



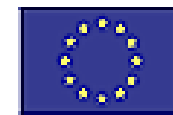
RÉSEAU FRANÇAIS DU FLUOR

CNRS  
CENTRE NATIONAL  
DE LA RECHERCHE  
SCIENTIFIQUE



**SOFFT**

*Systemes Organisés Fluorés  
À Finalités Thérapeutiques*



AGENCE NATIONALE DE LA RECHERCHE  
**ANR**



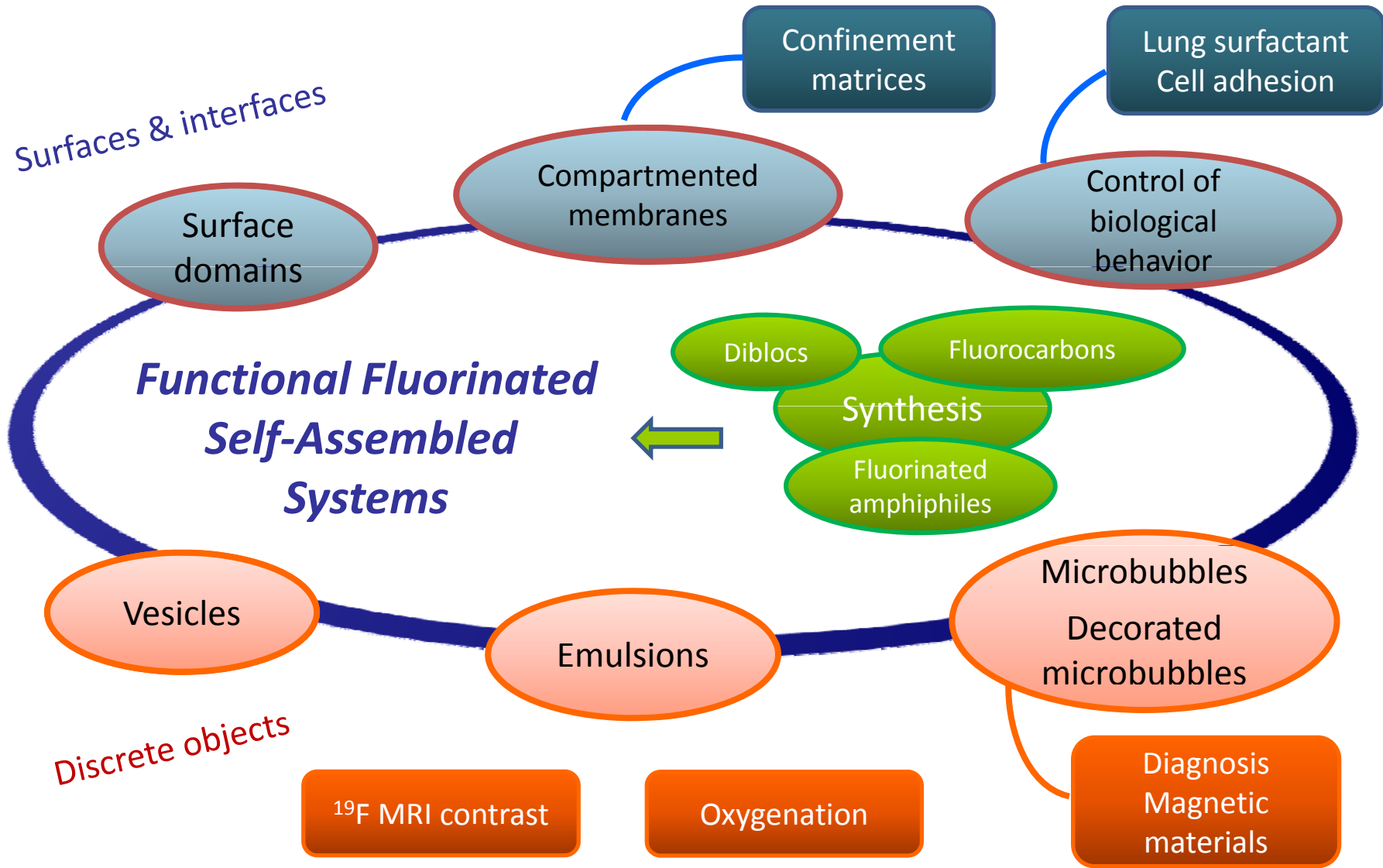
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23 rue du Loess. 67034 Strasbourg Cedex.**

