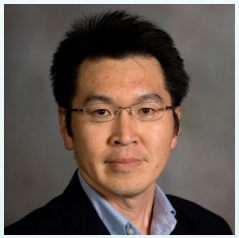
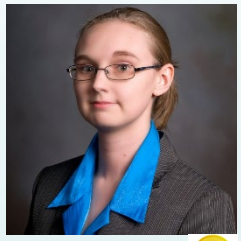
NanoEarth Team (Virginia Tech)



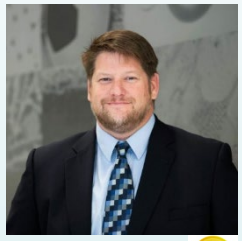
Murayama
Site Director

Michel
Deputy Director

Hochella
Director of User Development



Pruitt
Assistant Director



Hull
AD Innovation & Entrepreneurship

E/O Coordinator

Marr
Civil/Env. Eng.

Pruden
Civil/Env. Eng.

Schreiber
Geosciences

Vikesland
Civil/Env. Eng.

Reynolds
NCFL Director

Sowers
NCFL Admin.

Instrument Specialist

Leng
Instrument Specialist

McCartney
Instrument Specialist

Instrument Specialist

Instrument Specialist

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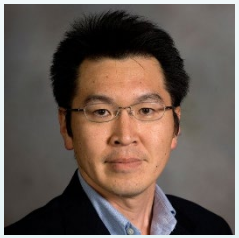
NanoEarth Team (Virginia Tech)



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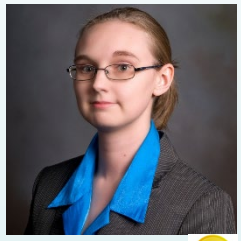

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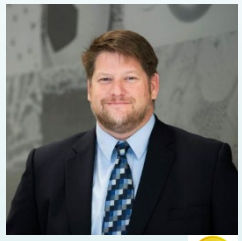

Hull
AD Innovation & Entrepreneurship

TBD
E/O Coordinator

Marr
Civil/Env. Eng.

Pruden
Civil/Env. Eng.

Schreiber
Geosciences

Vikesland
Civil/Env. Eng.

Reynolds
NCFL Director

Sowers
NCFL Admin.

Singerling
Instrument Specialist

Leng
Instrument Specialist

McCartney
Instrument Specialist

Sanchez
Instrument Specialist

TBD
Instrument Specialist

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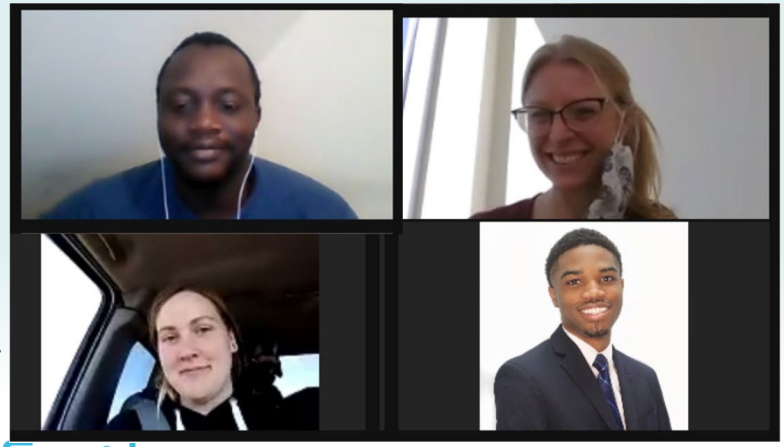
Co-PI/Staff-Led Initiatives During the Pandemic

On-line Educational Module Development & Remote Training

Post-Pandemic Goal: Rebuild the User Base

- ✓ Increase sharable resources for non expert users (will help with planning)
- ✓ Reduce "per user" staff time to accept more new projects & deep dive

- Nano Earth Systems (Nano-ES) Research Community
- Sharing our best practice with the entire network (Hall @ Coordinating office)
  - Providing a scalable opportunity that can be replicated across the NNCI, e.g., *NanoTechnology Entrepreneurship Challenge, Industrial Seminar Series*
- Nontraditional-research-fields Engagement (Michel, Schreiber, new postdoc)
  - Researchers: VT School of Plant & Environmental Sciences, Cooperative Extension, Government (DEQ, EPA), Industry
  - Education: 4-H & FFA



In 2021 NanoEarth awarded three NTEC-MUNI awards to teams from North Carolina A&T (two teams) and Central Community College in Nebraska (one team).

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NanoEarth's Mission – Reflected in New Initiatives

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

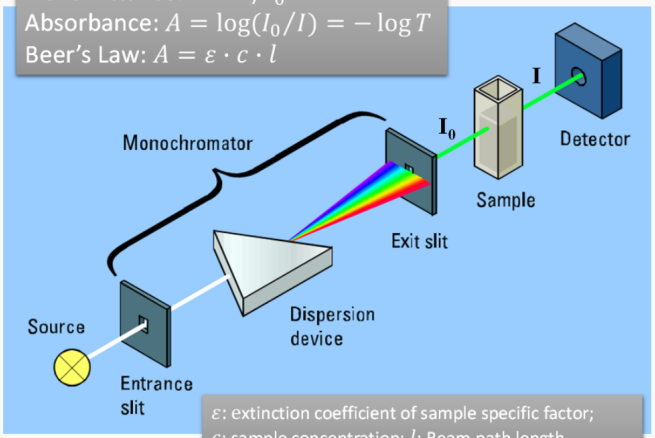
- Sharing our best practice with non expert users -

