MOMA: Mars Organic Molecule Analyzer: Instrument concept and results

L. BECKER[1]*, C. RICHARDSON[1], K. CHAICHAROEN[1], F. VANAMEROM[2], T. CORNISH[3], M. ANTOINE[4], V. PINNICK[5], R. COTTER[5], F. GOESMANN[6], F. RAULIN[7] AND P. EHRENFREUND[8]

[1]Johns Hopkins Unuversity Physics and Astronomy, USA (lbecker@pha.jhu.edu)
[2]Stanford Research Institute, USA
[3]C&E Consulting, USA
[4]Johns Hopkins Applied Physics Laboratory, USA
[5]Johns Hopkins School of Medicine USA
[6]Max-Planck-Institute for Solar System Research Katlenburg-Lindau, Germany
[7]Laboratoire Interuniversitaire des Systèmes, Atmosphériques, LISA-UMR, Université Paris, France
[8]Leiden University, Leiden, The Netherlands

The Mars Organic Molecule Analyzer (MOMA) is a powerful multi-source mass spectrometer-based instrument suite for investigation of potential life on Mars. MOMA has been selected as a core element of the Pasteur payload on the ESA/NASA ExoMars mission that will launch in 2018. The MOMA instrument is the next generation design for *in situ* life detection instrumentation. The MOMA suite includes a gas chromatograph (GC) and a 266 nm Nd:Yag laser allowing for dual methods of volatilizing and ionizing chemical compounds from intact samples over a broad mass range. Both the LD and GC share an ion-trap mass spectrometer (ITMS) for the detection of volatile (amino acids) and more 'labile' or heavier (small peptides) up to 2000 amu. The ITMS provides enhanced mass resolution and detailed structural information organic molecules and compounds in a given sample substrate. We present herein, our current MOMA design and some preliminary results from several Martian 'analog' samples.

Sulfide and oxide reference materials for LA-ICP-MS

L.P. BEDARD[1], S.-J. BARNES[2] AND D. SAVARD[3]

Sciences de la Terre, Universite du Quebec a Chicoutimi, Chicoutimi, QC, Canada (PBedard@uqac.ca, SJBarnes@uqac.ca, DDSavard@uqac.ca)

Sulfide and oxide ore deposits are of major economic importance. Analysis of the ore itself is crucial in many studies and trace elements are used as pathfinder or proxy for the understanding of ore genesis. The most commonly used Reference Material (RM) for determinations by LA-ICP-MS, the NIST-610 and NIST-612 glasses, are not ideal to calibrate for sulfide and oxide matrices. Many laboratories make their own reference materials, which raises the issue of traceability and inter-laboratory accuracy.

Two types of material can be used with the laser ablation technique: solid or pressed powder. Pressed powders have to be bound properly to avoid variations in ablation behavior. O'Connor *et al*. [1] proposed that vanillic acid should be used as a binding agent while Danyushevsky *et al*. [2] have used mixed doped sulfides bound in a glass disk. Bound powder minimizes the heterogeneity problem and allows more accurate matrix matching. MASS-1 has been proposed as an amorphous sulfide doped with various trace elements [3]. Others [4, 5] have prepared solid sulfides in experimental petrology labs but the amount of sample produced is often too small for wide distribution. In many cases, PGE and metalloids, important in mineral deposit studies, are poorly characterized. In terms of oxide determinations, two types of samples are currently used as RM: NIST steel and sludge [6, 7] and both have problems.

Although RM for LA-ICP-MS calibration are mandatory, a monitor sample is equally desirable in order to validate calibration and to minimize RM consumption. Amorphous sulfides [3] are good materials because they can easily be produced in large quantities and in many laboratories. Its matrix can be modified and trace elements can be added as desired.

It is proposed to reunite those interested in a common effort to produce sulfide and oxide RMwith many of the analytes important in mineral deposit studies, such as PGE, metalloids, etc.

[1] O'Connor C., Landon M.R., Sharp B. (2007) *JAAS*, **22**, 273-282 [2] Danyushevsky L.V., Robinson P., Gilbert S., Norman M., Large R., McGoldrick P. and Shelley J.M.G. (2010) *GEEA* (in press) [3] Wilson S.A., Ridley W.I. and Koenig A.E. (2002) *JAAS* **17**, 406–409. [4] Wohlgemuth-Ueberwasser C.C., Ballhaus C., Berndt J., Paliulionyte V.S., Meisel T. (2007) *CMP* **154**, 607-617. [5] Barnes S.-J., Cox R.A., Zientek M.L. (2006) *CMP* **152**, 187-200. [6] Savard D., Barnes S.-J., Sunder Raju P.V. (2010). *GCA* (this issue) [7] Nadoll P., Koenig A.E., Mauk J.L. (2009) *Geoanalysis 2009. Abstract book and final programme.*