ESRF Grenoble, 3 & 5 February 2009
Venue : ILL Amphi Chadwick

Programme and Abstracts

Organising Committee : O. Konovalov, A. Madsen, D. Pontoni and F. Mengoni

E-mail:sdssi-workshop@esrf.fr
http://www.esrf.fr/events/conferences/usersmeeting2009/SDSSi

Structure and Dynamics of Soft Surfaces and Interfaces

Tuesday, February 3

13:00-14:00 Registration

14:00-14:10 Workshop opening

14:10-14:20 Research Director's Introduction

14:30-15:15 Peter Pershan –
'Liquid metal surfaces'

15:15-16:00 Moshe Deutsch
'Pouring Oil on Troubled (Soapy) Waters: Surfactant-Promoted Interfacial Phenomena at Water/Alkane Interfaces'

16:00-16:30 Coffee break

16:30-17:15 Bob Evans –
'Phase Transitions of Fluids under Confinement: Some New Perspectives'

17:15-18:00 Motomu Tanaka - talk presented by Emanuel Schneck :
'Physical Mechanisms of Bacterial Survival Revealed by Grazing-Incidence X-ray Scattering'

18:00-19:30 Apéritif & Poster Session

19:30 Bus departure to the Workshop Dinner

Thursday, February 5

9:00-9:45 Sunil K. Sinha –
'Recent Studies of Temperature Dependence of Capillary Fluctuations in Polymer Films using XPCS'

9:45-10:25 Boris Toperverg –
'Access to Higher Order Correlation Functions and Non-linear Dynamics via AC Reflectometry and Correlation Spectroscopy at Grazing Incidence'

10:25-10:45 Coffee break

10:45-11:30 Adrian Rennie –
'Surfactant and Polymer Structures at Solid/Liquid Interfaces - use of contrast variation'

11:30-12:15 Markus Mezger –
'High-Energy X-Ray Reflectivity Studies of Deeply Buried Solid-Liquid Interfaces'

12:15-13:00 Ben Ocko –
'Self-assembly and Surface freezing: are they the same?'

13:00-14:00 Lunch

14:00-14:45 Jean Daillant
'Structure and fluctuations of single floating lipid bilayers'

14:45-15:30 Mark Schlossman - 'Ions Distribution at Liquid-Liquid Interfaces'

15:30-16:00 Coffee break

16:00-16:45 Christian Gutt –
'Soft matter surfaces in slow motion'

16:45-17:30 Yuriy Chushkin –
'Surface dynamics of a supercooled liquid'

17:30-18:00 Summary & Perspectives

18:00 End of the workshop

Abstracts of Posters
(alphabetical order)

Interaction Skin-Vehicules

M. Cócera[a], G. Rodríguez[b], L. Barbosa-Barros[b], F. Fauth[c], A. Labrador[c], A. de la Maza[b], O. López[b]

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The stratum corneum (SC) is the outermost layer of the mammalian skin. It consists in the corneocytes (flat and dead cells filled with keratin filaments) embebed into a lipid matrix (mainly ceramides, cholesterol, fatty acids, cholesterol esters, cholesterol sulfate) structured in lamellae. The specific composition and structure of the tissue confers the barrier function of the skin to the SC[1].

Bicelles are discoidal structures formed by phospholipids of different length chain. These disk-like shape structures are small objects that mimic the bilayer environment[2]. Previous *in vivo* experiments consisting in the application of bicelles onto the skin showed that bicelles modified some biophysical properties of the skin, such as the elasticity and the transepidermical water loss[2]. The bicelle-skin interaction induced some structural changes in the tissue that it was necessary understand for designing better and more efficient topical delivery systems. In this sense, bicelles could act as enhancers for altering the barrier function, allowing the pass of substances through or at the SC.

The experiment was carried out as follow: SC was removed from pig skin[3]. DMPC/DHPC or DPPC/DHPC bicelles were applied overnight. The tissue was mounting between two capton foils and measured at 24°C in BM16 beamline. The wavelength (λ) used was 0.9795 Å. Sample-to-detector distance for SAXS and WAXS was 1.5, and 0.35 m, respectively.

The results show that bicelles penetrate into the SC and modify the lipid phase. Changes could be related to the water contribution, but also to the lipid structure. Bicelles are able to alter the lipid organization, probably promoting changes in the lateral packing of the lipids. For all of these reasons, bicelles are very good candidates as topical drug delivery systems into or across the skin.

