

NNCI I&E Core Program Elements – 2022 Update

- Research and **ENTREPRENEURSHIP** Experience for Undergraduates (REEU)
- I&E Seminar Series
- NanoTechnology Entrepreneurship Challenge (NTEC)
 - NTEC Diversity Award
 - NTEC Accelerator Program
- Entrepreneurs-in-Residence (EiR)
- *Stretch Goal: NNCI Innovator's Academy*

NNCI AD Update

10:45-11:45 AM

Biotechnology Building G10

20 October 2022

Matthew Hull, PhD

NNCI AD, Innovation &

Entrepreneurship

Contact: mahull@vt.edu

I&E Working Group



Kevin Walsh
KY Multiscale



Andy Ligley
MONT



Sara Ostrowski
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Daniella Duran
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Hanh Phan
NNF



Steve Wignall
NNF



Kristin Field
MANTH



Gerald Lopez
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Karl F. Böhringer
NNI



Yves Theriault
SDNI



Ying Jia
SHyNE



Ron Olson
CNF



Sherine Obare
SENIC



Paul Joseph
SENIC



Jessica Hauer
NCI-SW



Mughees Khan
CNS

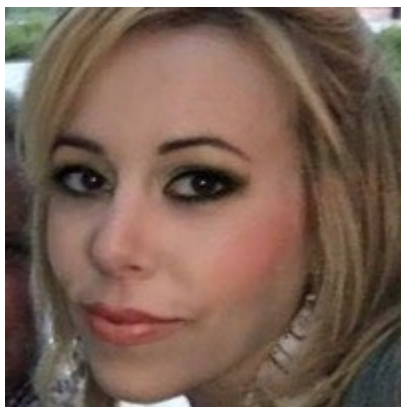


Matthew Hull
NanoEarth

2021-2022 REEU Participation



Yves Theriault
SDNI



Ana S. Galiano
KY Multiscale



Kristin Field
MANTH



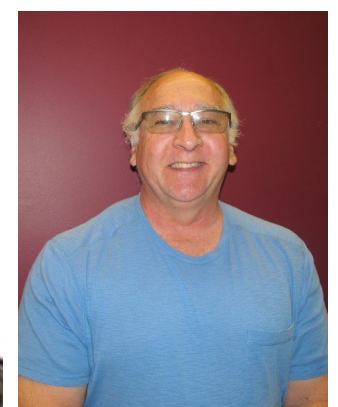
Jessica Hauer
NCI-SW



Leslie O'Neill
SENIC



Hanh Phan
NNF



Steve Wignall
NNF

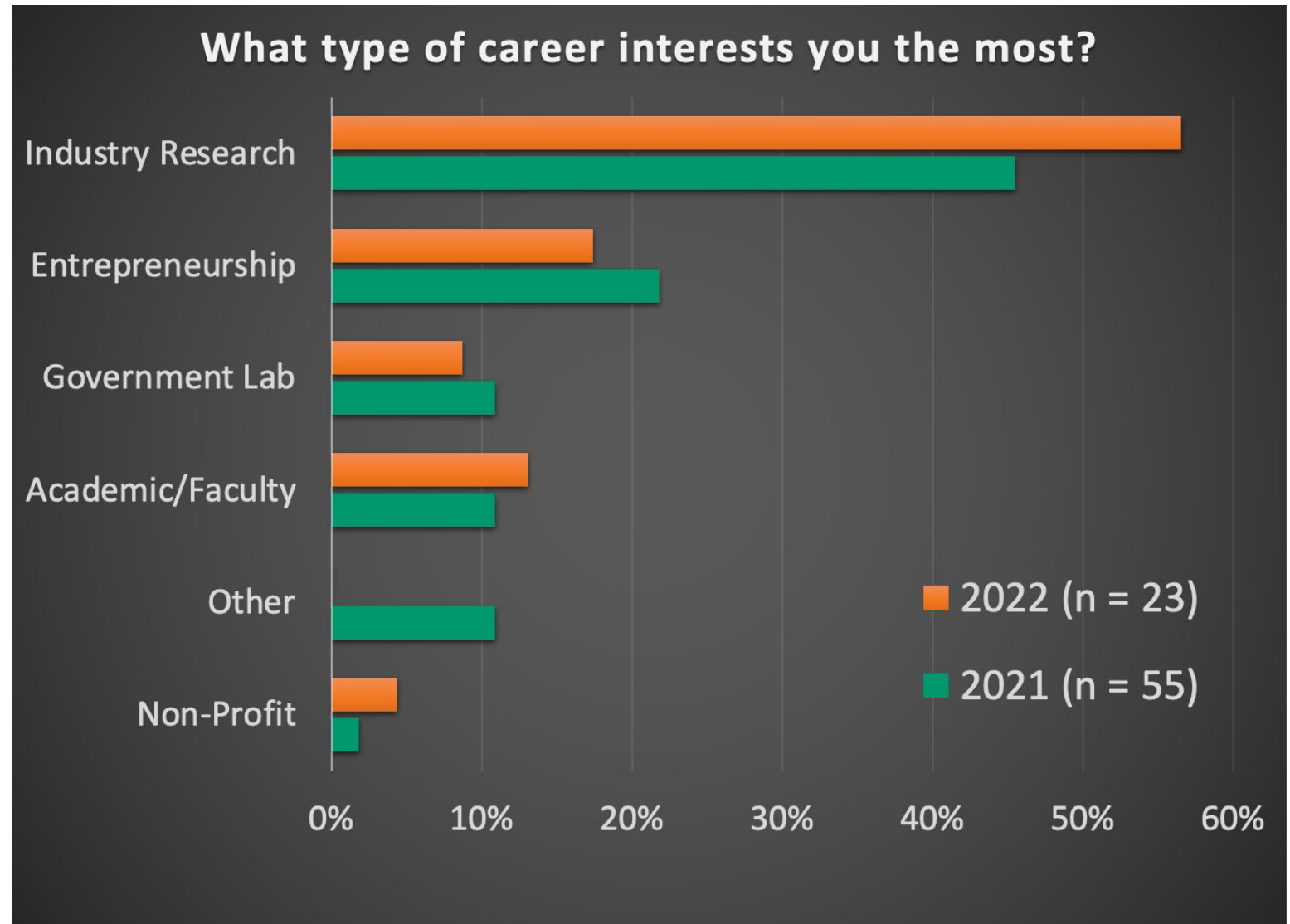


6 sites and 78 REU students engaged 2021-2022

REEU Participant Feedback (2021-2022)

Interest in industry careers remains high among REU students

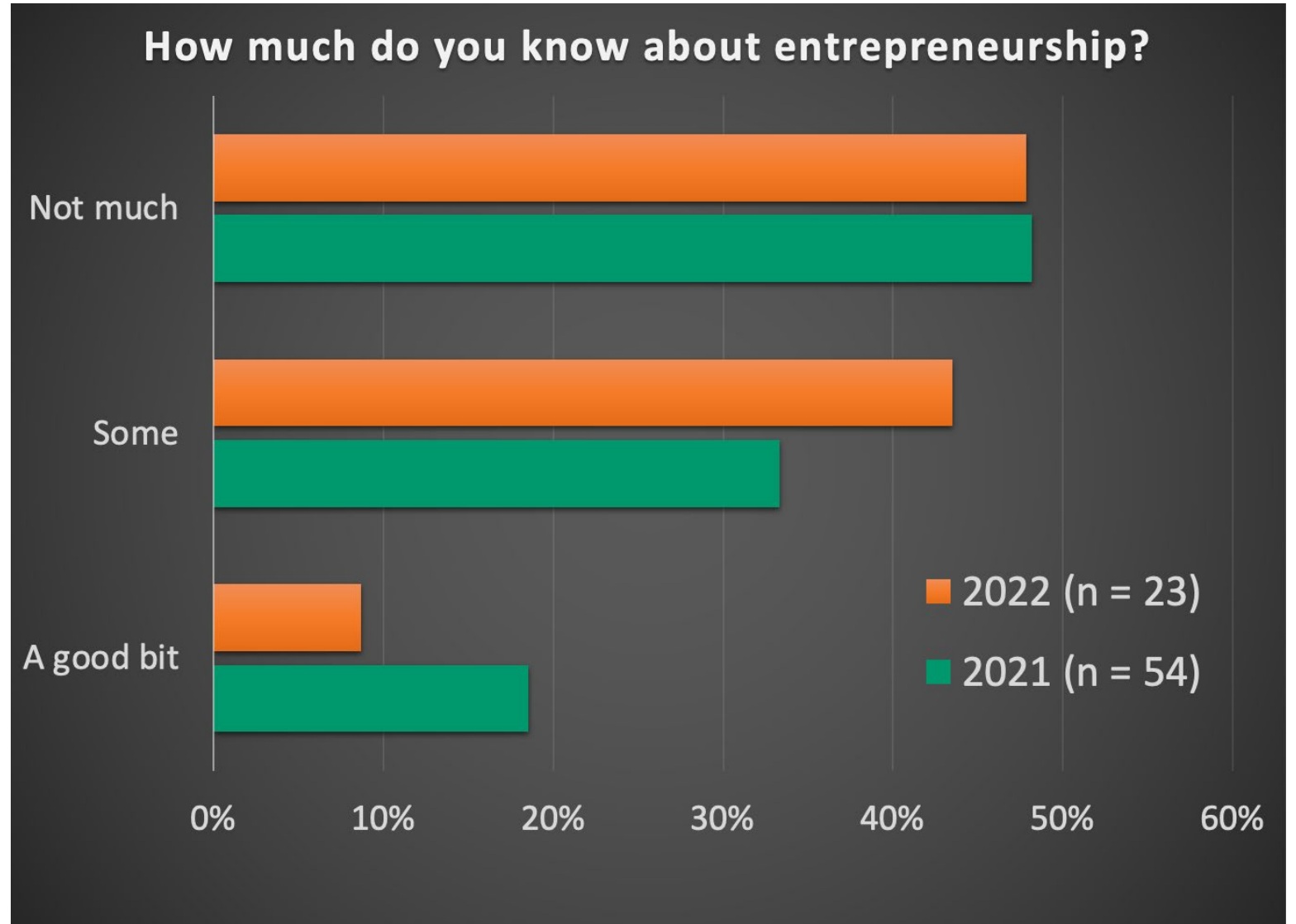
Combined interest in industry or entrepreneurship represents 67-74% of students



