

A Newsletter for the Advancement of Field-Deployed Mass Spectrometers

## Introducing a New Newsletter

Dear Colleagues,

Following some discussions at PittCon 2012 in Orlando this past March, several HEMS (Harsh Environment Mass Spectrometry) workshop participants felt that it would be nice to informally keep in touch with those in the field. It was decided that we would have a newsletter that would have four issues a year, nominally distributed in late March, June, September and December. The intent is for all to contribute to the newsletter so that it can be as balanced as possible. Below is a description of the various sections included.

**Editorial** – The editorial section is typical for any periodical. Some typical topics would include instrument issues, recent advances, recent applications, funding issues, education policies, government policies, etc. Everyone is welcome to submit an article.

**“Spotlight”** – This section is intended to place emphasis on HEMS participants by discussing recent projects and/or successes. Discussions about general research performed in one’s lab is also desired. This issue’s Spotlight is from a student in Guido Verbeck’s lab (University of North Texas), and provides a student’s perspective.

**One Thousand Words** – This section is a single photograph with limited explanation and is intended to be a profound reminder of why we work so hard to miniaturize and/or ruggedize mass spectrometers.

**COTS Corner** – A brief discussion about a commercial product relevant to the advancement of field-deployed mass spectrometers. Topics include pumps, mass analyzers, detectors, electronics, etc.

**Reviews** – This includes reviews of books, journal articles, conferences or any other public literature.

**Advertisements** – This section provides our community to advertise specific issues such as – job openings, workshops, project proposals, etc.

We hope you enjoy the newsletter and welcome your feedback and contributions.

Sincerely,

C Richard Arkin (Arkin.HEMS@gmail.com)

## One Thousand Words

Shown here is a prototype of the new lunar rover that NASA is developing. It will carry a GC/MS for characterization of H<sub>2</sub>, He, CO, CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>O, N<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>S, and SO<sub>2</sub> in lunar regolith.

**Submitted by:** J. Captain (Janine.E.Captain@nasa.gov)



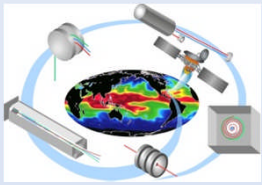
## COTS Corner – Small Valve

One of the most effective methods of reducing the need for large inefficient vacuum pumps is to reduce the system gas load. Utilizing components with high leak integrity is a crucial step in reducing both excess gas load and sample contamination.

There are a variety of valves on the market with high leak integrity for UHV applications. Some examples include

Varian’s pneumatically actuated ConFlat series, and MKS’s solenoid actuated VCR valves (shown here). The Parker Series 99 valves (also shown here) provide equivalent leak integrity, yet are significantly smaller and lighter in weight. Currently this valve is only available in the normally-closed configuration, however a 3-way configuration is also available.





## High Schooler in Harsh Environment Lab

When my friends ask me what I do all day at research, I tell them I train my pet BAILEY, a super genius electric bloodhound-baleen whale hybrid. After learning from graduate students this past fall, I confronted Dr. Verbeck and cheekily asked him if I could start my own project with environmental applications. To my delight, he agreed and provided everything necessary for success, including all the expensive magical gizmos and an abundance of patience. All winter, I worked under the direction of Dr. Verbeck and graduate student William “Billy” Hoffman to engineer a sensitive option for real-time air quality analysis using membrane-introduction mass spectrometry. Mounting PDMS membrane tubing for monitoring VOCs in oil production sites to the inlet of an Inficon Transceptor CPM (see figure inset) enabled the instrument to detect toluene in real time at 3.4 ppm using the Faraday-cup and 122 ppb using the electron multiplier.

Now a new question arises: what is the optimal design that improves accuracy without too significantly sacrificing response time?

I spent a week drawing up membrane designs. Just last week, Billy and I tested a new membrane idea on BAILEY—named so for reminding me of a baleen whale because it used a purge gas not unlike how a whale gulps water. This idea consisted of a piece of PDMS tubing connected to a low pressure chamber so that the vacuum would draw organic substrates from atmospheric pressure through the membrane into the MS. The only issue had been the pressure difference, which very likely would have caused the membrane to collapse, but this was solved by inserting a spring of similar diameter into the tubing. BAILEY responded beautifully to a minute of toluene vapor exposure. Four trials showed consistency in detection as well as a lagging phenomenon for further investigation—see Figure.

HelixMark just sent us our requested PDMS tubing samples. For now, I will make new membranes and hope I don't blow something up.

**Written by:** Jenny He (POC – GVerbeck@UNT.edu)

## Call for Articles

Please tell us about your lab, research, project, instrument, or just an opinion. Please submit articles for consideration by 31-Aug-12, to Richard Arkin (Arkin.HEMS@gmail.com). Late submissions will be considered for the subsequent issue.

## Upcoming Conferences

SciX - SCientific eXchange (formerly known as FACSS)  
30 September – 5 October, Kansas City, MO

Asilomar Mass Spectrometry in Food Safety and Quality  
5 – 9 October 2012, Pacific Grove, CA

AVS 59<sup>th</sup> International Symposium and Exhibition  
28 Oct – 2 Nov 2012, Tampa, FL

Pittcon Conference and Expo  
17-21 March 2013, Philadelphia, PA

61st ASMS Conference on Mass Spectrometry  
9 - 13 June 2013, Minneapolis, MN

## Announcements

- The next HEMS Workshop will be held in September 2013, additional details forthcoming. ([www.HEMS-workshop.org](http://www.HEMS-workshop.org))
- There is a HEMS Workshop Group on LinkedIn as a forum for people to discuss real-time issues/solutions, job postings, and the like.

