Annual Highlights for InterCat - 2023

In 2023 we hosted the InterCat Center Conference – Workshop on Interstellar Catalysis – with support from DNRF. The conference brought together world leading experts in solid state astrochemistry to an isolated setting at Fuglsøcentret on Mols – see **Figure 1**. This gave ample opportunities for InterCat PhD students and Postdocs to talk with world leading researchers that they had previously only "known" from seminal papers within the field. The conference hosted inspiring talks, heated and engaging science discussions, and saw the launch of numerous new collaborative projects.

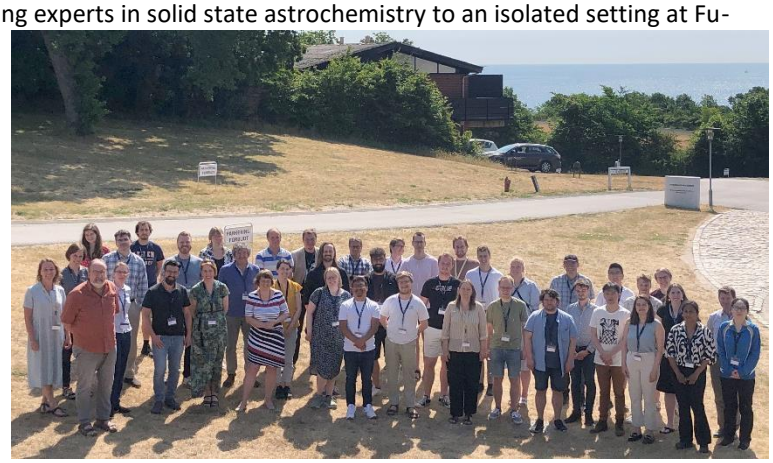

Figure 1. InterCat Center Conference - Workshop for Interstellar Catalysis, June 2023 (Fuglsøcentret, DK).

The flurry of new observational data from James Webb Space Telescope (JWST) continued into 2023. The first paper from the IceAge team – An Ice Age JWST inventory of dense molecular cloud ices – appeared in Nature Astronomy accompanied by world-wide press releases. The PDRs4All team received data revealing high deuterium enrichment in molecules in the Orion Bar, an observation that may be explained by experiments carried out by InterCat researchers. The JOYS and MINDS teams presented results that further underline the importance of reactions on interstellar grains for the development of interstellar molecular complexity.

Other research highlights from the center in 2023 include; the discovery of the low temperature state of carbon-dioxide ices - uncovered via close collaboration between InterCat researchers at Aarhus and Leiden universities - drawing on both the experimental and the theoretical groups; the identification of a possible pathway towards formation of amino acids beyond glycine in interstellar space; and the demonstration of new theoretical approaches to calculate infrared spectra of nano-silicate and determine their binding sites. Figure 2 illustrates another highlight from the center - Measurements carried out at Aarhus University and at the ATOMKI facility in Hungary reveal that glycine molecules in the solid state, when exposed to energetic radiation, can convert into peptide chains, a basic building block of proteins, under conditions mimicking those found in interstellar space.

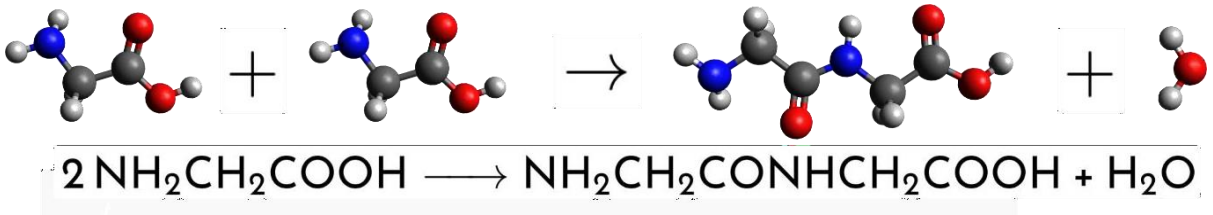

Figure 2: The proposed reaction mechanism for peptide chain formation from solid state glycine upon exposure to energetic particles.

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