REEU Participant Feedback

Half don't know much about entrepreneurship
(same as 2021)

10-20% know "a good bit" about entrepreneurship



What comes to mind when you think of “entrepreneurship”?

Opinions comparable to previous year...

Favorable: *creativity, innovation, leader*

Less favorable: *risky, responsibility, hard work*





*Hosted by MONT
October 12, 2022*



TELEDYNE SCIENTIFIC & IMAGING
Everywhere you look™

NNCI YouTube Channel or

<https://tinyurl.com/muwyyh8v>

Lab-to-Fab: Transitioning from University Cleanrooms to Industrial Prototyping and Low-Volume Production

Miguel Urteaga, Director, Foundry Products and Services
Miguel.Urteaga@Teledyne.com



Andy Lingley
MONT



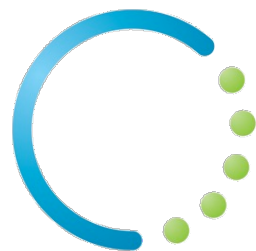
Miguel Urteaga
Teledyne

- 3 speakers 2021-2022
- Sites host (NNI, MONT thus far)
- Planning for 2023 (2-3 per year)

Congratulations to our 2022 NNCI NTEC Awardees!

Team #	Student Lead(s)	NNCI Site	Award Type	Mentor(s)	Title
27	Faisal Adams	NanoEarth-VT	Regular	Marc Michel	Effective acid mine drainage treatment with composite nanotube-polymer membranes
28	Yi Shiou Duh	Nano@Stanford	Regular	Mark Brongersma	illuminate.Brain
29	Matthew McGlennen	MONT (Montana Nanotechnology Facility)	Regular	Stephan Warnat	Microfabricated impedance sensor system for biofilm detection
30	Aditya Garg	NanoEarth-VT	Regular	Wei Zhou Peter Vikesland	
31	Wesley Allen Williams	North Carolina A&T (SENIC/NanoEarth-VT)	Diversity	Shyam Aravamudhan	
32	Ge Zhang	Nano@Stanford	Diversity	Anthony Kovscek	
33	Amer Yaghi	SDNI (UC San Diego)	Regular	Professor Sheng Xu	
	Tom Park	SDNI (UC San Diego)		Dr. Yves Theriault	
	Abdal Abdulhameed	SDNI (UC San Diego)			
	Elio Li	SDNI (UC San Diego)			
34	Lauren Takiguchi	SDNI (UC San Diego)	Regular	Dr. Yves Theriault	Functionalized DNA Origami-siRNA Nanotube Complex to Reverse Osteoarthritis

- First NNCI-wide NTEC
- 5 sites participated
- 14 students, 8 teams



NTEC and the “Valley of Death”

Commercialization “Valley of Death”

Funding gap between discovery and commercial production

Universities and National Laboratories

Industry

Discovery

Basic Research

Applied Research

Product Development

Production

Student Research

NTEC

NTEC is NOT the same as a lab research project!

