

# SHYNE

Soft and Hybrid Nanotechnology  
Experimental Resource

*ILLUMINATE YOUR RESEARCH*



**Sossina Haile**  
Materials Science and  
Engineering, Applied  
Physics



**Chad Mirkin**  
Materials Science,  
Chemical and Biological  
Engineering,  
Biomedical  
Engineering, Medicine



**Jian Cao**  
Mechanical Engineering,  
Civil and Environmental  
Engineering, Materials  
Science and Engineering



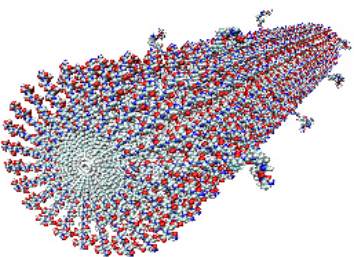
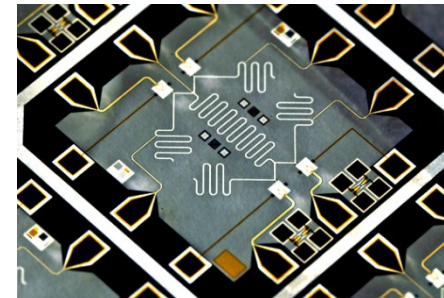
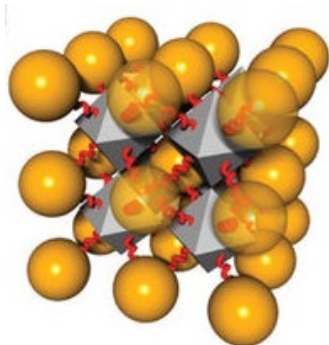
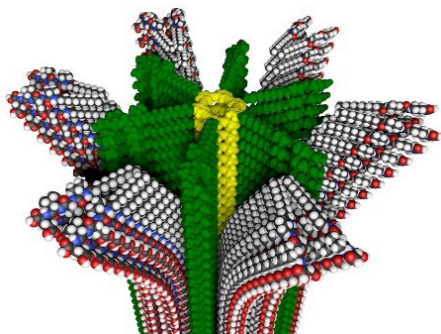
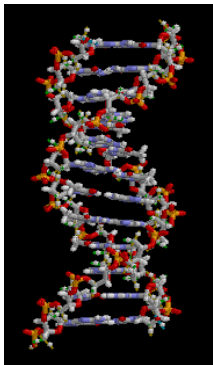
**Andrew Cleland**  
Physics, Molecular  
Engineering Innovation  
and Enterprise



**Vinayak Dravid**  
Materials Science and  
Engineering

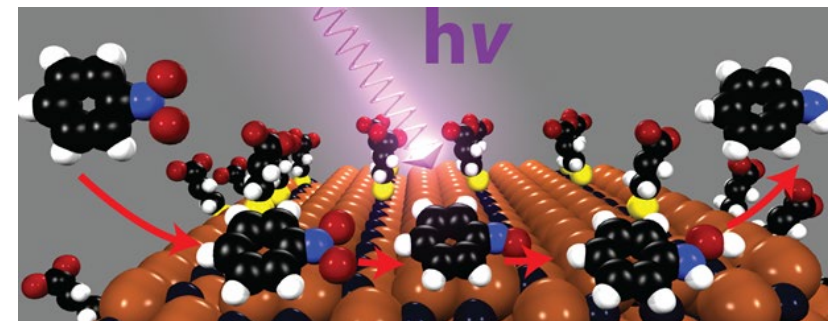
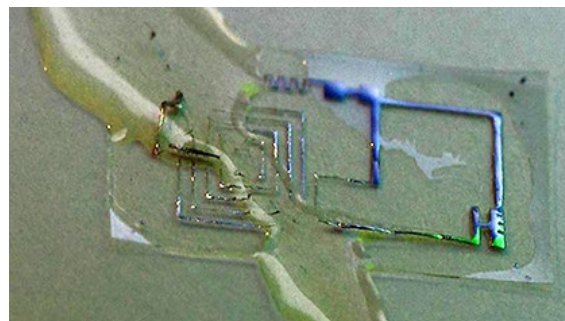
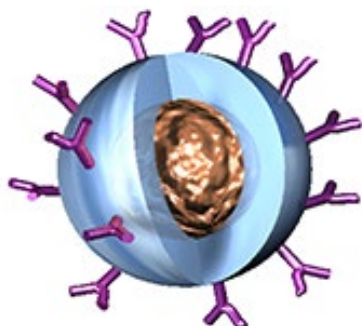
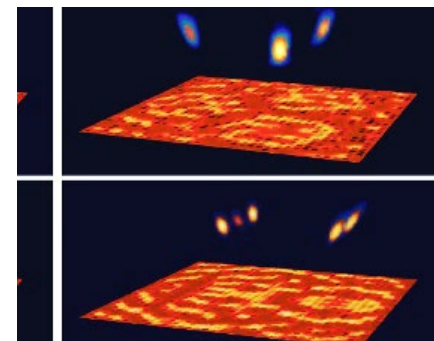


