

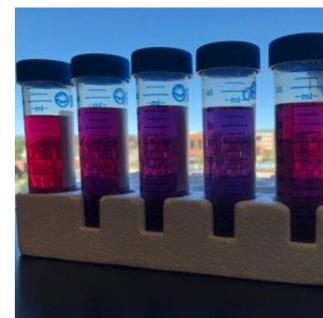
[NanoEarth]: Overview

- NanoEarth is the only NNCI site dedicated to the nanoscience and technology of Earth and its environment.

Partner:

- Focus Areas:

- Non-traditional areas of study
- Diversity – MUNI (Multicultural & Underrepresented Nanoscience Initiative)
- Innovation & Entrepreneurship

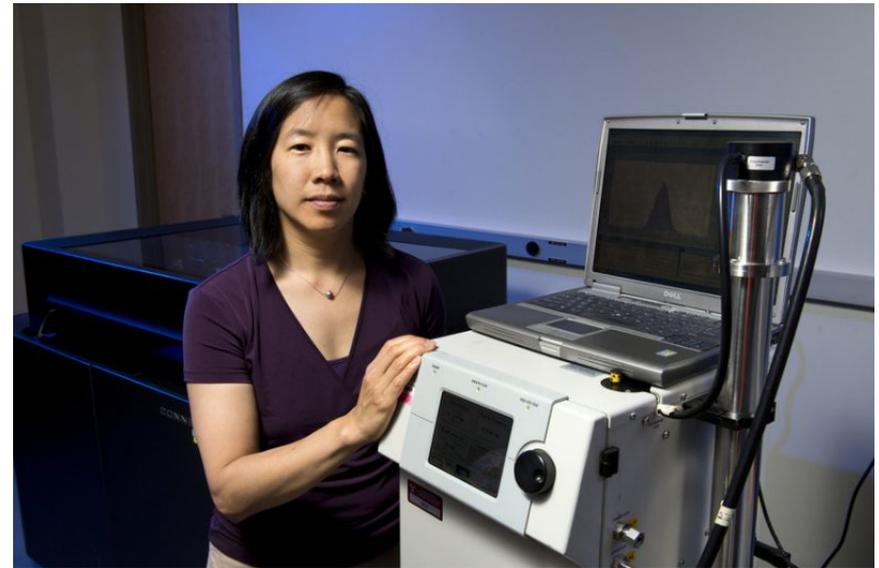


*Engineered Nanoparticles:
Contaminants of Concern or
Building Blocks for a Sustainable
Future – Considerations for
Public and Environmental
Health Professionals*

