



Contribution ID: 287

Type: **Poster**

Liquids in vacuum. Atomic Layer Injection for studying the origin of life.

Tuesday 19 June 2018 18:00 (20 minutes)

Liquids and vacuum are opposite concepts. We have developed a new technique for making possible the co-existence and the emergence of liquid solutions inside a vacuum chamber. We call this technique «Atomic Layer Injection», ALI [1] and it allows to deposit sub monolayers of biomolecules, as Adenosine triphosphate (ATP), or gold nanoparticles from a liquid solution at room temperature. With this technique the molecule to be deposited or nanostructure stays in its original solution (outside of vacuum), and it is introduced inside the vacuum vessel as micro droplets.

The second application of the technique is related to space simulation [2,3]. In the Mars polar regions, cyanobacteria could survive in specific areas where ice coexists with water, or alternatively form in cycles. This process occurs at low temperature, few minibars of pressure in an environment mainly form of carbon dioxide. In a vacuum chamber it is very difficult to maintain a constant water pressure in the mbar range where the pumps are constantly working. The combination of low temperature, relatively high pressure and the correct design of pumping of the chamber with the control of water injection over a cyanobacteria registry, allow the study of the emergence of the microorganism in this extreme environments and learning about the possibility of habitability in Polar Regions of Mars.

REFERENCES:

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Session Classification: Poster Session Tuesday

Track Classification: Vacuum Science & Technology