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BOOK OF ABSTRACTS

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Mid-infrared spectroscopy of aliphatic molecular ices exposed to UV radiation in dense molecular clouds

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Dense molecular clouds (DMCs) are the densest regions of the interstellar medium (ISM), which are large amounts of gas and cosmic dust grains. On to the surface of these dust grains ice mantles are produced when the gas-phase species condense due to the low temperature (10 – 20 K) of DMCs. In addition, an active solid-phase chemistry in dust-ice systems is triggered by ultraviolet (UV) processing and leads to the formation of complex organic molecules. Moreover, aliphatic hydrocarbons are known to be widespread as a part of the carbonaceous cosmic dust and, recently the Rosetta mission has *in*-situ identified n-alkanes in comet 67P/Churyumov-Gerasimenko.

In this work, we have explored the UV (λ = 121.6 nm) photochemistry of n-C_6H_{14} and n-$C_{11}H_{24}$ by Fourier-Transform infrared (FTIR) spectroscopy at conditions mimicking those of DMs using INFRA-ICE module [1] of the Stardust machine, an experimental station devoted to simulate in the laboratory the long journey of cosmic dust from its formation in evolved stars to its processing in the ISM [2-4]. We elucidate the chemical pathways leading to the formation of olefinic moieties by a combination of FTIR spectroscopy, Thermal-Programmed Desorption (TPD) and *ab initio* calculations and show a preferential photocleavage of the C-C bonds over a dehydrogenation mechanism at the illumination wavelength employed. Finally, we have also derived kinetic constants from the quantitative analysis of the evolution of IR spectra that can be of interest to model the chemistry of n-alkanes in interstellar environments.

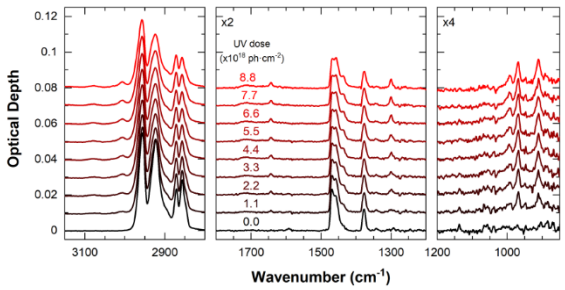

Figure 1. IR spectra of n-C_6H_{14} evolution by UV irradiation (right).

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