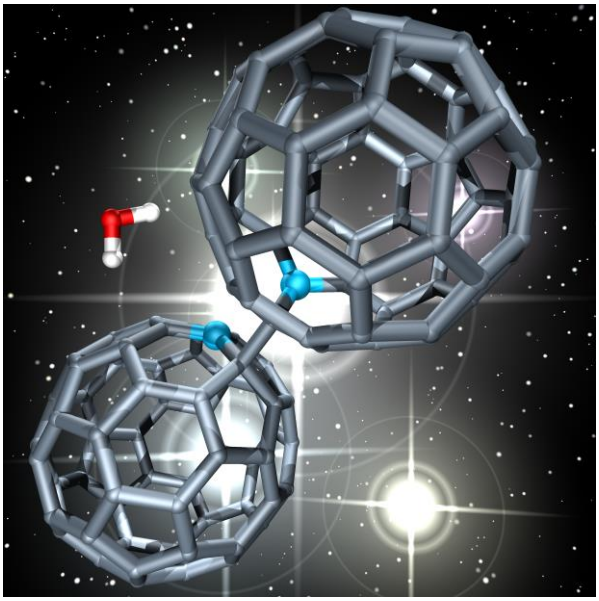
Press Release

Ice-covered C_{60} crystals, an interstellar birthplace for early life?



C_{60}, the football shaped molecule whose discovery led to the Nobel Prize in 1996, has recently been proven to exist in space [10.1038/nature14566]. A new interdisciplinary study from groups at the Theoretical and Physical Chemistry Institute (TPCI) in National Hellenic Research Foundation (NHRF), Athens, the Institute of Materials Jean Rouxel in Nantes, and other laboratories across Europe and Canada suggest that ice layers can form spontaneously on the surface of crystals of C_{60} molecules, and that these water layers should be stable even under the extreme conditions of interstellar space. This presents an intriguing additional piece to the puzzle of interstellar chemistry. "We know that C_{60} is excellent at absorbing UV-light energy, which is heavily present in the outflows from supernovae", says Nikos Tagmatarchis, corresponding author of the study in Athens, "and this unique combination of energy, a 2D surface on C_{60} crystals, and now a surface layer of water molecules suggest a perfect environment for creating more complex molecules, such as amino acids, the basic constituents of life".

The study draws on state-of-the-art spectroscopic analysis of C_{60} and $C_{59}N$ nano-crystals, synthesized at TPCI laboratories in Athens, combined with the latest techniques in computer modelling performed by collaborators in France, Austria and Turkey. Characterizing the samples involved collaboration between three different synchrotron facilities: Helmholtz Berlin Zentrum (Bessy II) in Berlin, the Advanced Light Source in Berkeley and the Canadian Light Source in Saskatoon. "What started as a small study has grown by bringing these diverse groups together" says Nikos Tagmatarchis and highlights "we hope this can be an important step towards unlocking the puzzle of fullerene surface chemistry in interstellar space".

Article Reference:

"Spectromicroscopy of C_{60} and azafullerene $C_{59}N$: Identifying surface adsorbed water"

Dogan Erbahar, Toma Susi, Xavier Rocquefelte, Carla Bittencourt, Mattia Scardamaglia, Peter Blaha, Peter Guttmann, Georgios Rotas, Nikos Tagmatarchis, Xiaohui Zhu, Adam P. Hitchcock & Chris P. Ewels

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Contact:

Dr Nikos Tagmatarchis – Email: tagmatar@eie.gr / Tel.: + 30 210 7273835

Theoretical and Physical Chemistry Institute

National Hellenic Research Foundation

48 Vassileos Constantinou Avenue, Athens 11635