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Laboratory studies on photo-processing and desorption of prebiotic molecules in space

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Today thanks to the advent of large telescopes, an increasing number of gas phase complex molecules is observed in star forming regions, prestellar dense cores, circumstellar disks and winds [1, 2, 3]. Planets are formed in protoplanetary disks during the first millions of years of stellar evolution. Thus, it is important to understand if molecules observed in gas phase, are already available in the solid phase adsorbed on the surface of dust and which fraction of such molecules will end up in protoplanetary disks in newly formed planetesimal.

Among these molecules formamide ($HCONH_2$) can play a key role. Formamide like other molecules containing H, C, N and O, is considered a plausible pathway in the synthesis of biomolecules under prebiotic conditions and it is the simplest molecule containing the peptide linkage first detected in the gas phase in Orion-KL and $SgrB_2$ [4]. It is plausible that it is initially adsorbed on the surface of grains within these regions of star formation and then thermally desorbs into the gas phase. Interpretation of observations can benefit of laboratory activities where it is possible to study these molecules simulating and following space processes. In laboratory, we are studying the interaction between space relevant mineral surfaces and biomolecules in simulated space conditions investigating both photo-stability of molecules and thermal desorption process. These studies will support the interpretation of molecule observations in star forming regions with the goal of understanding the role of the grain surface in driving prebiotic chemistry in space.

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[3] Codella, C. et al. 2015, *Mon. Not. R. Astron. Soc.*, Vol. 449

[4] Nummelin, A. et al. 1998, *The Astrophysical Journal Supplement Series*, Vol. 117

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