From Interstellar Ices to PAHs
A symposium to honor Lou Allamandola's Contributions to the Molecular Universe
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INVITED TALK

Follow the evolution of organic matter using laboratory experiments: from volatile organics to organic residues.

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A living organism arranges a set of chemical processes to maintain a non-equilibrium state by exchanging matter and energy with its environment, as well as to reproduce and evolve. A large set of molecules and a given environment therefore interact to sustain a living organism. The living cannot exist and grow without chemical processes, whereas a chemical reaction can take place without the necessity of living. Chemistry can be considered as "universal." However, clues that the emergence of life is a common and inevitable phenomenon in our Galaxy have not yet been provided. Currently, the known life forms resides only on the Earth. To determine if other planetary systems could undergo a similar evolution, it seems important to trace the fate of organic matter. This will help to understand what chemical processes could be established, in which environments and from which sources of matter and energy. The knowledge of this chemical evolution will provide clues about the possibility of finding other environments that may lead to the emergence of biosystems. In this context, this contribution will focus on laboratory experiments concerning UV irradiation and warming of astrophysical ice analogs. We will determine in which extent these experiments provide information on the chemical reactivity occurring during the formation of a planetary system as well as on the organic matter composition of interplanetary objects. We will particularly discuss about the formation and detection of volatile organic compounds (Abou Mrad et al. 2014, 2015) and on the composition of refractory residue (Danger et al. 2013, 2015) formed during the ice processing. These experiments are also of prime interests for the current Rosetta mission.

REFERENCES

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