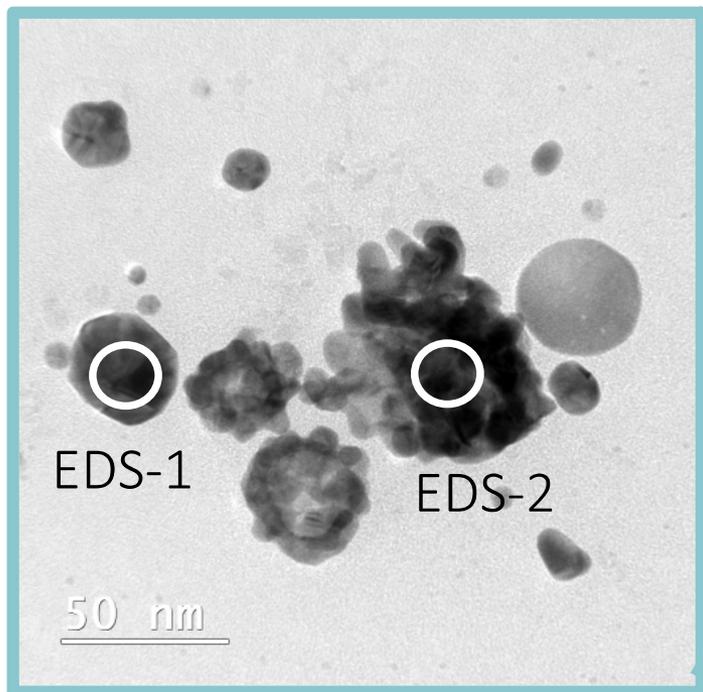


[NanoEarth]: Personnel Updates

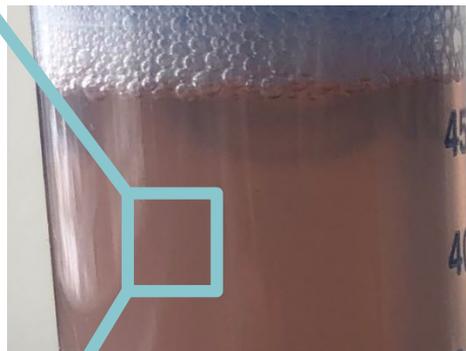
- Retirement of Founding Site Director Michael Hochella
 - Michael Hochella (PNNL) – Director of User Development
- New Site Director – Mitsuhiro Murayama, Professor of Materials Science and Engineering & Geosciences Adjunct
- New Deputy Director – Linsey Marr, Professor of Civil & Environmental Engineering



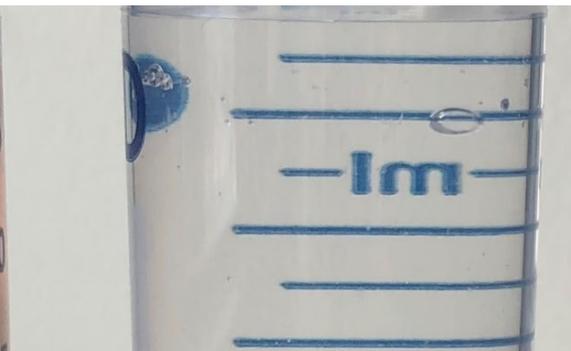
Research Highlight: Industry Collaboration: Scalable Removal of Nanoparticles from Wastewater



Nano Waste



Effluent



- **Small, woman-owned company** located in Appalachia (Wise Co., VA)
- NanoEarth **demonstrated effectiveness of MicroEvap™ purification technology**
- Supports the company to expand markets and secure SBIR funding



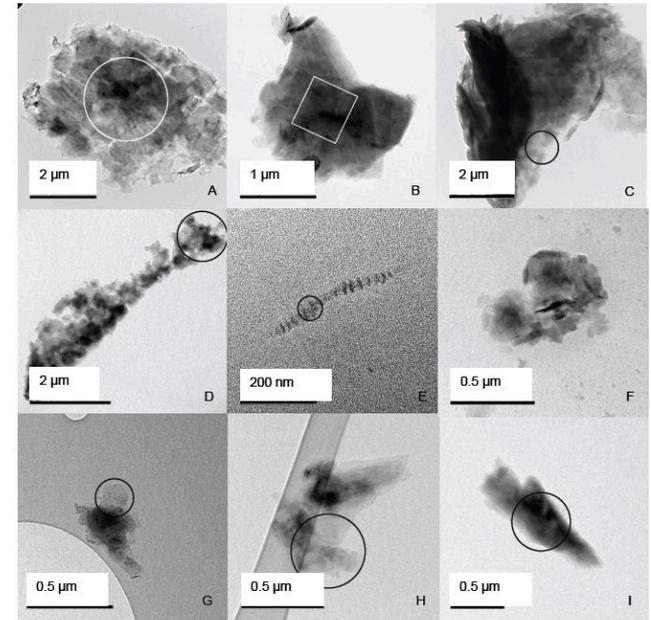
MicroEvap™
Technology



Research Highlight:

Abiotic synthesis of graphite in hydrothermal vents

- The structure and origin of an old component of deep marine organic carbon has been a mystery.
- Identifying the sources, transport pathways, and fate of this relatively old carbon is key to understanding the dynamics of the marine carbon cycle.
- This study reveals that the old carbon is graphite that originates from hydrothermal vents, and NanoEarth supported nanoscale characterization.



TEM images of reduced carbon particles reveal that they are graphite originating from hydrothermal vents.

Estes, E., Berti, D., Coffey, N.R., Hochella, M.F., Jr., Wozniak, A.S., and Luther, G.W., III (in review) Abiotic synthesis of graphite in hydrothermal vents. *Nature Geosciences*.