Understanding the basics of lab research is great, but it's not enough to be successful in NTEC or make it as an entrepreneur.

OA-Away: A siRNA-Liposome Loaded Transdermal Patch for Osteoarthritis Relief

Lauren Takiguchi, George Gaus, Bolarin Lawrence
Faculty Mentor: Dr. Yves Theriault

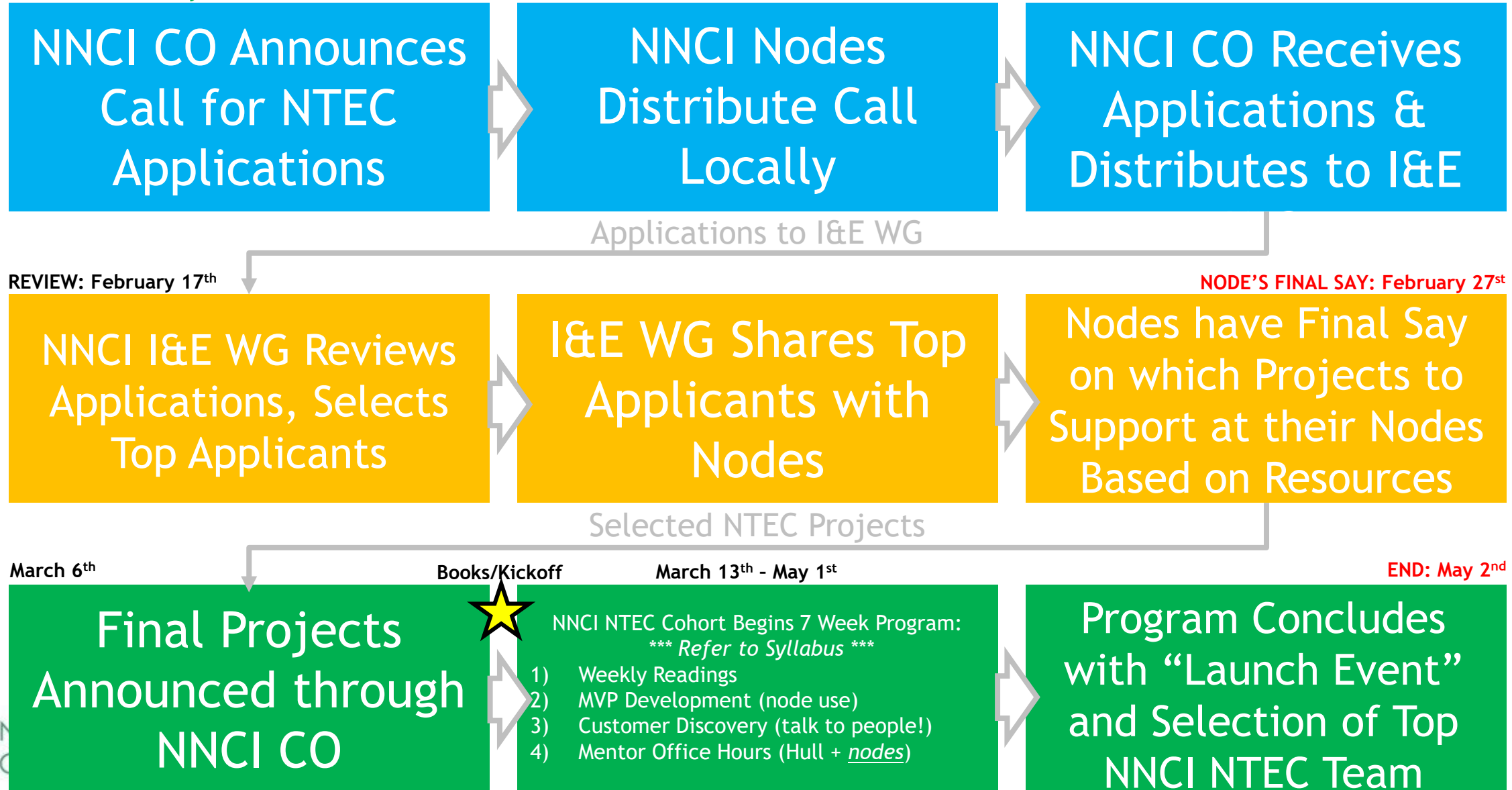
Top NTEC Teams – 2022



NNCI NTEC – Looking Ahead to 2023

ANNOUNCE: January 9th

DUE: February 11th) National Inventor's Day

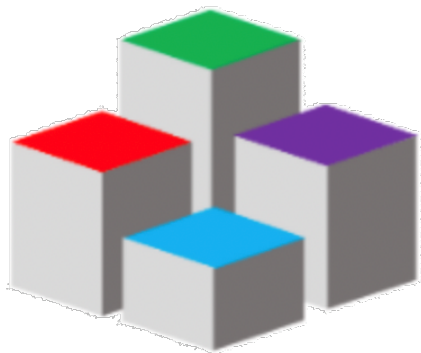


Entrepreneurs-in-Residence

Site	EiR Contact
MONT	Trevor Huffmaster
SDNI	Yves Theriault (students and postdocs) Bernd Fruhberger (industry users and faculty)
NNI	Mike Robinson
NanoEarth	Matthew Hull
NNCI (when local site EiR is not available)	Matthew Hull

NNCI EiRs are individuals who are willing to mentor start-ups at NNCI sites.

Commercialization at NNCI Sites



2022 NNCI
Nano + Additive
Manufacturing
S U M M I T

KY Multiscale:
Micro/Nano/MEMS
entrepreneurship



CNF: 2022 NNN Symposium @ Cornell
“Bridging the Workforce Gap” May 19, 2022

2022 Conference

COMMERCIALIZING QUANTUM TECHNOLOGIES IN
NEBRASKA: FROM RESEARCH TO LICENSING -- THURSDAY,
APRIL 14



NNF: Toward
commercialization
of Quantum



National Nanotechnology Initiative (NNI) Public Webinar
Nanotechnology Commercialization: Perspectives from a Regional Innovation Ecosystem

Webinar Panel:

June 28, 2022, 2 PM Eastern



Anthony P. Green, PhD
Chief Scientific Officer for Ben
Franklin Technology Partners of
Southeastern PA

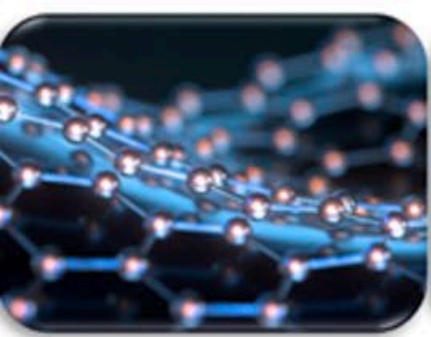


Gerald Lopez, PhD
Director, Business
Development, at
the Singh Center
for Nanotechnology, University
of Pennsylvania



Brendan DeLacy, PhD
President and Founder of
