

rick.vaughn@riosalado.edu

www.riosalado.edu/programs/nanotechnology/Pages/default.aspx



+

NCI
Southwest





Learning About Nanotechnology

James Schifley



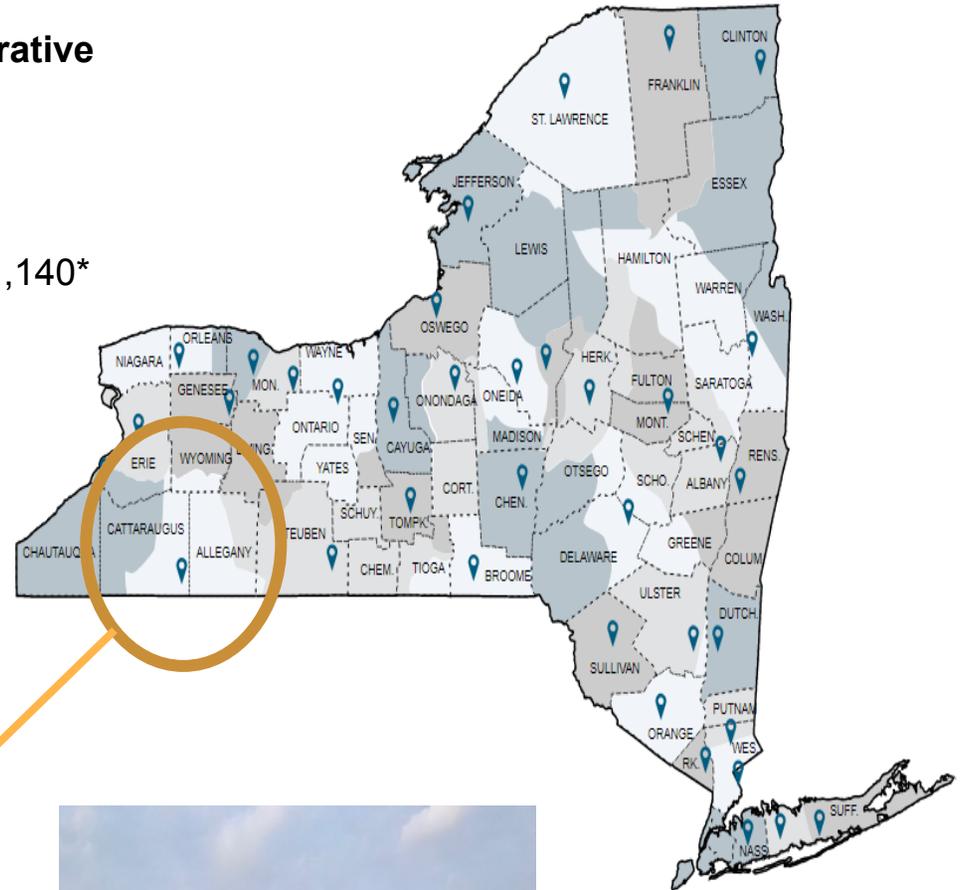
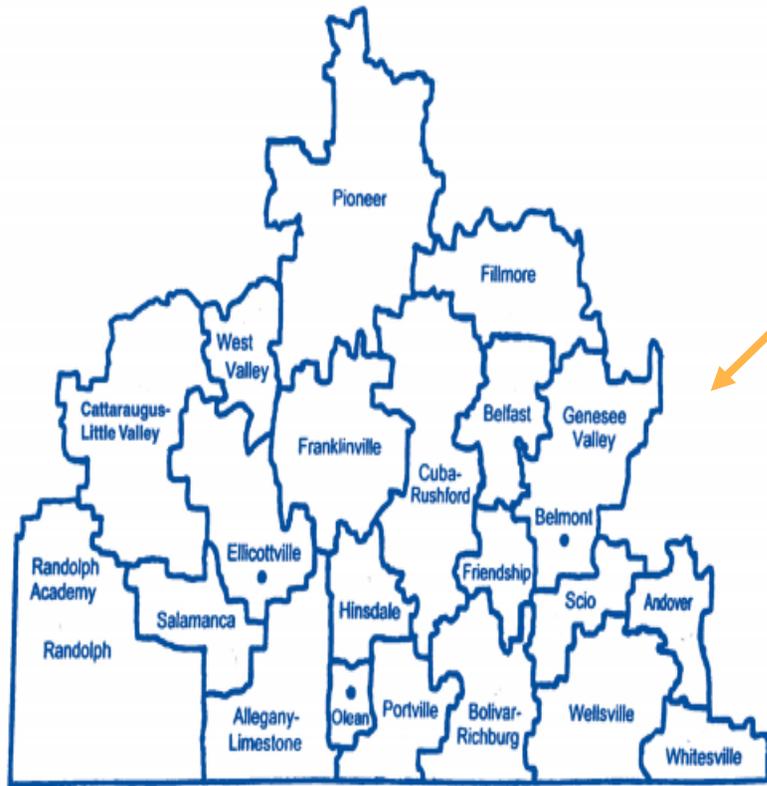
Cattaraugus-Allegany BOCES (Board of Cooperative Educational Services) Overview:

