

## Field Testing ALPXS

The portable aerosol-to-liquid particle extraction system (ALPXS) was developed at Savannah River National Laboratory to facilitate very rapid sampling of potentially hazardous aerosols. Meinhard is producing a commercial version which will be available in 2010. The ALPXS pulls air at 350 L/min through an electrostatic section which charges particles, then through a collection section where the charged particles are attracted to an electrode that is continuously washed with solvent. As a result, particulates are accumulated in a very small volume of liquid (typically < 50 mL) that is ready for analysis by ICP-OES or ICP-MS, with concentration factors of as much as 13,000.

A poster at the 2010 Winter Conference on Plasma Spectrochemistry in Ft. Myers, Florida, January 4 - 9, by Dr. Gerhard A. Meyer (TP39) will provide comprehensive details on ALPXS performance, as briefly summarized here.

To test ALPXS collection efficiency, a dry aerosol generation system was used to provide known concentrations of various elements in a 0.7 L/min carrier stream. The efficiency of aerosol production was tested using a set of mini-impingers so that actual mass delivered could be known. With the ALPXS collecting aerosol at 350 L/min, a known aerosol containing Ni at 8  $\mu\text{g}/\text{m}^3$  was collected for 10 minutes. Analysis of the collection liquid by ICP-OES yielded an apparent concentration of 104  $\text{mg}/\text{m}^3$ , a preconcentration factor of about 13,000 - almost exactly as noted in documentation provided by Savannah River National Laboratory!



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## ETV for ICP-MS and ICP-OES

There are a number of advantages to electrothermal vaporization of samples into a plasma, not least of which is that nearly 100% of the sample goes into the plasma. Compare that to perhaps 3 - 5% with conventional nebulization and perhaps 30% with a desolvation system. Detection limits can be improved nearly 100-fold compared to conventional nebulization. Solid samples can be weighed into pyrolytic graphite-coated graphite boats, avoiding time-consuming and hazardous digestion procedures. Solutions can be volumetrically transferred as in GFAA.

Spectral Systems (Germany) has introduced the first purpose-built ETV system for use with ICP-OES and ICP-MS. The ETV 4000c includes an autosampler which can handle up to 50 graphite boats. A set of ceramic tweezers extracts the autosampler boat from the tray and reproducibly positions the boat within the furnace. The door closes, the system purges with argon, and the atomization cycle begins.

An ETV 4000c was recently installed at a major research laboratory to introduce samples into a



*ETV 4000c from Spectral Systems*

Thermo X-Series 2 ICP-MS. After a bit of methods development, preliminary data will be presented in a paper at the 2010 Winter Conference on Plasma Spectrochemistry.

Please contact Meinhard for more information.

## Field Testing ALPXS - continued

As an additional test of performance, the ALPXS was taken to a local large manufacturing plant to measure worker exposure levels for metals in the workplace atmosphere. It was located near an area where vigorous activity, such as hammering and product demolition, was taking place. The ALPXS was positioned within a few meters and operated for 10 minutes at 350 L/min during constant activity. The resulting collection solution was ready for immediate analysis by ICP-OES. In another experiment, the ALPXS was located near a furnace ventilation outlet where the air was again sampled for 10 minutes. In both cases, ambient levels of hazardous metals were easily detected. In contrast, standard workplace monitoring procedures require approximately 4 hours (or much more) of sampling, followed by digestion/extraction of filter media, then analysis by ICP-OES or ICP-MS. The speed and efficiency of the ALPXS yields tremendous time- and cost-savings.

In summary, the ALPXS is a device that has applications wherever there is interest in measuring the concentration of a variety of metals in ambient air or a gas stream. By virtue of the tremendous preconcentration factors, the ALPXS can produce an analytical sample in a much shorter period of time than the more typical filter collection method. Analytical chemists and industrial hygienists alike can use the ALPXS to measure metal concentrations in the workplace or outside, sample metals in process gases, or wherever imagination takes them.

A working, battery-operated ALPXS will be on display at the **Meinhard booth, #36**, during the **2010 Winter Conference on Plasma Spectrochemistry**. Please stop to see it or contact Meinhard for more information.

## Prodigy DC Arc Update

The new Teledyne Prodigy DC Arc Instrument is now available. Let us show you how fast, simple and easy analysis by DC arc can be when you have a state-of-the-art instrument.