[1] *J.A. Bouwstra, Colloid Surf. A-Physicochem. Eng. Asp., 123 (1997) 403*
[2] *L. Barbosa-Barros et al., Int. J. Pharm.,352 (2008) 263*
[3] *O. López et al., Colloid Surf. A-Physicochem. Eng. Asp., 162 (2000) 123*

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Grenoble, 27 February 2009

CERTIFICATE

To Whom it may concern,

This is to certify that **Dr Mercedes COCERA**, from BM16 CRG Beamline at the ESRF, Grenoble, France, participated in the **ESRF Users' Meeting 2009 & SDSSI Workshop**, held at the ESRF in Grenoble, France, from 3rd to 5th February 2009.

Sincerely,

ESRF User Office

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INTERACTIONS SKIN-VEHICLES

M. Cócera[a], G. Rodríguez[b], L. Barbosa-Barros[b], F. Fauth[c], A. Labrador[c], A. de la Maza[b], O. López[b]

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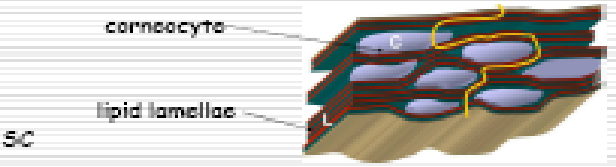
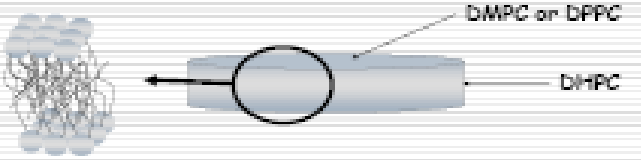
INTRODUCTION

The **stratum corneum** (SC) is the outermost layer of the mammalian skin, with the corneocytes (flat and dead cells filled with keratin filaments) into the lipid matrix structured in lamellae[1].



Bicelles are small disks formed by phospholipids of different length chain[2].



DMPC/DHPC and DPPC/DHPC bicelles

q=DMPC/DHPC or DPPC/DHPC molar ratio

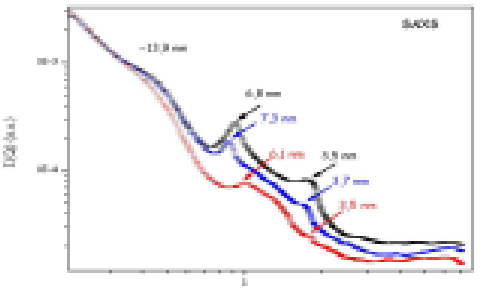
In vivo studies showed that topical application of bicelles changed biophysical properties of skin[2].

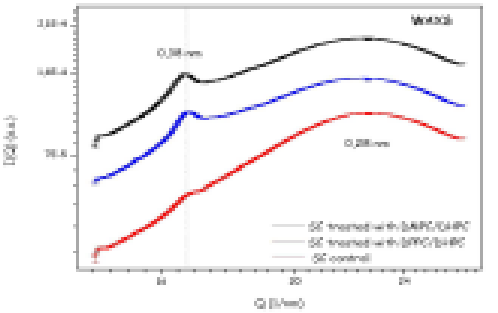
The **AIM** of this work is understand **how the bicelles interact with the SC: SAXS and WAXS study**

MATERIALS & METHODS

- SC (removed from pig skin[3]) + bicelles
- DMPC/DHPC & DPPC/DHPC, q=2, 20% w/v lipid conc[3].
- SAXS (1.5m) & WAXS (0.35m) at **BM16** (ESRF), λ=0.9795 Å

RESULTS & DISCUSSION





- bicelles modify lipid structure and organization of SC
- d-spacing for SC treated (6.8 and 7.3 nm) is higher, than for SC native (6.1 nm). Probably, water from bicelles produces the swelling of lipids
- the longer the lipid chain (DPPC), the longer the d-spacing
- shoulder around 13.9 nm could be compatible with the long spacing lamellar phase[1]
- peak corresponding to 0.38 nm distance is promoted in SC treated (WAXS results). Some authors described an orthorhombic lateral packing of lipids with this spacing[4]

REFERENCES

[1] J.A. Bouwstra, Colloid Surf. A-Physicochem. Eng. Asp., 123 (1997) 403
[2] L. Barbosa-Barros et al., Int. J. Pharm., 352 (2008) 263
[3] O. López et al., Colloid Surf. A-Physicochem. Eng. Asp., 162 (2000) 123
[4] M.W. de Jager et al., J. Lipid Res., 46 (2005) 2649

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IN SUMMARY bicelles penetrate into the SC and modify the lipid phase. Changes could be related to the water contribution, but also to the lipid structure. Bicelles are able to alter the lipid organization, probably promoting changes in the lateral packing of the lipids. For all of these reasons, bicelles are very good candidates as topical drug delivery systems into or across the skin.

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