Number of component districts - 22

Geographic area - 2,159 square miles

Component district enrollment – 17,000*

BOCES Career/Technical Education enrollment - 1,140*



Upstate New York



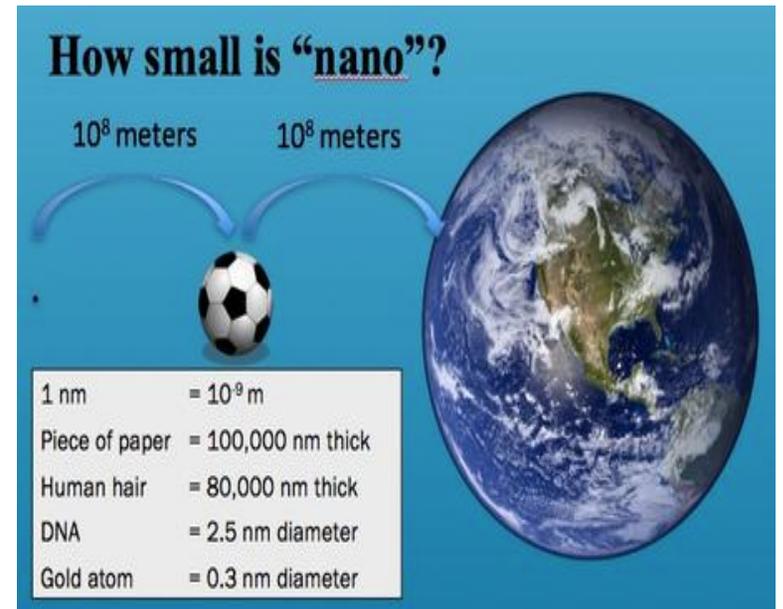
Not New York City

Challenges with starting a program:

Awareness – What is nanotechnology???

Teacher evaluation system and emphasis on testing/student pass rate

Less time/incentive to integrate new technologies



Challenges with starting a program (continued)

Cost – Research grade equipment is very expensive – Preventative maintenance contract cost on equipment is costly as well.

Personnel – Hiring experts to operate and instruct with the equipment at public school teacher wages

Contractual obligations – Teachers work from 8:15 am - 3:15 pm – 185 days a year



Strategies and Activities

Infrastructure and Professional Development:

- Integrated into all Career and Technical Education programs
- Affiliation with RAIN, MNTeSIG, HI-TEC, local colleges.
- Teacher focus group – find champions in districts
- F.A.S.T. – Future of Advanced Science and Technology committee
- Teacher workshops

Strategies and Activities

Outreach:

Webpage to host work

Work with local
businesses

Booth at Regional
Science Fair



Don't Do What We Did

Early on we sent out a flyer to all science teachers about a workshop with no follow up or personal contact.

Don't Do What We Did

Early on we sent out a flyer to all science teachers about a workshop with no follow up or personal contact.

Had one teacher show up out of 75-100.



Positives:

Students driving their own Science learning after exposure to equipment

Partnerships with businesses and student interns
– Reduced price of using equipment if business provides an internship or guest speaker/lesson.



More Positives:

Gaining momentum – Asked to showcase our efforts at the NYS capital in March

Requests to work with component schools are increasing

Changing the perception of CTE students



One thing to share with others starting out:

Don't try to do it alone



Omni Nano provided content for the first online nanotechnology offering

Final Questions



Join Us! www.mntesig.net



Apply for a fellowship to attend our Special Interest Group meeting at HI-TEC, July 23, 2019 in St. Louis

Webinar, Join Us: March 29, 2019: 1 PM Eastern

Capturing Movies of Molecules Using Ultrafast X-rays

Dr. William Graves
Arizona State University

