



National Institute of
Environmental Health Sciences
Superfund Research Program

Virtual Technology Fair for Small Business Grantees

Technologies for Lead (Pb) in Water: Detection and Treatment

Sponsored by the NIEHS Superfund Research Program

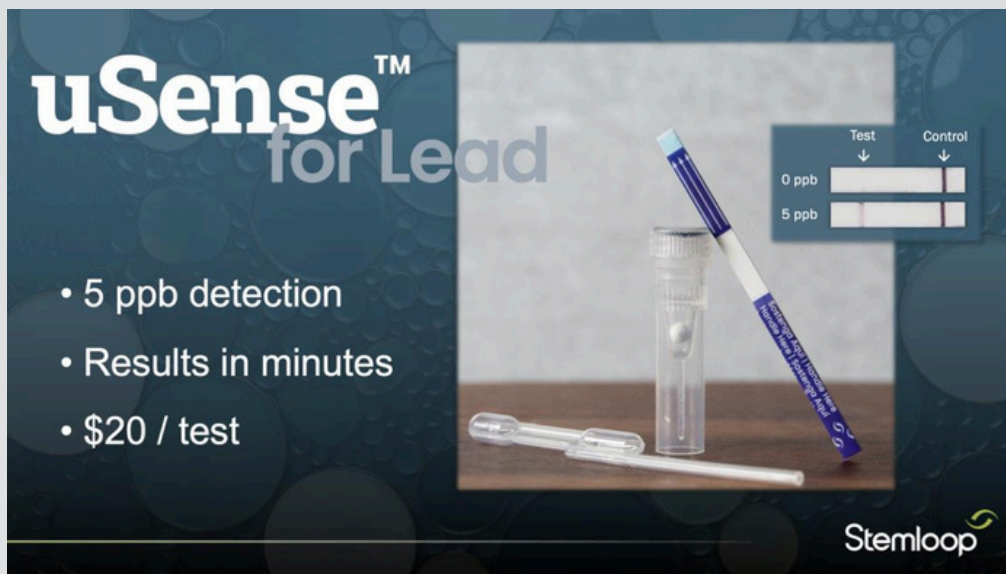
Monday, October 28, 2024
2:30 – 4:00 p.m. ET



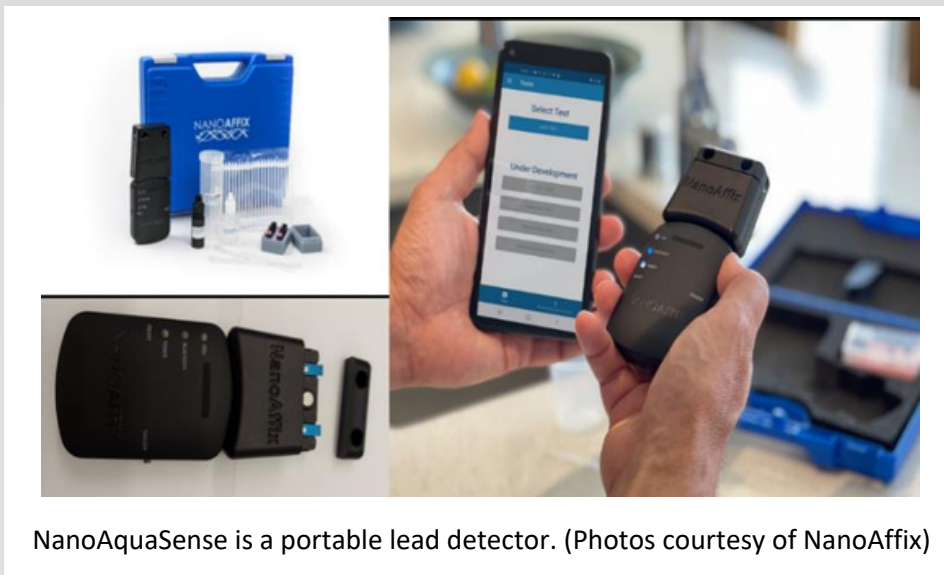
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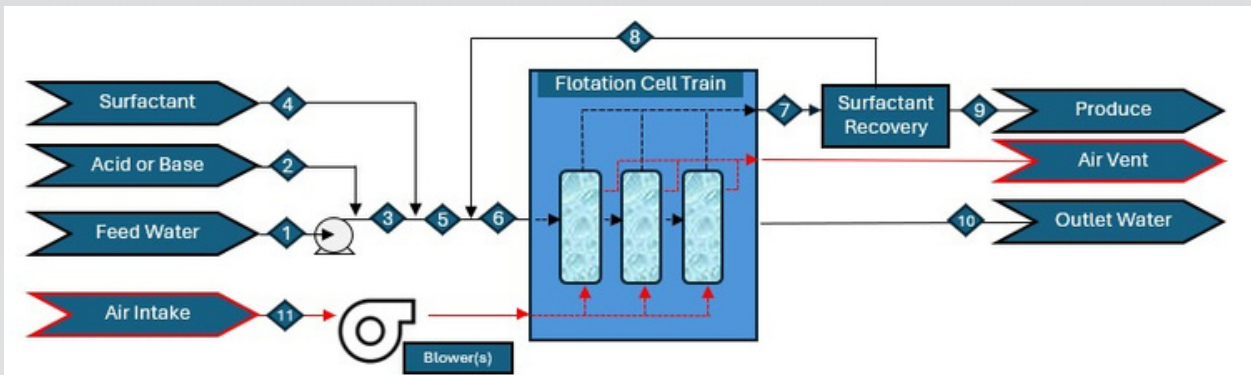
<p>Grant Information</p>	<p>Project: A Paper-Based Synthetic Biology Platform for the On-Demand Testing of Water Quality Grand Number: R44ES031899 Project Link: Stemloop, LLC</p>
<p>Presenters</p>	<p>Khalid K. Alam, Ph.D.</p>
<p>Technology Name and Description</p>	<p>uSense™ for Lead is an easy-to-use, rapid, and inexpensive test for the presence of lead in drinking water. The technology couples “cell-free” biosensor technology, in which a freeze-dried transcription reaction is regulated by a lead-responsive allosteric transcription factor, with lateral flow readout (similar to at-home rapid COVID-19 tests).</p>
<p>Innovation</p>	<p>uSense™ for Lead enables equipment-free screening of lead in drinking water by non-expert users in their home. It is designed as a rapid, scalable screening test that can be mailed directly to the end-user. The technology is highly adaptable and has been used to detect a wide range of small molecule analytes, ranging from ions to complex natural products.</p>
<p>Contaminant and Media</p>	<p>5 ppb detection of lead in drinking water within 30 minutes and for less than \$25/test</p>
<p>Technology Readiness Level (TRL)</p>	<p>Stemloop is at technology readiness level 7 having tested their system prototype in a space environment.</p>
<p>Main Point of Contact</p>	<p>Khalid K. Alam khalid@stemloop.com (314) 497-1984</p>