[NanoEarth]: Education and Outreach

Nanoscience Professional Development Workshop

- 2 days of instruction and hands-on activities
- Teachers received lab supplies for their classroom & access to a Google Drive full of resources

Assessment:

- Content Rating: 9.3/10
- Reach: 16 teachers impacting over 1,130 students per year

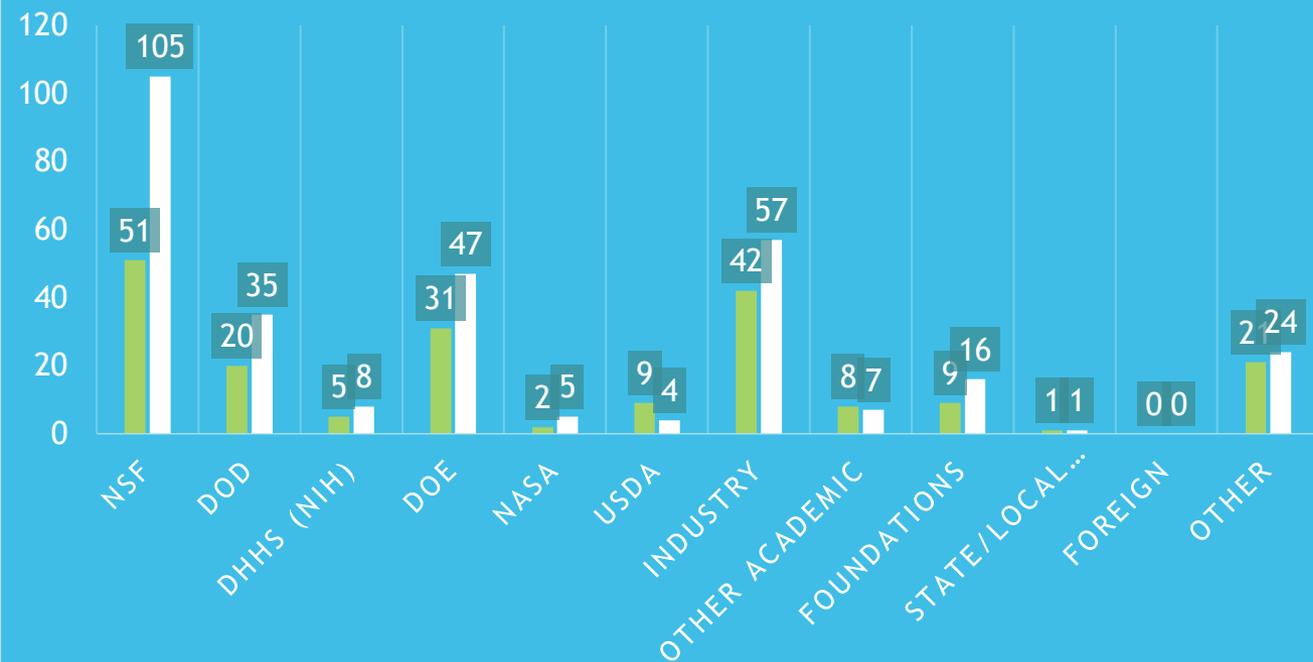


“Great workshop! I have been to many over my career and this workshop is one of the best!”

