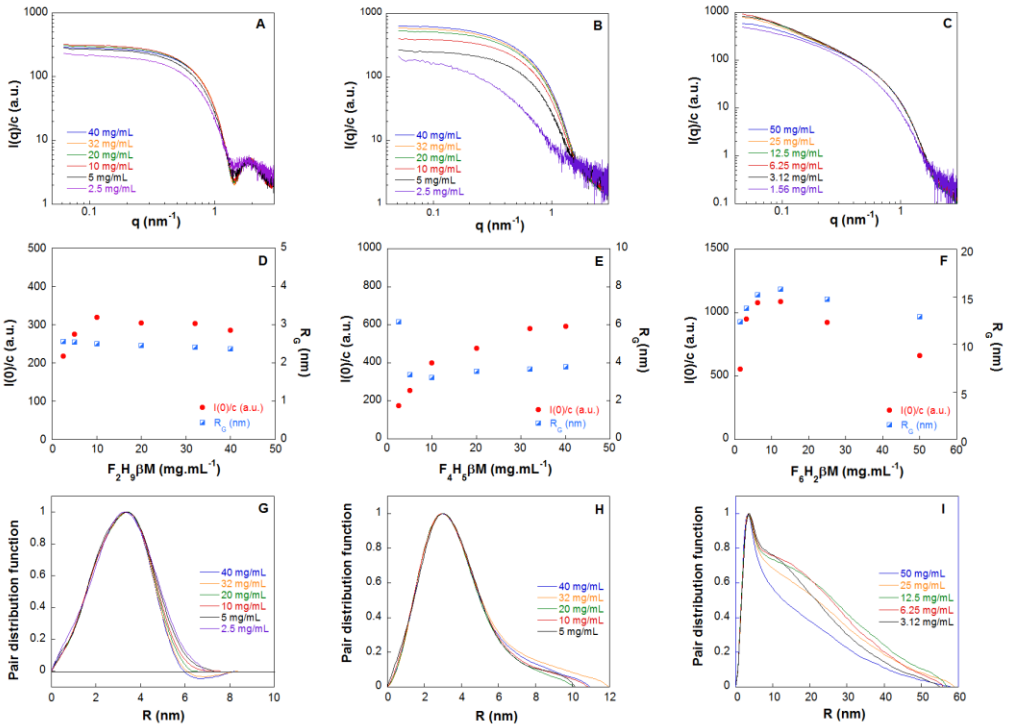
ESRF	**Experiment title:** Hemifluorinated surfactants as a new tool for membrane protein crystallization	**Experiment number**: MX1504
Beamlines: BM29	**Date of experiment**: from: 02 /05/2013 to: 04/05/2013	**Date of report**: 06/02/2015
Shifts: 6/6	**Local contact(s)**: Chloe Zubieta	*Received at ESRF:*

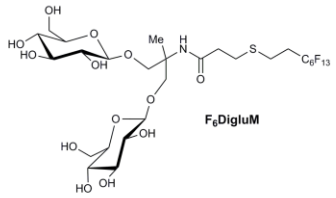
Names and affiliations of applicants (* indicates experimentalists):
Francoise Bonneté (CNRS IBMM Avignon)
*Grégory Durand (UAPV Avignon)
*Pierre Guillet
*Ghina Hajjar (Master 2 UAPV Avignon)

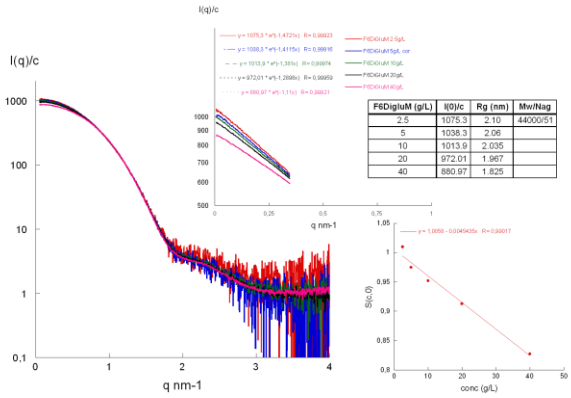
Report:

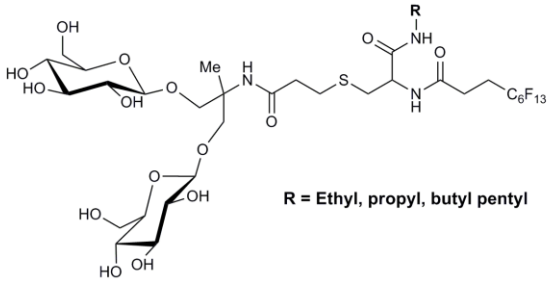
In SAXS experiments performed since 2010 (beginnng of L A Barret thesis) at ESRF on beamlines ID14-eh3 then BM29, we studied the behaviour (form factors and structure factors) of new surfactants for membrane protein crystallization, designed by variation of the hydrophobic part in comparison to the commonly used dodecylmaltoside (DDM). Results obtained on PCC maltoside compared to well known DDM have been published (L.-A. Barret et al *J. Phys. Chem*. 2013 **B 117**(29):8770-81), which show that PCC micelles present suitable properties in shape and interactions to crystallize membrane proteins. However the micelle size equivalent to that of DDM does not seem to improve the quality of crystal diffraction. In order to control the micelle shape and decrease size while keeping high hydrophobicity to stabilize MPs, fluorinated maltoside F2H9malt, F4H5malt and F6H2malt) were synthesized (Polidori et al NJC submitted 2015) and studied by SAXS and DLS for shape and interactions. Only F2H9malt presents small micelles and attractive interactions suitable for MP complex crystallization (Dahani et Acta crys F 2015 submitted). Crystallization trials are in progress.

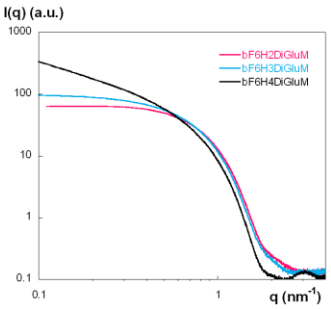


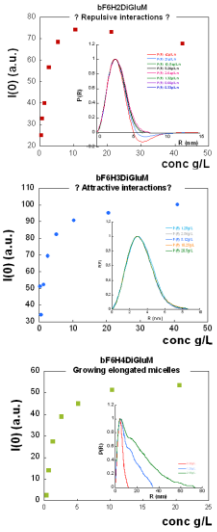
The behaviour of FH maltoside series has been compared with other fluorinated molecules with different polar head such as the F6SdiGlu series, which satisfy a packing parameter that leads to small globular micelles and a new lipid-like series with two hydrophobic chains, a fluorinated one and an hydrocarbonated chain with variable length.











The modulation of fluorosurfactant design with the polar head and the chain structure allows us to control the size of the micelles for stabilization of membrane proteins but also of micelle-micelle interactions for crystallization.

It was also planned to characterized surfactant belt around a photosynthetic RC-LH1-pufX complex (α helix PM) and the alpha hemolysin (β barrel PM) with different fluorosucfactants by using the GPC coupled to SAXS on the beamline BM29.
Because of not enough allocated beamtime (6shifts / 12 asked), these experiments could not be done.