<p>Grant Information</p>	<p>Project: Graphene-based Nanosensor Device for Rapid, Onsite Detection of Total Lead in Tap Water Grand Number: SB1ES036493 Project Link: NanoAffix Science, LLC</p>
<p>Presenters</p>	<p>James Hill, Ph.D.</p>
<p>Technology Name and Description</p>	<p>NanoAquaSense: NanoAffix Science is developing a portable handheld detector for rapid cost-effective detection of lead using nanotechnology to fabricate graphene-based sensors.</p>
<p>Innovation</p>	<p>This technology utilizes graphene nanosheets, which have unique electronic properties enabling precise monitoring of small changes in concentration. The sensor can easily be adapted to detect many other analytes by attaching probes to the graphene that selectively interact with the desired target compound.</p>
<p>Contaminant and Media</p>	<p>This device targets water quality monitoring and can be used to conduct onsite real-time measurements of lead in drinking water and groundwater. The target limit of detection is a lead concentration of 1 ppb, and the measurement takes about one minute.</p>
<p>Technology Readiness Level (TRL)</p>	<p>NanoAffix is at technology readiness level 7, having tested prototypes in an operational environment.</p>
<p>Main Point of Contact</p>	<p>James Hill jhill@nanoaffix.com (920) 226-5798</p>