# SHyNE - Soft & Hybrid (Soft-Hard) Nanotechnology Experimental Resource



Soft

HARD



# SH<sub>y</sub>NE – Integrated & Comprehensive Approach

## Outreach and Education



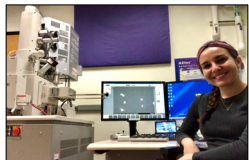
- Nano-Journalism, Social Media
- Nanotech Exhibits, Museums
- Lecture series, iNANO, M3S



- Industry Workshops, Demos
- Vendor Relations
- SEED Funding, Targeted Marketing



- Seminars, Courses, User meetings
- Technical Workgroups
- Proposal Development



- REU – Workforce Development
- CC Internship Program
- Open House, Image Contest



- RET - curriculum Development
- Science in Society (SiS) - camps, science clubs, Boys/Girls Clubs, URM
- Lab Tours, Demos, Remote Learning

Public, Community

Industry, Entrepreneurs

University, Faculty

Comm. College, Undergrad

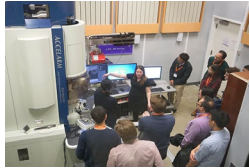
K-12

## Diversity and Belonging

- Science Chicago, Regional outreach
- Chicago Museums, URM community
- Women in Nano, SWE, SBE hiring



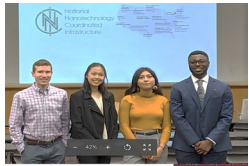
- Diversity Survey - demographics
- External user onboarding
- Improved tracking and metrics



- Targeting URM universities
- Diversity Survey – demographics
- Coordination: Dean Williams



