167 Phase Transitions of DPPC Bilayer produced by Langmuir Blodgett methods, using Ellispsometry Techniques

C.M. Gonzalez-Henriquez[1]*, G. del C. Pizarro[1], **F.A.Droguett-Droguett[1]**, E.N Cordova-Alarcon[1] and M.A. Sarabia-Vallejos[2].

[1]*Departamento de Química, Universidad Tecnológica Metropolitana, Santiago, Chile,*

[2]*Instituto de Física, Pontificia Universidad Católica de Chile, Santiago, Chile.*

Email address corresponding author: carmenmabel@gmail.com

In previous research, Physical vapour deposition (PVD) technique was used for the deposition of DPPC molecules over Silicon wafer [1], due to the ease of thickness control that can be achieved with this method. The problem is that in general PVD tends to produces films with DPPC molecules in random orientation, but in no case bilayer structure (Fig. 1a).

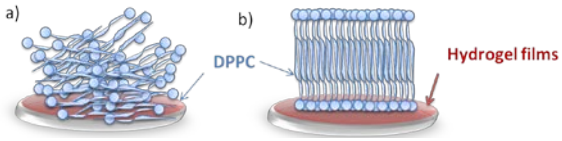

Fig. 1 *DPPC bilayer formation over hydrogel using: a) PVD and b) Langmuir-Blodgett techniques.*

However, the Langmuir Blodgett technique is based on the amphipathic state of some molecules. The molecule in our case DPPC is dissolved in chloroform and put on the surface of a large container with water, then the surface area were reduced forcing the molecules to reach bilayer structure. Then, these films were deposited by transferring layer by layer from the air-water interface to the silicon wafer, used as substrate.

This method ensures a reproducible formation of DPPC bilayer with the correct thickness (≈ 55 Å) as reported by different research groups [2-3]. The novelty in this study lies in the optical characterization against external thermal changes that is realized to the sample. With this method is possible to study the layer motion tilt.

Ellipsometry curve (Fig. 2) presents a slow decrease in thickness as a function temperature, until an inflexion point close to the L_α/isotropic phase (~46 °C). Also is showed all the transitions from the $L_{\beta'}$, $P_{\beta'}$ to L_α. These transitions are associated to molecular tilt, assuming a monolayer of 24±0.1 Å and the difference of ±7 Å is related to the water between the layers.

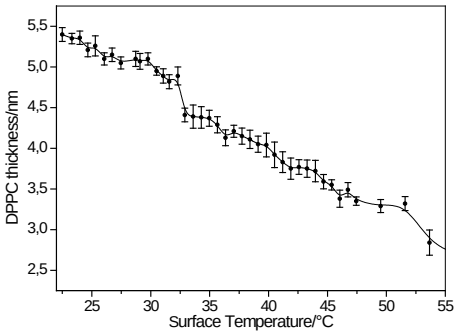

Fig. 2 *Ellipsometry studies for the system DPPC/HEMA-DEGDMA/Substrate.*

The authors acknowledge the financial support given by FONDECYT Grant N° 11121281 and 1110836, also to the advanced human capital insertion program, PAI 7912010031-CONICYT, finally to the DAAD for the ellipsometer donation. Mr. Sarabia acknowledges the financial support given by CONICYT through the Magister Scholarship Grant.

References

[1] C. Gonzalez Henriquez, Ulrich H. Volkmann, Maria J. Retamal, Marcelo Cisternas, Mauricio A. Sarabia, Karina A. López, J. Chem. Phys. **136**, 134709 (2012).

[2] A. Colomer, L. Perez, R. Pons, M. R. Infante, D. Perez-Clos, A. Manresa, M. J. Espuny, and A. Pinazo. Langmuir. **29**(25), 7912 (2013).

[3] S. Tatur and A. Badia. Langmuir. **28** (1), 628 (2012).