**Keywords : Fluorinated amphiphiles, Fluorocarbons, Self-assembly, Monolayers, Surface micelles, Nano-patterned surfaces, Vesicles, Emulsions, Microbubbles, Oxygen transport, Lung surfactant substitutes, Contrast agents.**

**Dr. Marie Pierre Krafft  
CNRS Research Director**



# Synopsis of SOFFT Research Activities



# Films of Self-Assembled Surface Domains of Fluorocarbon/Hydrocarbon Diblocks

Collab. ICS: M. Maaloum, P. Muller, S. Semenov, J.-F. Legrand

INSP: M. Goldmann (GISAXS / ESRF)

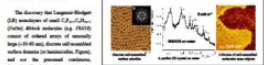


Conceptus Template for  
**ACCOUNTS**  
of chemical research

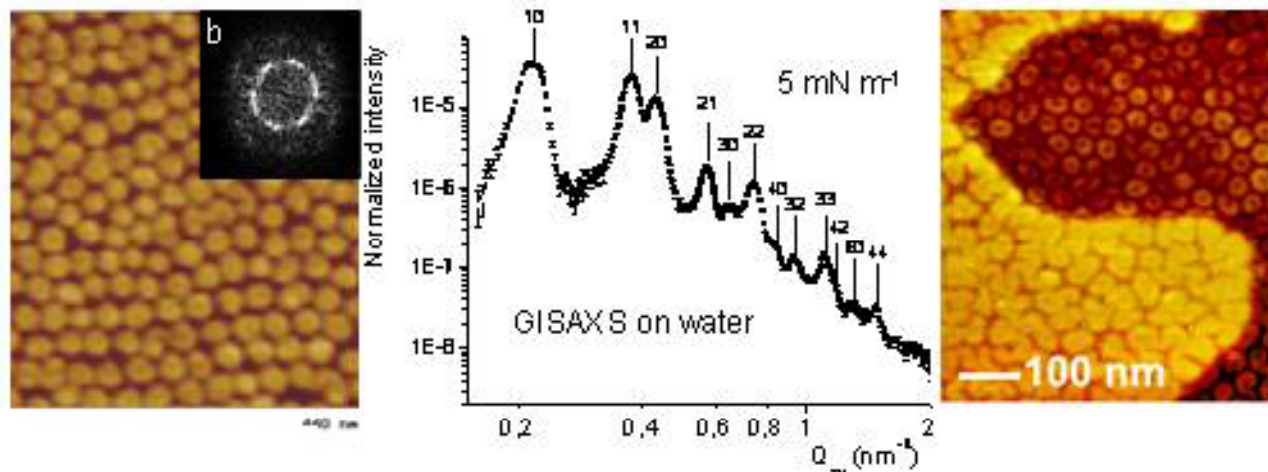
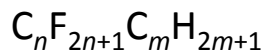
Large Organized Surface Domains Self-Assembled from  
Non-Polar Amphiphiles

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#### CONCEPTUS



The discovery that amphiphilic diblock molecules of small  $C_nF_{2n+1}C_mH_{2m+1}$  (with different numbers of  $CF_2$  and  $CH_2$  units) can self-assemble into large, ordered surface domains on water and on solid substrates, and that these domains are highly oriented, is a significant step towards the development of functionalized surfaces. This discovery is particularly important because it shows that large, ordered surface domains can be formed from non-polar amphiphiles, which is a significant departure from the conventional wisdom that such domains are only formed from polar amphiphiles. This discovery opens up new possibilities for the development of functionalized surfaces and for the study of the self-assembly of amphiphilic diblock molecules on water and on solid substrates.



