Geophysical Research Abstracts, Vol. 7, 06071, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06071

A combined GC/MS and AP-MALDI Instrument for the Detection and Identification of organic Molecules on Mars

F. Goesmann (1), L. Becker (2), P. Ehrenfreund (3), F. Raulin (4), M. Hilchenbach (1)

(1) Max-Planck-Institute for Solar System Research, Max-Planck-Strasse 2, 37191 Katlenburg-Lindau, Germany

(2) University of California, Institute of Crustal Studies, Dept. of Geological Sciences, 1140 Girvetz Hall, Santa Barbara, CA 93106, USA

(3) Astrobiology Laboratory, Leiden Institute of Chemistry, POBox 9502, 2300 RA Leiden, The Netherlands

(4) Laboratoire Interuniversitaire des Systèmes Atmosphériques, LISA-UMR 7583, Universités Paris 12 & Paris 7, Faculté des Sciences, 61 Ave Général de Gaulle, 94010 Créteil Cedex, France

One of the key issues in the search for life on Mars is the question of organic molecules. In view of the Viking results, yielding very low upper limits for the concentration of carbon molecules in the Martian soil, a future search needs to be performed with highly sensitive instruments. Here we propose the combination of various measurement concepts into one instrument capable of detecting and identifying carbon bearing molecules from extremely volatile (atmospheric) to extremely non-volatile (large molecules or organic salts). The concept includes a gas-chromatograph / mass-spectrometer (GC/MS) complemented by an AP-MALDI (atmospheric pressure – matrix assisted laser desorption ionisation) sampling source. This instrument has two major advantages. (i) investigating the same samples with multiple methods allows for a rather complete scan of all conceivable molecular species down to low abundances; (ii) sharing hardware resources (mass-spectrometer, vacuum system, electronics) leads to significant mass reductions. Samples for the instrument would be collected from the atmosphere in enrichment cells or soil samples from a drill treated

with pyrolysis, laser radiation, or means of chemical derivatisation.

The knowledge about an organic inventory is important for the human exploration of Mars as a possible hazard on one side and as planetary protection issue on the other.