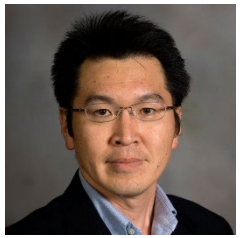
NanoEarth (Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure)

NNCI Annual Conference, October 27, 2023



Murayama
Site Director

Michel
Deputy Director

Hochella
Director of User Development

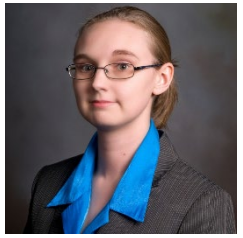
Hull
Facility Director; AD Innovation & Entrepreneurship

Marr
Technical AD

Pruden
Technical AD

Schreiber
Technical AD

Vikesland
Technical AD



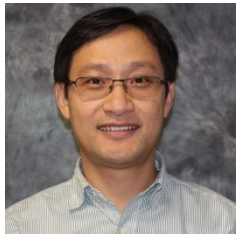
Pruitt
Assistant Director

Sowers
Facility Admin.

Velasquez
Diversity & Outreach Coordinator

Lade
Postdoctoral Associate

Horn
Instrument Specialist



Leng
Instrument Specialist

McCartney
Instrument Specialist

TBD
Instrument Specialists

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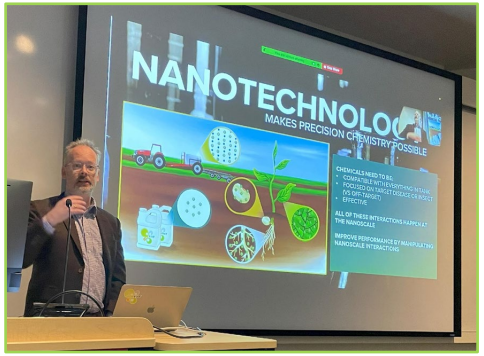
NanoEarth's Mission & Focus

Mission

The mission of NanoEarth is to stimulate discovery and innovation, and to share knowledge of Earth and environmental nanoscience and nanotechnology

Focus Areas

- Non-traditional areas of study
  - Geo and Earth Sciences
  - Environmental Sciences
  - Agricultural Sciences
- Diversity – MUNI (Multicultural & Underserved Nanoscience Initiative)
- Innovation & Entrepreneurship



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What successful examples of programs, activities, and relationships in the current NNCI could be adapted or expanded for multiple sites in a future network to increase impact?

NanoEarth Innovation Ecosystem

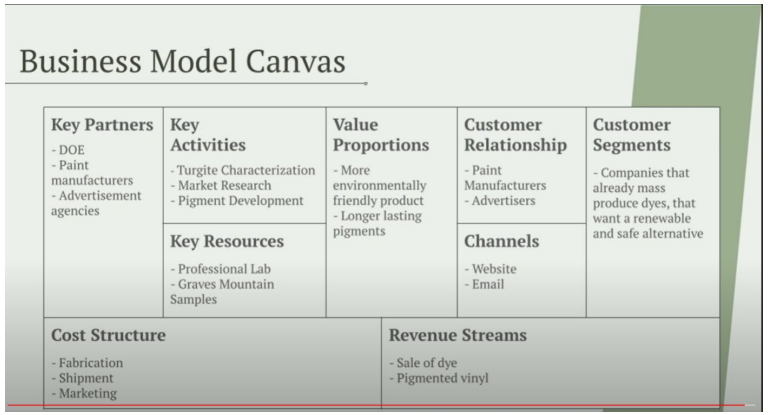
Goal: Provide an environment that fosters thriving industrial engagement, innovation and entrepreneurship.

