# The GUAPOS project: A comprehensive study of peptide-like bond molecules

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Complex organic molecules (COMs), i.e. molecules containing carbon with 6 or more atoms, have been detected ubiquitously in the interstellar medium (ISM) towards low- and high-mass star-forming regions (e.g. [1]). Among prebiotic COMs, those containing peptide-like bonds (NCO backbone) are of great interest because they can participate in the link of amino acids forming proteins (e.g. [2]).

Here I present a study of HNCO, $HC(O)NH_2$, $CH_3NCO$, $CH_3C(O)NH_2$, $CH_3NHCHO$ (Fig. 1) towards the chemically rich hot core G31.41+0.31, where these molecules have been observed together for the first time in the disk of our Galaxy, outside the Galactic Centre ([3]). This work is part of the GUAPOS (G31 Unbiased ALMA sPectral Observational Survey) project, which is a sensitive spectral survey conducted with the ALMA (Atacama Large Millimeter/submillimetre Array) observatory towards the star-forming region G31.41+0.31, covering the whole Band 3, that is from 84 to 116 GHz, and with an angular resolution of 1.2'' (~750 au, see [4]).

From the comparison with other sources, we find that molecular abundance ratios towards different sources are found to be consistent between them within one order of magnitude, regardless of the physical properties (e.g. different masses and luminosities), or the source position throughout the Galaxy. Correlations have also been found between the abundances of these molecules. These results suggest that all these species are formed on grain surfaces in early evolutionary stages of molecular clouds, and that they are subsequently released back to the gas-phase through thermal desorption or shock-triggered desorption.

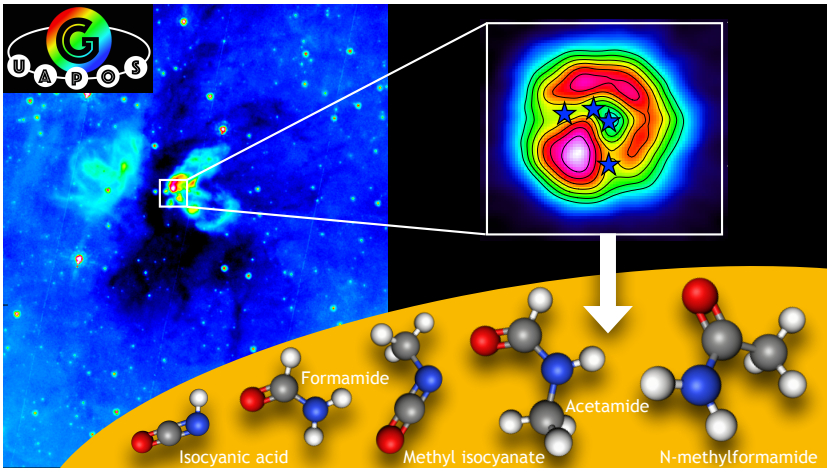


Figure 1: G31.41+0.31 at 8 μm (IRAC4, Spitzer space telescope, left panel) and ALMA 0.2'' resolution integrated emission maps at 1.4 mm of $HC(O)NH_2$ (right panel, see [3]). The blue stars indicate the position of protostars that are forming within this region. In the bottom the chemical structure of the peptide-like bond molecules studied are shown.

## References

[1] B. McGuire, 2021, eprint arXiv:2109.13848
[2] R. Pascal, L. Boiteau, & A. Commeyras, A. 2005, ed. P. Walde (Springer Berlin Heidelberg), 69–122
[3] L. Colzi, V. M. Rivilla, M. T. Beltrán et al. 2021, A&A, 653, A129
[4] C. Mininni, M. T. Beltrán, V. M. Rivilla, 2020, A&A, 644, A84