

Development and realization of a spatialized micro LC for the analysis of biomarkers

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Abstract

Search for organic matter in the solar system has become a key challenge in planetary exploration in order to understand whether they played a role in the origin and evolution of life on Earth. To date, instruments dedicated to the in situ analysis of organic compounds are essentially gas chromatographs [1]. These methods, applied to the study of extraterrestrial objects, such as comets or analogs, have demonstrated that these are formed of thousands of different chemical compounds [2–4]. However, GC does not allow the direct detection of biopolymers (peptides, nucleotides ...) yet essential as markers of the living.

Complementary study made with Liquid chromatography could provide a more comprehensive analysis of molecular structure by separating a large set of compounds. Studies have already been carried out in the laboratory on cometary analogues and they have confirmed the presence of compounds of high molecular masses [5] thus once again demonstrating the interest of these methods for astrobiological studies.

In this line, this work presents the development of a micro LC for the in situ analysis of high molecular weight compounds.

References

- [1] R. Sternberg, F. Raulin, C. Szopa, A. Buch, C. Vidal-Madjar, GAS CHROMATOGRAPHY | Gas Chromatography in Space Exploration, in: I.D. Wilson (Ed.), *Encycl. Sep. Sci.*, Academic Press, Oxford, 2007: pp. 1–13. doi:10.1016/B0-12-226770-2/06291-8.
- [2] C. Meinert, J.-J. Filippi, P. de Marcellus, L. Le Sergeant d'Hendecourt, U.J. Meierhenrich, N-(2-Aminoethyl)glycine and Amino Acids from Interstellar Ice Analogues, *ChemPlusChem*. 77 (2012) 186–191. doi:10.1002/cplu.201100048.
- [3] G.M. Muñoz Caro, W.A. Schutte, UV-photoprocessing of interstellar ice analogs: New infrared spectroscopic results, *Astron. Astrophys.* 412 (2003) 121–132. doi:10.1051/0004-6361:20031408.
- [4] N. Abou Mrad, F. Duvernay, P. Theulé, T. Chiavassa, G. Danger, Development and Optimization of an Analytical System for Volatile Organic Compound Analysis Coming from the Heating of Interstellar/Cometary Ice Analogues, *Anal. Chem.* 86 (2014) 8391–8399. doi:10.1021/ac501974c.
- [5] B. Eddhif, A. Allavena, S. Liu, T. Ribette, N. Abou Mrad, T. Chiavassa, L.L.S. d'Hendecourt, R. Sternberg, G. Danger, C. Geffroy-Rodier, P. Poinot, Development of liquid chromatography high resolution mass spectrometry strategies for the screening of complex organic matter: Application to astrophysical simulated materials, *Talanta*. 179 (2018) 238–245. doi:10.1016/j.talanta.2017.11.008.