Do you have a need for direct analysis of solids? Do you have difficult sample preparation issues for AA, ICP, or ICP-MS? Are you currently using a DC arc? You will be amazed by the sophistication of the Prodigy DC Arc which is equipped with reverse-polarity, great tools for easy method development (or method improvement), and many ease-of-use features.

The same spectrometer used in the Teledyne Prodigy ICP anchors the Prodigy DC Arc instrument. It combines a highly advanced Echelle optical system with the latest in solid-state detection: Teledyne's Large-format Programmable Array Detector (L-PAD).

This instrument provides complete wavelength coverage from below 180 nm to 1100 nm in a single exposure, with a resolution of 9 pm at 200 nm. The newly-designed source and stand have been fully integrated. Easy-to-use software allows for rapid method development using wavelength scans, time-resolved analysis, simultaneous background correction, and much more.

Please contact us for more information, to schedule a demonstration, or to obtain the latest application notes.



## ***Spectron: ICP-MS Cone Maintenance***

All sample and skimmer cones, regardless of ICP-MS manufacturer or design, serve the same function. They are the differential apertures separating the sample at atmospheric pressure from the mass filter and detector(s) in high vacuum. Though the fundamental dimensions are all essentially the same (sample cone with shallow angle, skimmer cone with acute angle), each manufacturer has designed the cone's critical dimensions to its own unique specifications (orifice diameter, hole depth, material composition, etc.). The analytical zone, the area most in need of maintenance, displays the

most significant differences. These differences, together with sample type (ground water, soil digests, sea water, etc.) contribute to the rate at which oxides and salts accumulate in and around the cone orifice. They also affect the rate of cone degradation and influence the cleaning methodology. A comprehensive guide to cone maintenance is available at Spectron's web site:

[http://www.spectronus.com/uploadcache/1245104651-S.I.\\_Cone\\_Cleaning\\_Guide\\_-\\_609.pdf](http://www.spectronus.com/uploadcache/1245104651-S.I._Cone_Cleaning_Guide_-_609.pdf)

**Meinhard is very pleased to supply Spectron cones.**

## ***Conference Notes***

### **Winter Conference 2010**

**Heritage Lecture by Jean-Michel Mermet**, Monday January 4. Now "retired", Professor Mermet has been one of the most prolific, creative, and thorough scientists to study inductively coupled plasmas and sample introduction. Meinhard is very pleased and proud to be the sponsor of this lecture.

Pick up your **Meinhard insulated coffee mug** at **Booth 36** when you stop by to see the **newest and best sample introduction components in quartz and glass for ICP-OES and ICP-MS.**

### **FACSS 2009**

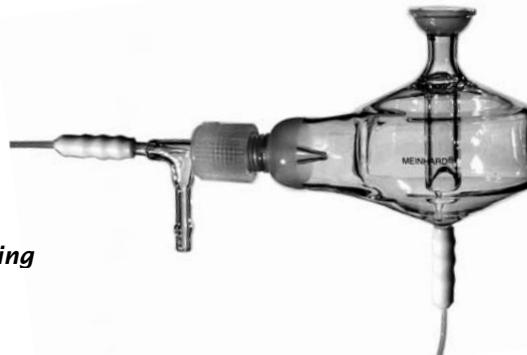
The two Meinhard-sponsored student poster awards went to Jiyan Gu of Wake Forest University and Corinne Weinel of Thomas More College. Each has received an honorarium along with a membership in the Society for Applied Spectroscopy. Working with Professor Brad Jones, Jiyan Gu has developed a portable tungsten coil atomic emission spectrometer and has applied it to the analysis of water and soil samples. Ms. Weinel used ICP-OES to acquire trace element data from cicadas (an insect which spends its early life on tree roots) to study their life cycles and migration.

### **Pittcon 2009**

Four visitors to our booth won nebulizers: Ni Jin of Arcelormittal, Jon Mink of Trace Analytical, Jeremy Davis of OCWD, and Ray James of Sparger Technology. We hope you will stop by **Booth 3040 at Pittcon 2010** for an opportunity to win a nebulizer as well as to look at the newest and best sample introduction components.

**MEINHARD® Nebulizer with Fit Kit 3T solution connection**

**EasySeal Spray Chamber with secure threaded inlet, and Fit Kit 3T drain fitting**



**Meinhard Glass Products**

A Division of Analytical Reference Materials International Corporation

700 Corporate Circle, Suite A  
Golden, CO 80401 USA

Tel: (303) 277-9776  
Fax: (303) 216-2649  
Email: Sales@Meinhard.com  
Web: www.Meinhard.com

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