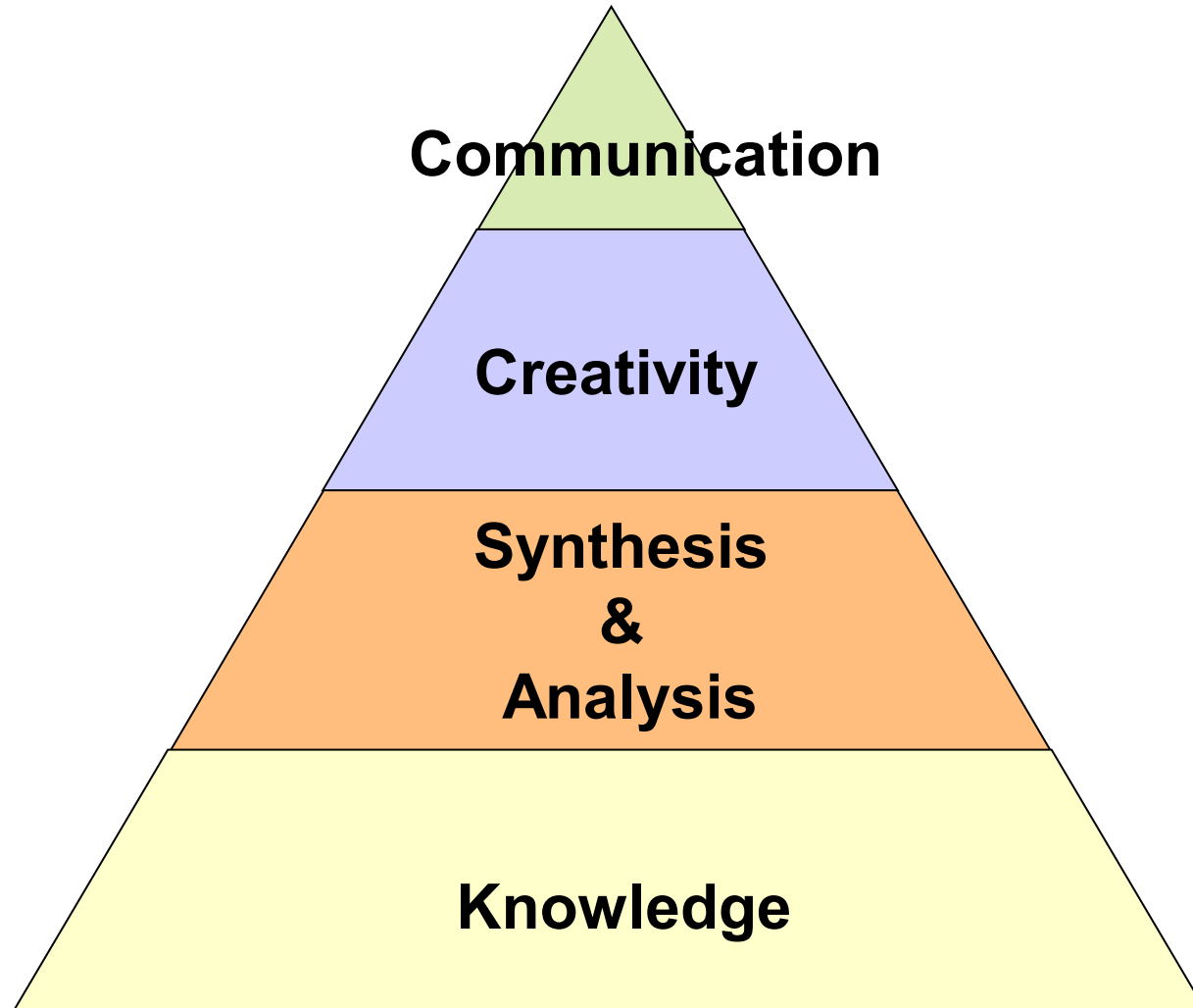
- SHyNE REU - 100% Women/URM
- Community College interns
- MRSEC REUs



- RET 100% URM teachers
- SiS Targets Chicago schools,
- Diversity Survey – demographics
- Tracking outcomes



# Taxonomy for 21<sup>st</sup> Century



*If I hear,  
I forget..*

*When I see,  
I may remember..*

*When I do,  
I understand!*

# SH<sub>Y</sub>NE – Workforce IMPACT Continuum

WORKFORCE DEVELOPMENT



## Women in Microscopy



KEYNOTE:

**Dr. Grace G. Burke**

Corporate Fellow, Oak Ridge National Lab

*"The impact of microscopy in structural materials research (and my career path!)"*

**3<sup>rd</sup> Women In Microscopy Conference**  
**MARCH 8, 2023**  
 Register: **Virtual Event**

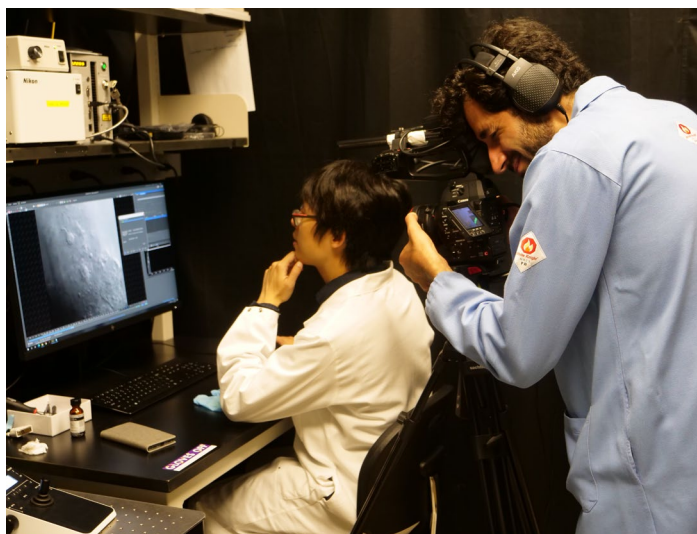
**JOIN US!**  
 3rd Annual Women in Microscopy Conference  
 Register today for this FREE virtual conference.  
 Friends & Allies are welcomed and encouraged to attend.