Matthew Hull

Associate Director for Innovation and Entrepreneurship
NanoEarth & NNCI Coordinating Office

- Entrepreneur-in-Residence (EiR)
- NTEC - NanoTechnology Entrepreneurship Challenge
- Research AND Entrepreneurship Experience for Undergraduates (REEU)
- Industry Engagement

REEU
Research **AND Entrepreneurship** Experience for Undergraduates



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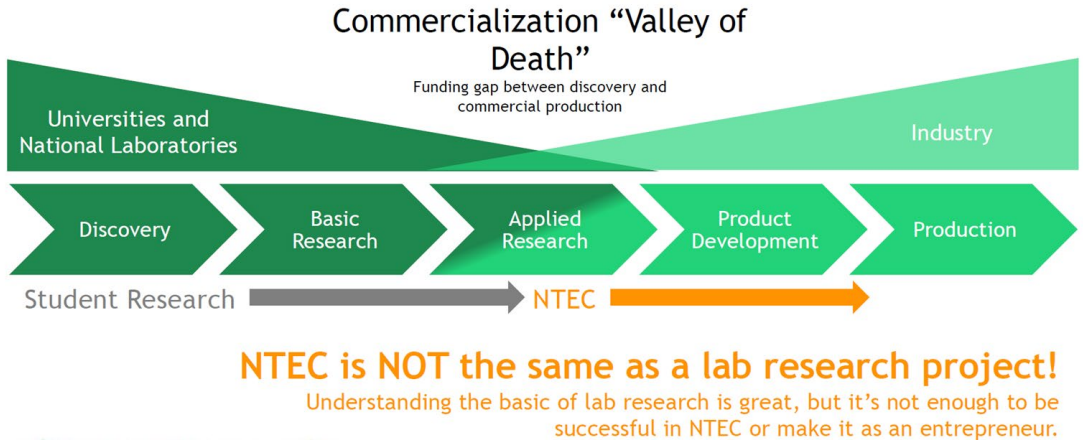
NNCI Nanotechnology Entrepreneurship Challenge (NTEC)

Team #	Student Lead(s)	NNCI Site	Award Type	Mentor(s)	NTEC Title
35	Hunter Holden	SENIC (JSNN)	Diversity ($1000)	Dr. Dennis LaJeunesse	Structural bacterial cellulose
36	Victor Mukora	NanoEarth	Regular ($500)	Dr. Anne Brown	Applications of real-time machine learning to solar energy
37	Trayda Murakami	NanoEarth	Regular ($500)	Dr. Matthew Hull, Ms. Tonya Pruitt	Women in NanoEARTH
38	Naimat K. Bari	NanoEarth	Regular ($500)	Dr. Bahareh Behkam	Nanofibrous living materials for pathogen detection
39	Mayuk Sengupta	NanoEarth	Regular ($500)	Dr. Marc Michel	Non-lethal ceramic/crystal tipped bullets
40	Micheal Erb Charles McKee	NanoEarth NanoEarth	Regular ($500)	Dr. Marc Michel	Chemical upcycling of polystyrene waste in aryl ketones
41	Charlie Ver Beek	NanoEarth	Regular ($500)	Dr. Craig Tollin	The effect of organic dye used in an organic photovoltaic cell on efficiency
	Chloe Nyhart	NanoEarth			
42	Cade Toth	NanoEarth	Regular ($500)	Dr. Marc Michel	Characterization of natural iridescent iron oxyhydroxide from Graves Mountain, Georgia
43	Haoxuan (Angelo) Lyu	MANTH	Regular ($500)	Prof. Marc G. Allen	Exploration of degradable encapsulants of bilayer wax systems
44	Ivonne Gonzalez Gamboa	SDNI (UC San Diego)	Diversity ($1000)	Dr. Yves Theriault, Dr. Nicole Steinmetz	Nanoparticle-embedded pesticides for reduced environmental toxicity

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 Showcase	

Supported by Readings, Mentorship



NTEC is NOT the same as a lab research project!

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

The NNCI is helping develop a new generation of "nano savvy" innovators and entrepreneurs who can help solve real-world problems using nano-enabled technologies.

