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Structural and Viscoelastic Properties of Semifluorinated Alkane Monolayers at the Air/Water Interface

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The structural and viscoelastic properties of monolayers at the air/water interface are of substantial interest from a scientific point of view, as well as of paramount importance for technological applications from soap films to surface coatings.
We currently investigate the class of semifluorinated alkanes at the air/water interface in order to develop a detailed structure-properties relation ship for this very particular class of materials.
Such semifluorinated alkanes are linear alkanes, which carry in one half of the molecular chain fluorine atoms instead of hydrogen. Due to the incompatibility of the fluorocarbon and hydrocarbon fragments, such molecules are considered amphiphobic and tend to locally phase separate into intriguing 3D and 2D structures. This intrinsic structuring capability is anticipated as novel building motif in supramolecular architectures.
For this purpose it is of fundamental importance to understand the structural and dynamic behaviour of these molecules, which we try to assess in monolayers at the air/water interface of a Langmuir trough in combination with an interfacial stress rheometer (ISR). While the structural organization was investigated on the water by neutron reflectivity and after transfer to solid substrates by atomic force microscopy, the rheological behaviour was studied for the floating Langmuir film by the ISR.

C.O. Klein et al, "Viscoelasticity of Semifluorinated Alkanes at the Air/Water Interface", Soft Matter 2011, DOI:10.1039/C1SM05357D

L. de Viguerie et al, "Effect of the Molecular Structure on the Hierarchical Self-Assembly of Semifluorinated Alkanes at the Air/Water Interface", Langmuir 2011, DOI: dx.doi.org/10.1021/la201377f

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Primary author: Dr JONAS, Ulrich (Institute of Electronic Structure and Laser, FORTH, Iraclion, Crete)

Presenter: Dr JONAS, Ulrich (Institute of Electronic Structure and Laser, FORTH, Iraclion, Crete)

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