- 180+ attendees
- Across US
- 12+ countries
- 6 Speakers, panels, professional development opportunities

## Nanojournalism



Mohammad Behroozian, SHyNE's Nanojournalism Program science content produce, creates [video content](#) for middle school-high school students.



## Magnifying Minds

- 3<sup>rd</sup>-8<sup>th</sup> grade program **"Magnifying Minds"**
- SHyNE technical and outreach staff are working with SiS & BGCC to provide video content, live and/or remote demos and informational materials to students



**BOYS & GIRLS CLUBS OF CHICAGO**



**Northwestern** | **SCIENCE IN SOCIETY**



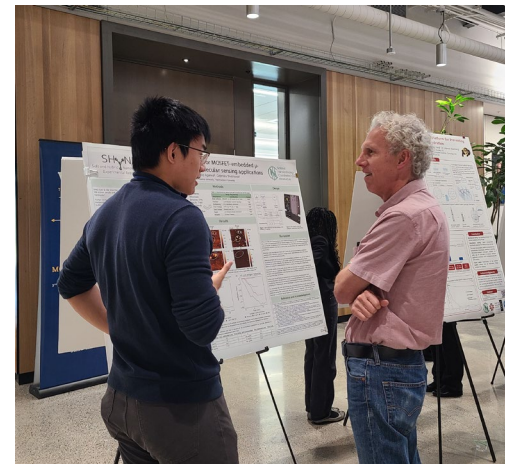
**Northwestern University**

# international Research Experience for Undergraduates (iREU) Program, Japan



*“Overall, my time in Japan was probably the **best summer I've ever had**. It was incredibly enriching to work on a project that I found interesting while also having the freedom to explore Japan...” -Ryan Talusan*