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Expanding & Strengthening the Innovation Ecosystem

M. Hull, Chair
NanoEarth

Primary Need: People - Dedicated and clearly defined role for an Innovation and Entrepreneurship person at individual sites (similar to Education & Outreach, SEI, and Computation)

Kevin Walsh
KY Multiscale

Andy Ligley
MONT

Sara Ostrowski, Daniella Duran
nano@stanford

Jenna Huttenmaier, Steve Wignall
NNF

Kristin Field, Gerald Lopez, Pat Watson
MANTH

Karl F. Böhringer
NNI

Yves Theriault
SDNI

Ying Jia
SHyNE

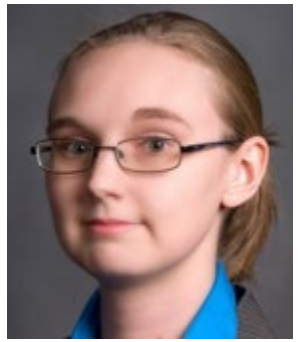
Ron Olson
CNF

Sherine Obare, Paul Joseph
SENIC

Jessica Hauer
NCI-SW

Mughees Khan
CNS

Phillip Strader
RTNN



Tonya Pruitt
NanoEarth

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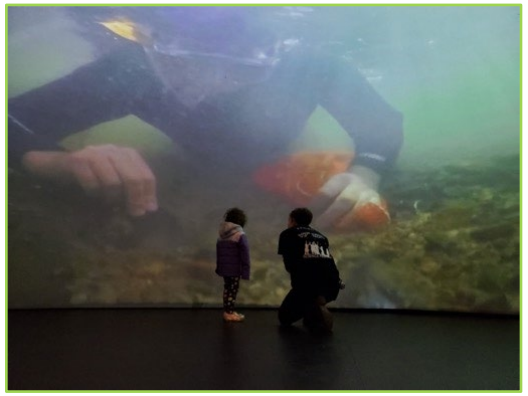
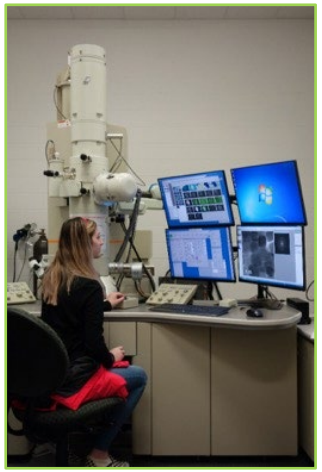
Pictured: Current I&E Working Group Members
(14 sites represented)

Research Community: Earth & Environmental Sciences

Goal: Enhance the Earth/environmental capacity and impact of the NNCI

- Develop research tools and infrastructure to provide us with the capacity to approach more complex questions than ever before;
- Train the next generation of researchers to approach scientific inquiry in a way that crosses scales and scientific disciplines;
- Foster collaboration and convergent research across the network and beyond by helping us to consider multiple levels of organization and complexity in addressing key trans-disciplinary questions.