Ballydel Technologies

MANTH: Nearly \$60M in start-up support



NANOFANS FORUM

"Bridging Biology & Nanotechnology"

Micro- / Nanotechnology Commercialization: Opportunities and Challenges – Part 1 & 2

All 8 faculty members have their own startups based on their academically developed technology.



Paul Joseph
SENIC



Spring 2022 (05/24)

Dr. Todd Sulchek
Commercialization of microfluidic technologies to enable manufacturing of safer, more precise, more cost-effective cell therapies



Dr. Farrokh Ayazi
Path to Commercialization for CMOS-MEMS Sensor and Actuator Microsystems



Dr. Mark Prausnitz
Microneedles, patches, and STARS: translating technology from the lab into commercialization



Dr. Mason Chilmoneczyk
Starting a Company is Hard: Lessons Learned as a (new) Biotech Startup Founder



Fall 2022 (10/13)

Dr. David Ku
Creating Medical Devices using Micro and Nano Technology



Dr. Nick Housley
A Road Less Traveled, Our Nanohydrogel's Path to a Phase 0 Clinical Trial



Dr. Omer Inan
Wearable Acoustic and Vibration Sensing and Machine Learning for Human Health and Performance



Dr. Gabe Kwong
Bioengineering Immunity: Bringing the Next Wave of Cancer Diagnostics and Immunotherapies to Market

I&E WG Projects 2023



Image credit:

<https://www.ntaskmanager.com/blog/project-design-in-project-management/>

- **Project #1. NNCI Economic Impact Survey – 10 years after NNIN:** The group agreed that an updated economic impact survey based on the original NNIN survey (with modifications as appropriate) was a worthwhile effort to undertake.
- **Project #2. NNCI “Commercialization Scraper”:** Investigating a pilot web-scraper for relevant technologies publicly available for license through NNCI sites.