# Research Experience for Undergraduates (REU) Program

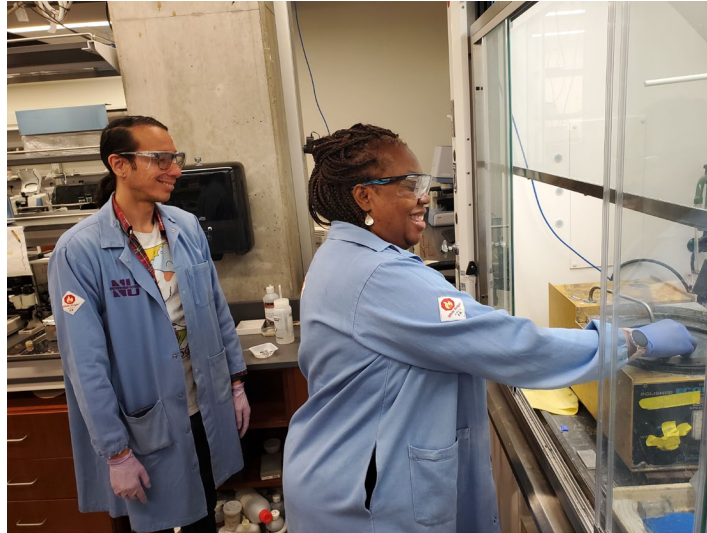


SHyNE hosts 5 students for a summer research program



# Research Experience for Teachers (RET) Program

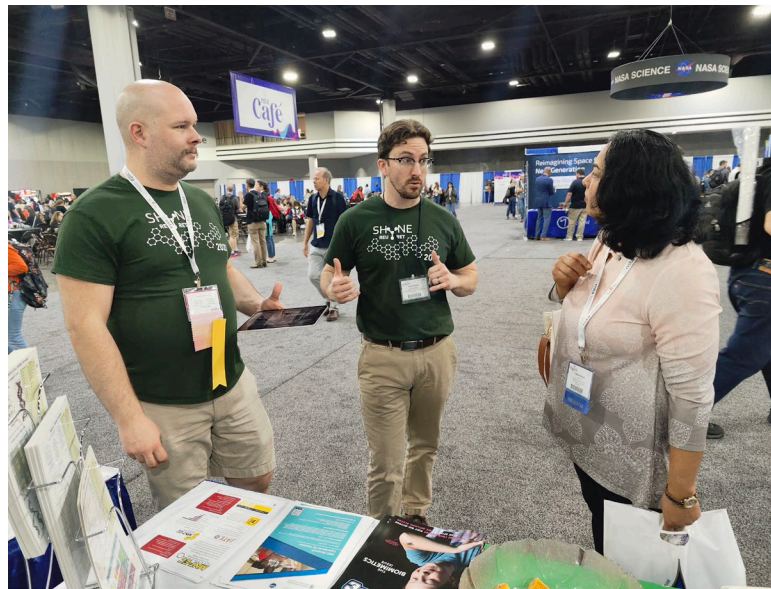
WORKFORCE | INTEGRATION



SHyNE hosts teachers from Chicago area high schools and community colleges



SHyNE RETs attend the National Science Teacher Association conference.



## How to Teach About Innovative Nanotechnology to Any High School Student

While participating in the Research Experience for Teachers at Northwestern University, I manufactured technology that can capture submicroscopic objects. This opportunity allowed me to create a mini curriculum that includes hands-

### Carbon Dioxide Moisture Capture

Noryana Nano<sup>1</sup>, Maggie Yang<sup>2</sup>, Tirzah Abbott<sup>3</sup>, Benjamin Shinde<sup>1</sup>, Vinayak David<sup>3</sup>

<sup>1</sup>Maine East High School, Park Ridge, IL

<sup>2</sup>Amherst College, Amherst, MA

<sup>3</sup>Northwestern University Atomic and Nanoscale Characterization Experimental Center (NUANCE), Evanston, IL



#### Lessons

Day 1: Macroscopic

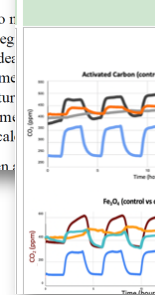
Day 2: Making a M

Day 3: Metal-Organ

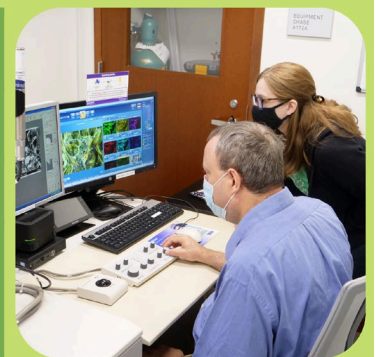
Day 4/5: Designing

Assuming little to no knowledge, we begin introducing the idea and practicing dimensional analysis. The lecture pictures of the same but at different scales.

