

**Poster #21-9****New Analytical Tools for in-situ Research of Biogeochemicals and Trace Metals**Donald Nuzzio<sup>1\*</sup><sup>1</sup> Analytical Instrument Systems, Inc., Flemington, N.J.Contact: [ais@aishome.com](mailto:ais@aishome.com)

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The challenge in collecting data from any environment is the lack of tools that combine all the measurements required to understand a particular system under study. Researchers are left with interfacing together a myriad of instruments to obtain the information required.

Our SBIR Phase II project has focused on bringing electrochemical instrumentation into the field in a simple, affordable and user-friendly system. From the preparation of the sensor itself, to controlling the instrument and then processing data we have put together new unique systems allowing for accurate collection of biogeochemical data from any aquatic environment. These new electrochemical systems can perform any analysis from anodic or cathodic stripping voltammetry to simple current monitoring experiments. These systems allow the detection of most biogeochemicals including (and not limited to), oxygen, sulfide, iron, iron sulfide, and manganese directly on one sensor in real time in about 3-5 seconds. Analyzing any ion in the environment from mercury to any heavy metal down to the parts per trillion levels will become routine. The design of our new instruments allow deployment into any area including rivers, streams, ponds, lakes, marshes, wells and even hydrothermal systems. A new instrument called the AIS DLK-Well-Stat-1 will be deployed at the Crested Butte area in Colorado with Ken Williams and at Savannah River National Laboratory in Aiken, South Carolina with Dan Kaplan. This particular new instrument is 1" wide and can be deployed in any well monitoring system for long periods of time. Having the ability to connect these units to telemetry will afford real time observation for any field site.

An offshoot from our basic designs has allowed us to develop an instrument called the AIS DLK MP-1, micro-pstat. This hand-held unit will allow the researcher a way to quickly investigate any water source. The above systems mentioned can be set-up and run using an iPad or iPhone as well as a simple computer interface through USB. The newly designed AIS DLK-1 instrument is a research tool allowing for more complicated integrated field measurements. This instrument is equipped with an Ethernet connection for control and data dumping locally or to the cloud. It will also allow flexibility for mesh networks to be developed from many other instruments.

Just recently one of our DOE colleagues approached us to collect data from several sensors of their particular choice. These sensors could be easily connected to our current bench top AIS DLK-MO-1, micro-observatory system. However this system has more capability than is required for their particular application. Having a smaller more compact instrument to accomplish this, lead us to the conclusion that the AIS DLK-Well-Stat-1 could be made to collect data from any sensor (not voltammetric) with very little time in development for immediate deployments. This new instrument will be called the AIS DLK- Nano-Obs-1, and will currently allow for 4 channels of data to be collected from any analog sensor. The cost point will be less than \$1000 and allow for many systems to be deployed!!

In summary this poster will illustrate data collected from these new systems and allow the potential user insight into these new tools for research.