About | Our Instrument | Projects | Selected Publications | UV-Vis Resources

Ultraviolet-visible (UV-Vis) spectroscopy is a multiresponse technique that analyzes the evolution of the absorption spectra in UV-Vis regions during an electrode process. This technique provides information from an electrochemical and spectroscopic point of view. In this way, it enables a better perception about the chemical system of interest. On one hand, molecular information related to the electronic levels of the molecules is obtained from the evolution of the spectra. On the other hand, kinetic and thermodynamic information of the processes is obtained from the electrochemical signal. Ultraviolet-visible (UV-Vis) spectroscopy is a multiresponse technique that analyzes the evolution of the absorption spectra in UV-Vis regions during an electrode process. This technique provides information from an electrochemical and spectroscopic point of view. In this way, it enables a better perception about the chemical system of interest. On one hand, molecular information related to the electronic levels of the molecules is obtained from the evolution of the spectra. On the other hand, kinetic and thermodynamic information of the processes is obtained from the electrochemical signal.

UV-Vis spectrophotometer is a powerful analytical technique to determine the optical properties (transmittance and absorbance). It is generally used to determine analyte concentrations or the chemical conversion of a component in solution, and measure the transmittance of a solid sample.

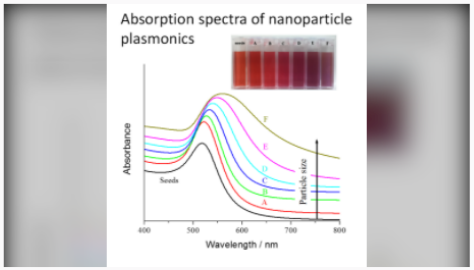
Transmittance: $T = I/I_0$
Absorbance: $A = \log(I_0/I) = -\log T$
Beer's Law: $A = \varepsilon \cdot c \cdot l$

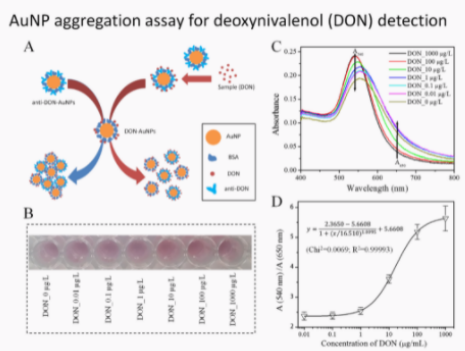


ε: extinction coefficient of sample specific factor;
c: sample concentration; l: Beam path length

APPLICATIONS

- Determination of the optical properties of liquids and solids
- Quantification of analytes in solutions
- Gold nanoparticle size/shape identification
- Colorimetric analysis





LIMITATIONS

- Other components in solution may cause interferences
- Chromatographic analysis methods are more accurate and precise than UV/VIS/NIR methods
- Sample size / sample volume have specific requirements (see technical specifications)

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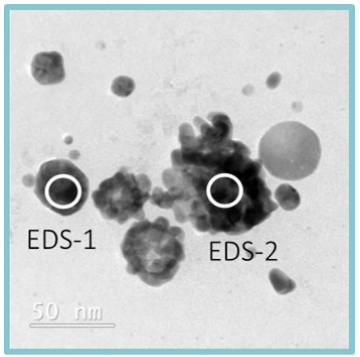
Extra slides (For Q&A)



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MICRONIC TECHNOLOGIES
The Clean Water Solution
MicroEvap™ Technology

Uniquely Situated to Support COVID-19 Efforts

- Aerosols, Face Masks, Test Swabs, Sewage Testing, & Football -

Halting Environmental Antimicrobial Resistance Dissemination

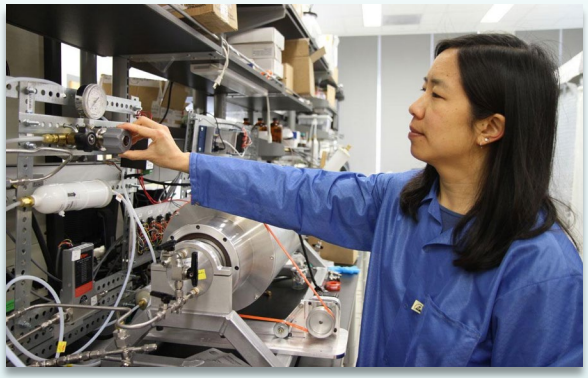
Early warning system to determine if a community is shedding virus, for resource allocation

Designing & testing the efficacy of face shields for football helmets

The New York Times

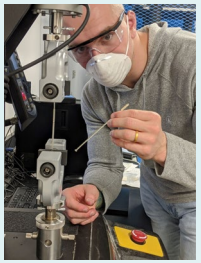
The Scientist, the Air and the Virus

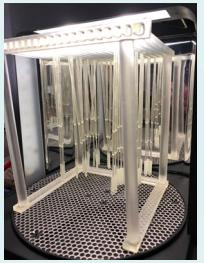
Most of us had never heard of aerosol science before the pandemic. Then Virginia Tech's Linsey Marr showed up and became our tour guide to the invisible world of airborne particles.



Mentioned 5,433 times in news from 86 countries reaching an estimated 14 million unique individuals.

Integrated powered air-purifying respirators (PAPRs) retrofit kit





3D Printed Test Swab Method Development & Implementation

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