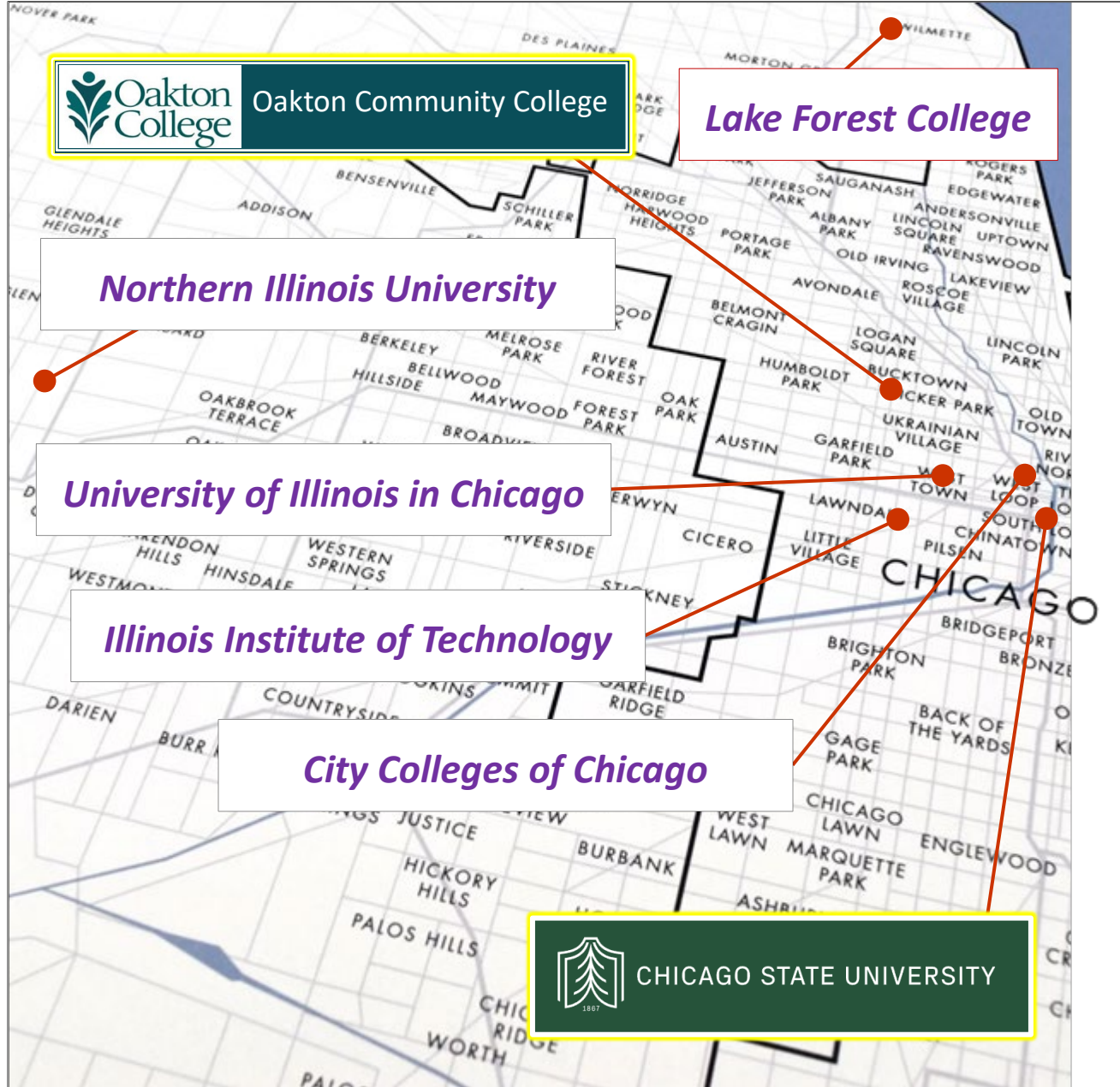
Students are given



RESEARCH EXPERIENCE FOR TEACHERS (RET)







# Oakton Comm. College Internship



# Chicago State University Undergraduate Summer Internship



# SHyNE Resource – Regional Start-ups

## Querrey InQbation Lab (\$150M investment)

- \$50M investment from Illinois
- \$25M philanthropy
- \$75M university/alumni match



**AZUL**<sup>3D</sup>

volexion

**EeroQ**<sup>™</sup>  
QUANTUM HARDWARE

**mfns**

**MicroMGX**

**Flexterra**

**AMPHIBIO**

**NANOGRAF**  
TECHNOLOGIES

- Azul 3D – nanoscale 3D additive manufacturing
- Volexion - graphene-based cathode, Li-batteries
- EeroQ – quantum computing in superfluid helium
- MFNS-Tech – environmental remediation
- MicroMGX – synthetic biological pharmaceuticals
- Flexterra – flexible thin-film transistor devices
- AmphibIO – nano for regenerative medicine
- NanoGRAF – graphene-based anode, Li-batteries

# (SH<sub>Y</sub>NE) – Workforce IMPACT Continuum

WORKFORCE DEVELOPMENT



**Thank you...**

**Discussion**

**Q & A**