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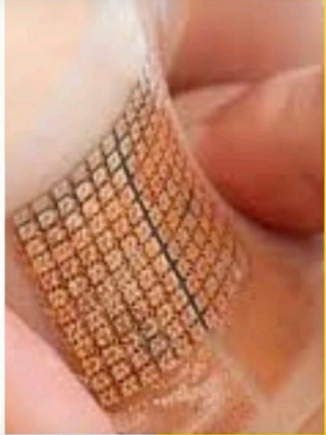
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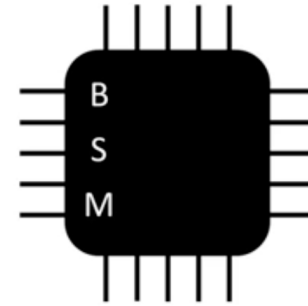
Contact: mahull@vt.edu



PARKLY

Continuously monitoring and
treating Parkinson's

A. Yaghi
SDNI



BIG SKY MICRO

M. McGlennen
MONT



NTEC Showcase – Distinguished Panelists



- **Sheeba Dawood**
CEO & Co-Founder at Minerva Lithium
- **Pascal Deschatelets**
Co-Founder & Chief Scientific Officer at Apellis Pharmaceuticals
- **Douglas Freeman**
Senior Director, Founding Member, Jones-Dilworth, Inc.
- **Eduardo Gonzalez-Cantero**
Student and previous NTEC recipient
- **Prof. Sylvester Johnson**
Assistant Vice Provost for the Humanities at Virginia Tech
- **Paul Joseph**
Principal Research Scientist at Georgia Tech
- **Andrew Lingley**
Manager and Research Engineer at Montana State University

Team 6 - Amer (Detect/Treat Parkinson's)





NSF Support for a New Technology Directorate and Regional Innovation Engines



**Use-inspired research
and development**



**Translation of innovation
results to society**



**Workforce development to grow and
sustain regional innovation**

Up to 10 years and \$160 million to support the development of diverse regional coalitions to engage in use-inspired research and development, translation of innovation to society, and workforce development – with the goal of growing and sustaining regional innovation ecosystems throughout the U.S.

Entrepreneurs-in-Residence

KP: *“Many experienced entrepreneurs enjoy mentoring new start-ups”*



Image credit: <https://ideas.ted.com>

- Local entrepreneurs willing to engage with your node to help mentor student and/or faculty entrepreneurs
- Role
 - A conduit to local I&E resources
 - An educator who helps promote I&E awareness
 - Sounding board for I&E ideas
- Characteristics of an E-i-R
 - A “mentor mentality”
 - Already associated with your program? A faculty member? A user?
 - Connected to local I&E resources, startup hubs
 - Could be volunteer, part of assigned duties, or compensated

2021-2022 NNCI Site Entrepreneurs-in-Residence

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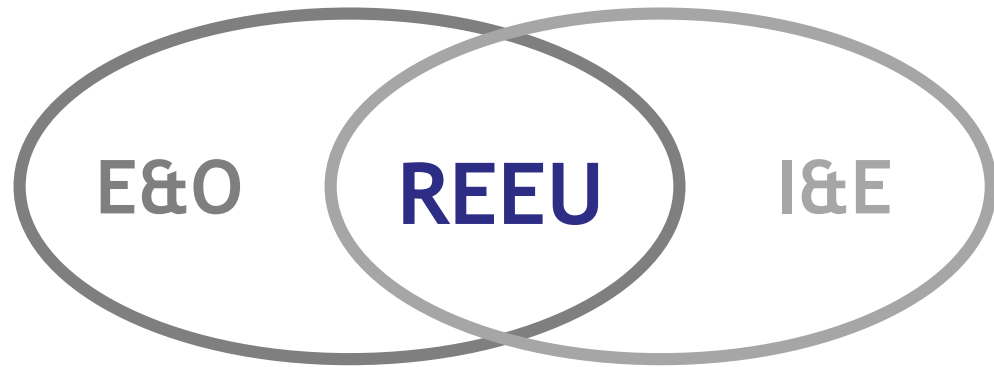
Why Innovation & Entrepreneurship (I&E)?