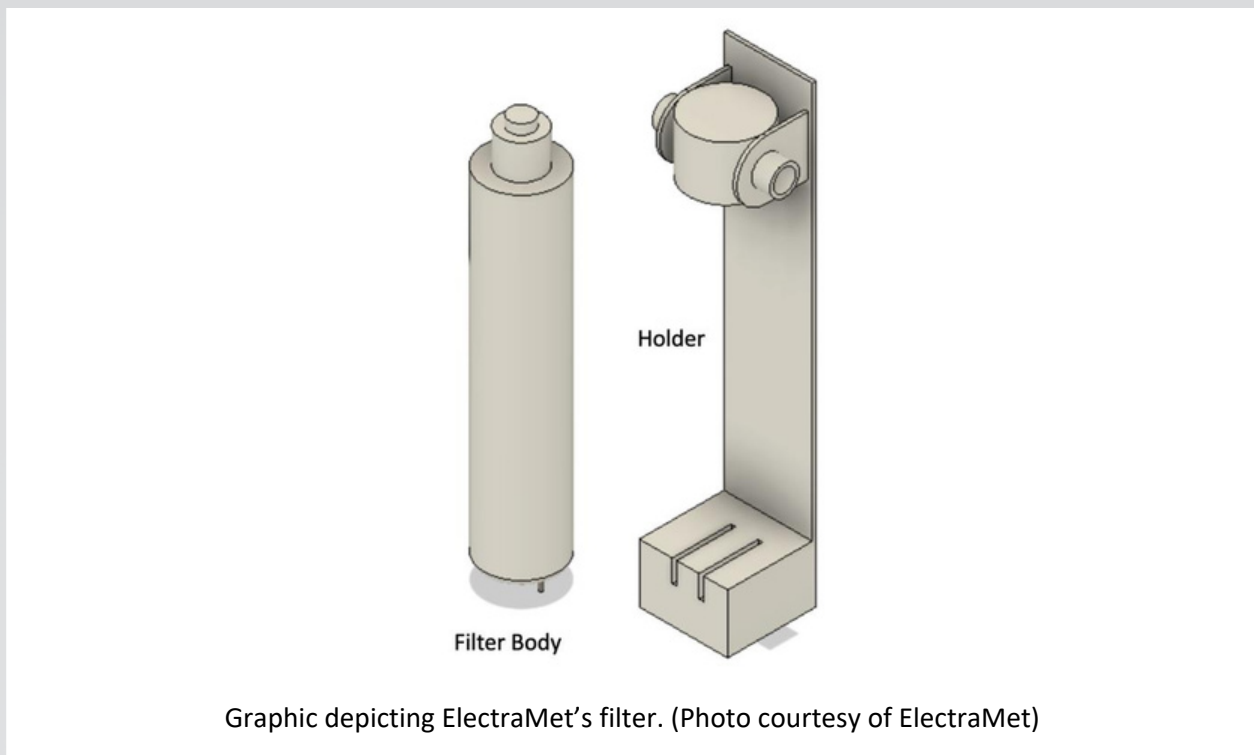


Grant Information	<p>Project: Rhamnolipid-Based Remediation Technologies for Uranium and Rare Earth Element Contamination Grand Number: R44ES031897 Project Link: Glycosurf, LLC</p>
Presenters	Chett Boxley, Ph.D., and Raina Maier, Ph.D.
Technology Name and Description	Bioinspired glycolipids are employed in recovery of rare earth elements, uranium, lead, and other metals from both simple systems, e.g., ground water and complex systems, e.g., aqueous mining waste streams. The team has successfully used ion flotation and functionalized solid media technologies. They are developing membrane and hydrogel technologies.
Innovation	Glycolipids are green molecules with high efficiency, high treatment capacity, and low waste generation. This technology can be scaled for treating small point-of-use systems to large-scale water treatment systems.
Contaminant and Media	Glycolipid technology currently targets critical metals, such as rare earth elements, as well as common water contaminants, including lead and uranium, in any type of aqueous medium.
Technology Readiness Level (TRL)	TRL is 4-5 for ion flotation. Technology has been demonstrated at the lab-scale and is currently being scaled for on-site demonstration. TRL is 3 for membrane and hydrogel technologies.
Main Point of Contact	<p>Chett Boxley boxley@glycosurf.com (435) 901-1839</p>

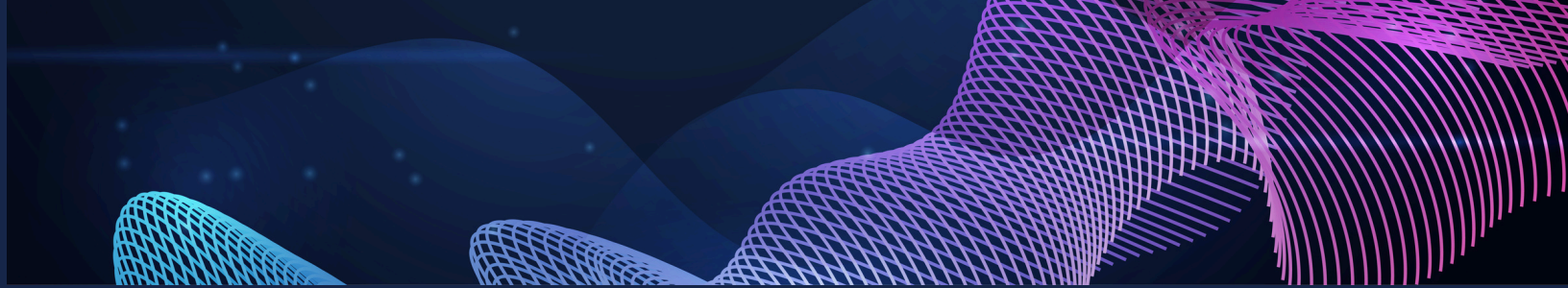


Process flow diagram for glycolipid-based ion flotation of mining solutions. (Photo courtesy of Glycosurf and the University of Arizona)

Grant Information	<p>Project: Electrochemical POU Water Purification System Grand Number: SB1ES028171 Project Link: PowerTech, LLC (ElectraMet)</p>
Presenters	Lindsay Boehme, Ph.D.
Technology Name and Description	ElectraMet has developed an electrochemical filter for metals removal. It uses carbon electrodes and a small amount of electricity to purify water.
Innovation	Their filtration technology is highly specific for lead, more reliable, efficient, and longer lasting than off-the shelf water filtration options. The end product is envisioned to be installed under the sink for point-of-use.
Contaminant and Media	The filter targets the removal of heavy metals in water, in particular lead in drinking water. The target treated concentration for lead is less than 5 ppb. The device treats water on demand.
Technology Readiness Level (TRL)	ElectraMet is at technology readiness level 4 having validated their prototype in a laboratory environment.
Main Point of Contact	<p>Lindsay Boehme lindsay.boehme@electramet.com (859) 600-1857</p>



Graphic depicting ElectraMet’s filter. (Photo courtesy of ElectraMet)



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