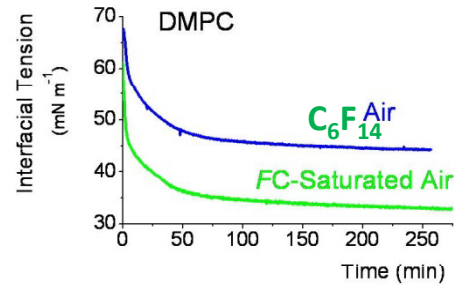
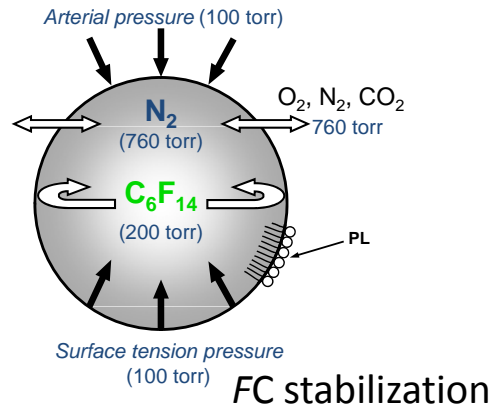
- Large domains of self-assembled semi-fluorinated alkanes on water and solid substrates
- Two-dimensional crystals on water
- Molecular orientation
- Stacked layers of nano-objects
- Essential role of central dipole
- Vertical phase separation from phospholipids

C. de Gracia Lux, B. Donnio, B. Heinrich and M. P. Krafft, *Langmuir*, 2013, **29**, 5325.  
 C. de Gracia Lux, J.-L. Galliani, G. Waton and M. P. Krafft, *ChemPhysChem*, 2012, **13**, 1454.  
 M. P. Krafft, *Acc. Chem. Res.*, 2012, **45**, 514.  
 M. P. Krafft, *J. Fluorine Chem.*, 2012, **134**, 90.  
 C. de Gracia Lux and M. P. Krafft, *Chem. Eur. J.*, 2010, **16**, 11539.  
 C. de Gracia Lux, J.-L. Galliani, G. Waton and M. P. Krafft, *Chem. Eur. J.*, 2010, **16**, 7186.  
 M. P. Krafft and J. G. Riess, *Chem. Rev.*, 2009, **109**, 1714.

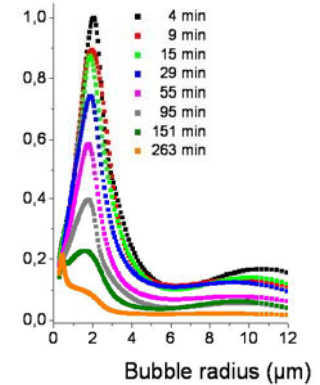
# Stable Microbubbles - Magnetic Microbubbles Stabilized by Fluorinated Compounds

ANR JeuxBulles, AirDeco.....Contrat Européen NanoMagdye

## Obtaining narrowly dispersed bubble populations

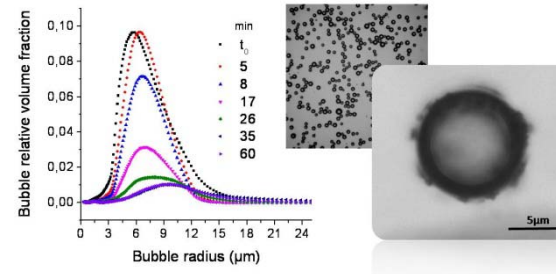
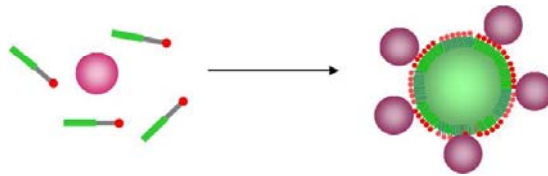


Co-surfactant



Small, stable bubbles

## Magnetic nanoparticle-decorated bubbles



- P. N. Nguyen, G. Waton, T. Vandamme and M. P. Krafft, *Angew. Chem. Int. Ed.*, 2013, **52**, 6404.  
 P. N. Nguyen, G. Waton, T. Vandamme and M. P. Krafft, *Soft Matter*, 2013, DOI:10.1039/C3SM51941D.  
 P. N. Nguyen, G. Nikolova, P. Polavarapu, G. Waton, L. T. Phuoc, G. Pourroy and M. P. Krafft, *RSC Adv.*, 2013, **3**, 7743.  
 C. Szijjarto, S. Rossi, G. Waton and M. P. Krafft, *Langmuir*, 2012, **28**, 1182.  
 P. N. Nguyen, T. T. Trinh Dang, G. Waton, T. Vandamme and M. P. Krafft, *ChemPhysChem*, 2011, **12**, 2646.  
 S. Rossi, G. Waton and M. P. Krafft, *Langmuir*, 2010, **26**, 1649.