- 2021 NNI Strategic Plan
 - **Goal 2: Promote commercialization of nanotechnology R&D**
- NNCI Quadrennial Review
- US, global entrepreneurship decline
- Successful node-level programs

“innovative mechanisms to realize the transformational societal benefits that flow from faster commercialization of nanotechnologies”

The NNCI is full of innovators & entrepreneurs who happen to also be nanoscientists.

REEU Program



Research **AND** Entrepreneurship
Experience for Undergraduates

- **Objective**

- Expose REU students to nano-enabled entrepreneurship opportunities linked to research

- **Flexible Options**

- Level 1: Brief discussion of entrepreneurship
- Level 2: General/theme-focused (i.e., aligns with REU theme) entrepreneurship lecture and Q&A (~1 hr)
- Level 3: Visit/tour at nearby start-up facility (few hours)
- Level 4: Extended duration project (“I-Corps lite”)

2022 NNCI NTEC Program

- Promote student-led entrepreneurship across NNCI nodes
- Flexible support mechanisms to maximize node engagement
 - In-kind instrument time
 - Direct funding (e.g., \$500 per team for instrument time, materials)
 - Diversity Award (encourage participation from underrepresented groups, minorities)
 - Voluntary participation in 7-week virtual NTEC Accelerator Program
- Opportunity to:
 - Explore nano-enabled technologies for sustainable solutions
 - Learn and “practice” entrepreneurship
 - Transition ideas beyond the lab
 - Fail safely, learn from mistakes
 - Connect NNCI nodes in the spirit of friendly I&E competition

I&E Seminar Series

- Objective
 - Engage specifically with industry, innovators, entrepreneurs to recruit users, address real-world challenges
- NNCI-wide I&E Seminars
 - Relevance across nodes
 - Elevate message of an impactful I&E story/collaboration/trend/opportunity
 - Hosted by nodes
 - Promoted by CO



Image credit: <https://alison.com>

Stretch Goal: NNCI Innovator's Academy



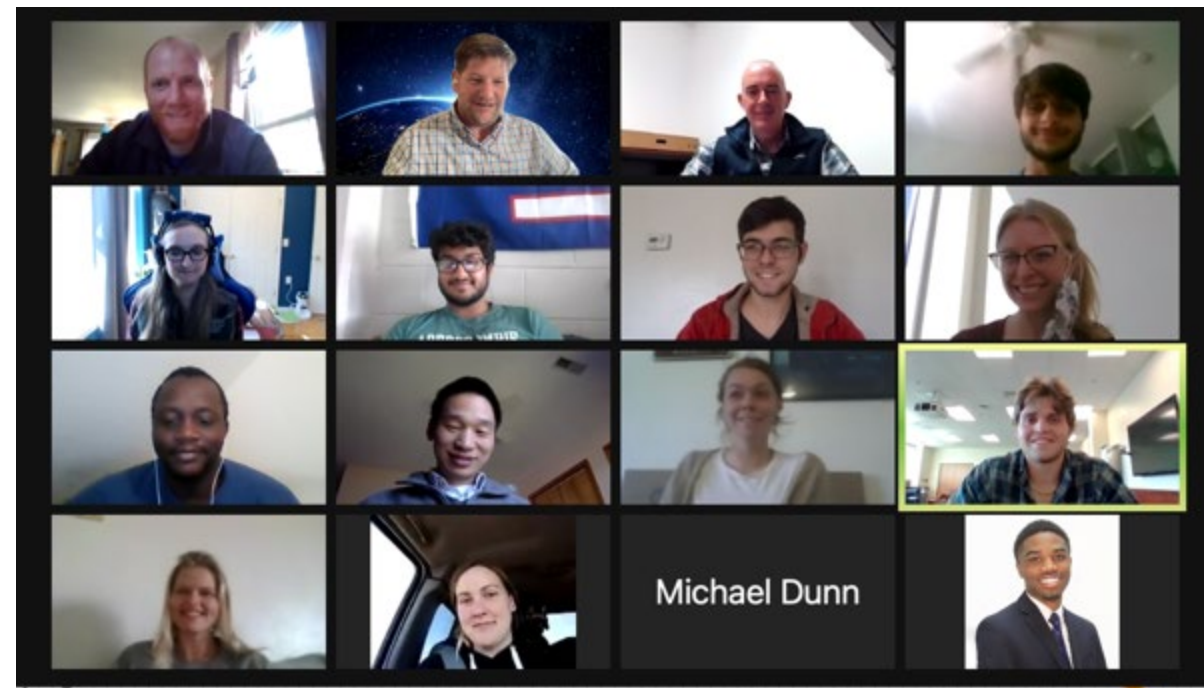
Image credit: <https://elearningindustry.com>

