# Ion processing of molecular clusters

**A. Domaracka[1*], R. Delaunay[1], M. Gatchell[2], S. Indrajith[1], A. Mika[1], C. Nicolafrancesco[1], L. Adoui[1], H. Zettergren[2], H. Cederquist[2], B.A. Huber[1], P. Rousseau[1]**

*[1]Normandie Univ, ENSICAEN, UNICAEN, CEA, CNRS, CIMAP, 14000 Caen, France*
*[2]Department of Physics, Stockholm University, S-10691 Stockholm, Sweden*
*[*]Corresponding author e-mail domaracka@ganil.fr*

Fullerenes and polycyclic aromatic hydrocarbons (PAHs) are expected to be important astrophysical species [1]. Also larger carbon-containing particles are most likely present as dust and grains, and it is an open question whether such particles are formed in bottom-up, top-down, or in a combination of such processes.

In this talk, we will give an overview of results on ion-induced fragmentation and ion-induced chemistry of carbon containing clusters colliding with slow ions. In particular, ion-induced growth mechanisms in collisions of 22.5 keV $He^{2+}$ and 3 keV $Ar^{+}$-projectiles with pure and mixed loosely bound clusters of $C_{60}$ and coronene molecules will be presented [2, 3]. The two projectiles lead to dramatically different reaction products (Fig.1) and the mechanism of covalent product formation will be discussed. In addition, recent results on the effect of the molecular structure on the molecular growth will be also presented in case of $C_{16}H_{10}$ isomers (pyrene and fluoranthene) [4].

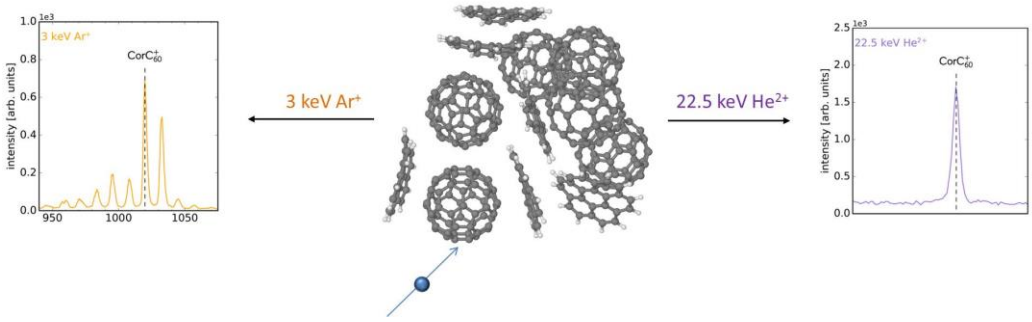


Figure 1: Ion-induced chemistry in mixed $C_{60}$ and coronene clusters.

**Acknowledgments:** The experimental studies have been performed at the low-energy ion beam facility ARIBE at GANIL (Caen, France). Research was conducted in the framework of the International Associated Laboratory (LIA) "Fragmentation DYNAmics of complex Molecular Systems" DYNAMO" and the COST actions "XUV/X-ray light and fast ions for ultrafast chemistry" (XLIC - CM1204).

## References

1] T. G. G. M. Tielens, Rev. Mod. Phys. 85 (2013) 102
[2] R. Delaunay, M. Gatchell, A. Mika, A. Domaracka, L. Adoui, H. Zettergren, H. Cederquist, P. Rousseau, B.A. Huber, Carbon 129 (2018) 766
[3] A. Domaracka, R. Delaunay, A. Mika, M. Gatchell, H. Zettergren, H. Cederquist, P. Rousseau, B. A. Huber, Phys. Chem. Chem. Phys. 20 (2018) 15052
[4] R. Delaunay, A. Mika, A. Domaracka, B. A. Huber, P. Rousseau, Eur. Phys. J. D 72 (2018) 149