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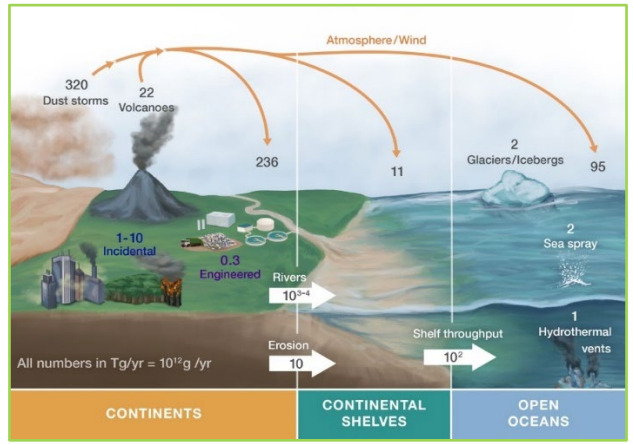
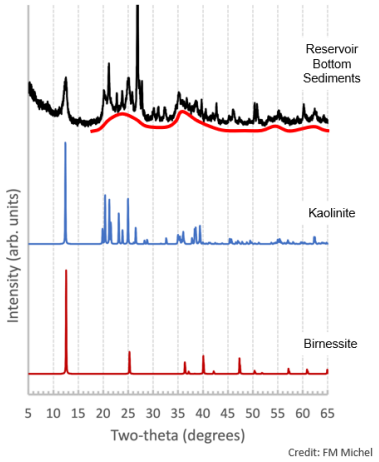
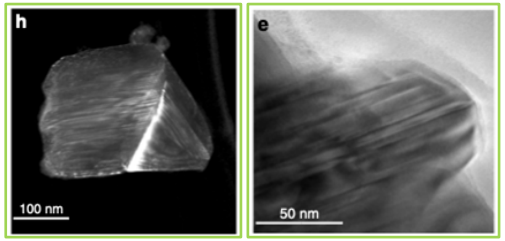
Primary Activity: Annual Virtual Workshops (2021, 2022, 2023)

Theme: New Frontiers of Nanoscience Research in the Earth and Environmental Sciences

- Topics areas have included:
  - A Nanoscience Approach to Understanding Environmental Samples
  - Role of Nanoparticles and Drinking Water Quality
  - Water Purification
  - Nano/Microplastics
  - Agriculture and Elemental Cycling
  - Sustainable Nanotechnology
  - Nanoscale Mineralogy of Meteorites
- "Office Hours" with the Experts
- All resources, including workshop video recordings, are available on the workshop website







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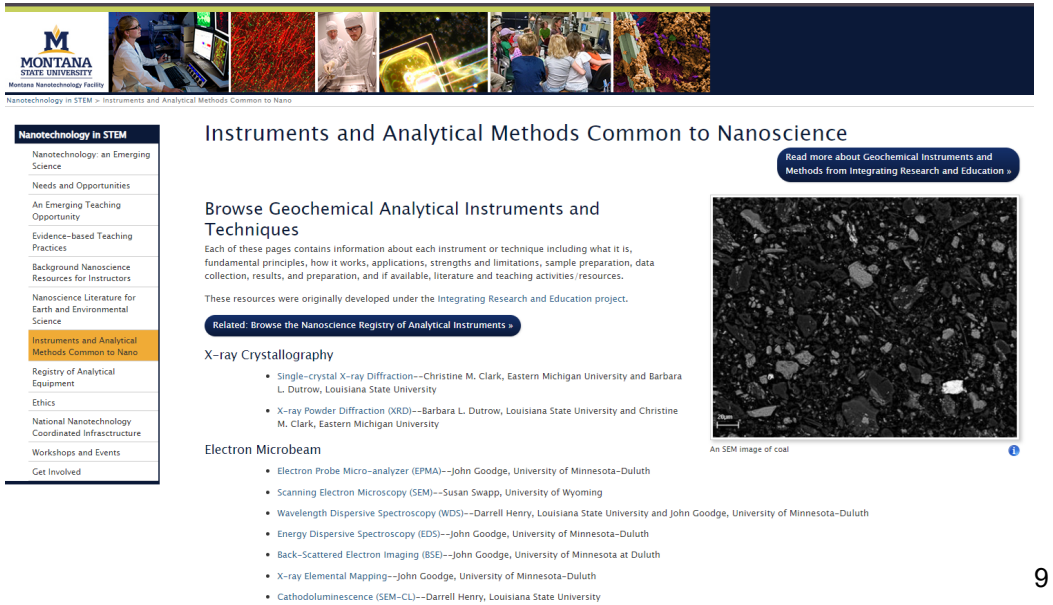
The Next Iteration of the Research Community