- Scale availability of NNCI I&E resources more broadly
- Collection of I&E education & training resources from across the NNCI
- Certificate program for training nano-savvy innovators, entrepreneurs

Innovation & Entrepreneurship (I&E) Report



MANTH REEU Poll 2021



NanoEarth NTEC 2021 Cohort





It's really important that we do train the new generation of chemists to be thinking about the entrepreneurial and sustainability aspects of their work.

— *Angela Wilson, chemist, Michigan State University, and president-elect, ACS*

Matthew Hull, PhD
NNCI AD, Innovation & Entrepreneurship
Contact: mahull@vt.edu



NTEC Accelerator Program (7 Week Program)

Week	MVP	Business Model Generation	Customer Discovery
1		Write your business thesis	
2		Customer segments and value propositions	
3		Channels and customer relationships	
4		Revenue streams	
5		Key resources, activities, and partnerships	
6		Cost structure	
7		*NTEC Launch Lunch	

Readings each week (MVP, business model)
Customer interviews

Implementation Timeline

I&E Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Align I&E programs with CO leadership and establish success metrics																				
Establish I&E Liaison at individual NNCI sites																				
Adapt successful year 1-5 I&E programs for NNCI-wide implementation in years 6-10																				
Identify and recruit EiRs at each NNCI site; establish EIR incentives/objectives																				
Adapt and refine REEU add-on for NNCI-wide implementation																				
Integrate components of NNCI Innovator's Academy across NNCI sites																				
Launch NNCI-wide Industry Seminar Series and run annually																				
Offer NNCI REEU add-on to NNCI REU coordinators																				
Launch NNCI-wide NTEC program and run annually																				
Launch NNCI EiR program																				
Launch NNCI Innovator's Academy																				
Evaluate and refine I&E program effectiveness annually																				
Seek resources to sustain NNCI I&E programs beyond year 10																				

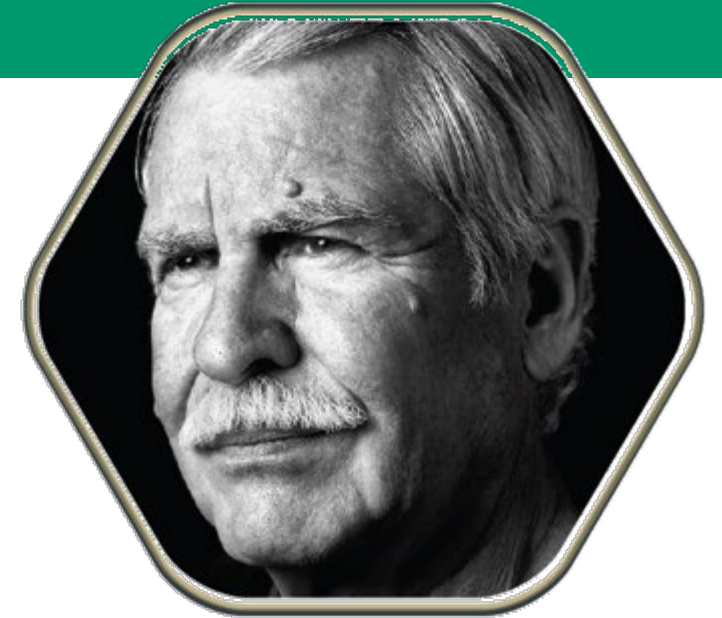
We are here

NNCI Seminar Series: 2021 I&E Speakers

Kurt Petersen, PhD | Member of the Silicon Valley Band of Angels

What Investors are Looking for in Early Stage Start-up Companies

Hosted by Karl F. Böhringer | NNI
October 28, 2021



Terrance Barkan | Executive Director, The Graphene Council

2D Advanced Materials and US National Priorities

May 27, 2021