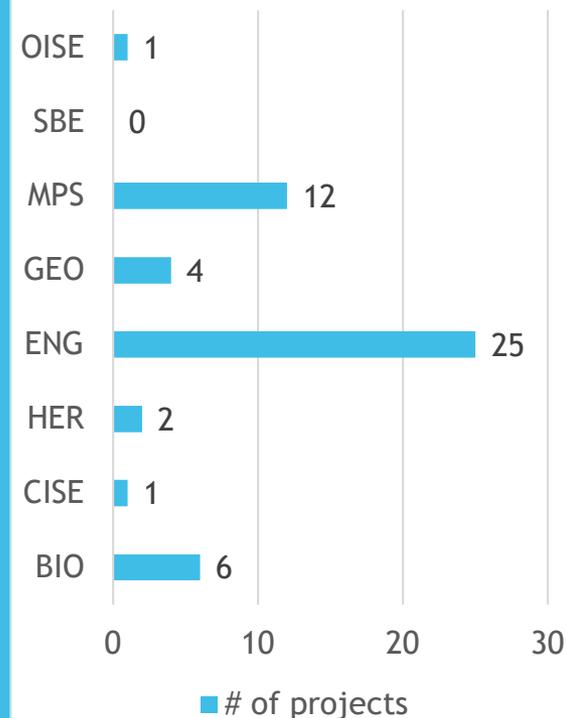


FUNDING REACH

■ # of projects from each funding source ■ # of users



NSF Directorates



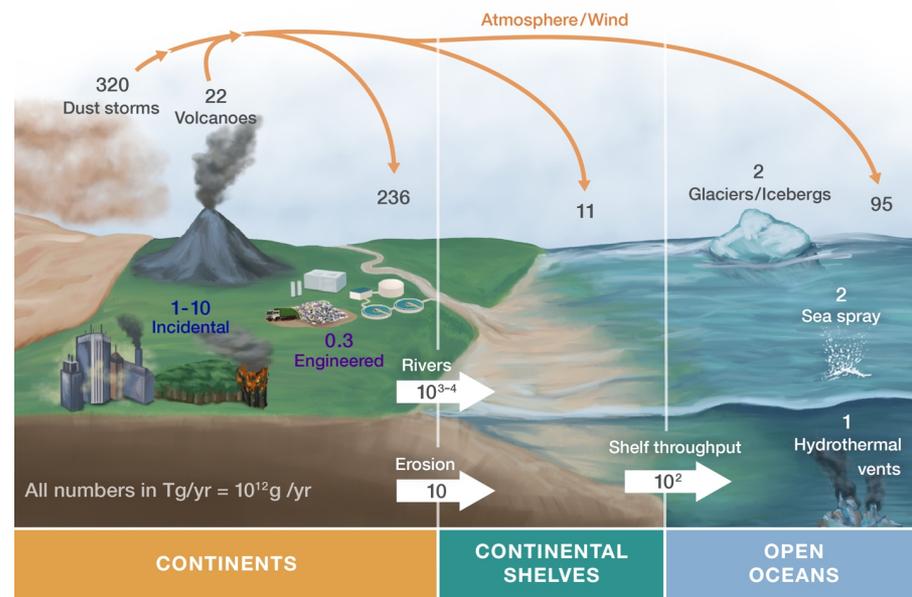
of PIs included in count: 111
of users: 219

of PIs funded by NSF: 38
of users funded by NSF: 105

[NanoEarth]: Network Collaboration

Natural, incidental, and engineered nanomaterials and their impacts on the Earth system

- Comprehensive *Science* review designed to inform the general science community
- NNCI Sites – NanoEarth+partner PNNL, MONT, NCI-SW



An estimated global accounting for all natural, incidental, and engineered nanomaterials on/in Earth's surface and atmosphere.

Hochella, M.F., Jr., Mogk, D.W., Ranville, J., Allen, I.C., Luther, G.W., III, Marr, L.C., McGrail, B.P., Murayama, M., Qafoku, N.P., Rosso, K.M., Sahaj, N., Schroeder, P.A., Vikesland, P., Westerhoff, P., and Yang, Y. (2019) Natural, incidental, and engineered nanomaterials and their impacts on the Earth system. *Science* 363, eaau8299.

[NanoEarth]: Panel Discussion

Aligning NNCI with National Research Priorities

- Catalyze interest and investment in fundamental research
- Continue to focus on diversity
- Build collaborations with industry and other agencies
- Earth & Environmental Sciences requires a convergence of disciplines to tackle global and long-term issues
 - Fate and Transport
 - Life Cycle Assessment
 - Ecotoxicology
 - Nanobiosensors
 - Environmental treatment

Panel Discussion – Collaborations Beyond NNCI

- Challenge: Funding to support sustainable interaction
 - e.g. exchange of technical and administrative staff
- Challenge: Time/funding/reporting cycles can vary internationally
 - Can be difficult to grow a seed project that has high potential impact research
- Suggestion: Similar goals and expanded potential
 - Find a collaboration partner where you both benefit
 - Example: Nanoscience program at Virginia Tech