- Further develop the community
  - Both within NNCI and external
  - Not just workshop ‘attendees’ – actual community
- Expand Activities
  - More than a once per year workshop
  - Sessions at conferences (e.g., Goldschmidt)
  - Staff exchanges, seminars, etc.
- Output
  - Easily navigable resources
  - Environmental sample prep guides



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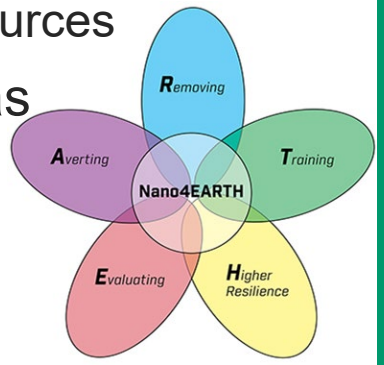
Panel Topic: How does NNCI support national research priorities, and how can this be enhanced in a future nanotechnology infrastructure?

Focusing on National Research Priorities:
Bottom Line: *There's a lot more than CHIPS!*

- NSF 10 Big Ideas
  - Growing Convergence Research
  - Navigating the New Arctic
  - NSF Includes
  - Understanding the Rules of Life
- NAE Grand Challenges
  - Providing Access to Clean Water
- USDA Priority Research Topics (Research Strategy: Cultivating Scientific Innovation)
  - Global Food Supply and Security
  - Climate and Energy Needs
  - Sustainable Use of Natural Resources
- EPA High-Priority Research Areas
  - Children's Environmental Health
  - Climate Change
  - Environmental Justice
- DOE Energy Earthshots



NNCI Provides

- Infrastructure & Expertise
- Flexibility & Nimbleness
- Regional Focus w/i National Network
- Reach & Scalability
- Research Communities
- Workforce Development

Enhancing a Future Nano Network

- Intensify democratization efforts
- Implement best practices & activities network wide
- Focus on connecting & growing a network of networks (e.g. research communities, regional networks, synergy with other facility networks)

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Acknowledgements

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INSTITUTE FOR CRITICAL TECHNOLOGY AND APPLIED SCIENCE
VIRGINIA TECH

U.S. DEPARTMENT OF ENERGY

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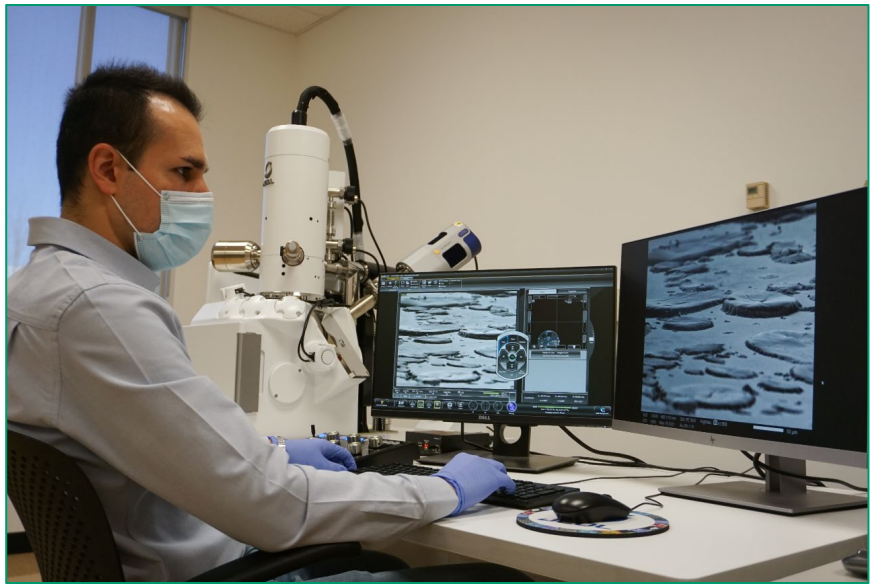
Questions?



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