COMMENTS

Comments on "Interfacial Lateral Electrical Conductance on Lipid Monolayers: Dose-Dependent Converse Effect of Alcohols", by Yoshida, T., Koga, Y., Minowa, H., Kamaya, H., and Ueda, I.

Ailton Cavalli[†] and Osvaldo N. Oliveira Jr.*[,‡]

Departamento de Física, IBILCE, UNESP, São José do Rio Preto, SP, Brazil, and Instituto de Física de São Carlos, Universidade de São Paulo, Brazil

Received: April 3, 2000; In Final Form: August 15, 2000

We would like to discuss two aspects of ref 1, namely, the removal of the meniscus effect in the lateral conductance measurement, which was present in the earlier works of Morgan et al.[2] and Menger et al.,[3] and the influence of introducing alcohols into the subphase on which a DPPA monolayer has been spread. Although the measuring apparatus is cleverly designed, the authors failed to acknowledge that the meniscus effect had already been dealt with in ref 4. The measuring system in ref 4 adopted a differential mechanism that not only improved resolution but also made it possible to measure the lateral conductance without the need to control the atmosphere. It would be interesting if the data reported by Yoshida et al. for pure DPPA monolayers could be compared with published data for related monolayers in ref 5.

With regard to the experimental apparatus, it would have been useful if the authors of ref 1 had analyzed monolayers in a Langmuir trough, which allows for the continuous change of the concentration of film-forming molecules. The method employed by them, i.e., adding known amounts to a monolayer that has already formed, may present problems with regard to reproducibility. In addition, the meniscus formed between the subphase and the trough (not with the measuring electrodes) has been studied by Goryunov and Yupatov.[6] According to the latter reference, the decrease of surface tension due to the monolayer may cause a change in the height of the meniscus, with a consequent decrease in the distance between the electrode and the water surface. Such a decrease could yield changes in lateral conductance upon spreading any monolayer, if the trough is small.[6] Yoshida et al.[1] did not indicate whether they checked for this possibility. Moreover, Shapovalov and Il'ichev[7] used a similar idea to solve the meniscus effect as the one employed by Yoshida et al.,[1] but the results are contradictory because Shapovalov and Il'ichev[7] failed to detect any enhancement in the lateral conductance when a phospholipid monolayer was spread. A comparison between the results of the two systems would be welcome.

As for the reasons why alcohols affect the lateral conductance, the two competing mechanisms proposed by Yoshida et al.[1] seem perfectly reasonable, being consistent with previous proposals (see Leite et al.[8]). However, the expected increase in enhanced conductance with the length of the alcohol chain, which would increase its partition in the membrane, is not supported by their data in Figure 4.[1] The conductance upon introducing butanol is lower than propanol, which may beg further explanation for the interaction of alcohols with the phospholipid monolayer. Here, further data would be required, especially on the expansion of the phospholipid monolayer caused by introducing the alcohol, which could easily be carried out in a Langmuir trough.

References and Notes

(1) Yoshida, T.; Koga, Y.; Minowa, H.; Kamaya, H.; Ueda, I. *J. Phys. Chem. B* **2000**, *104* (6), 1249.
(2) Morgan, H.; Taylor, D. M.; Oliveira, O. N., Jr. *Chem. Phys. Lett*. **1988**, *150*, 311.
(3) Menger, F. M.; Richardson, S. D.; Bromley, G. R. *J. Am. Chem. Soc*. **1989**, *11*, 6893.
(4) Cavalli, A.; Oliveira, O. N., Jr. *Rev. Sci. Instrum.* **1995**, *66*(12), 5567.
(5) Morgan, H.; Taylor, D. M.; Oliveira, O. N., Jr. *Thin Solid Films* **1989**, *178*, 73.
(6) Goryunov, A. V.; Yupatov, E. E. *Biol. Membr*. **1992**, *9*, 4405.
(7) Shapovalov, V. L.; Il'ichev, Yu. V. *Chem. Phys. Lett*. **1992**, *197*, 303.
(8) Leite, V. B. P.; Cavalli, A.; Oliveira, O. N., Jr. *Phys. Rev. E* **1998**, *57*(6), 6835.

* To whom correspondence should be addressed. Osvaldo N. Oliveira Jr. Instituto de Física de São Carlos, Universidade de São Paulo, C. P. 369, CEP 13560−970, São Carlos, SP, Brazil. Fax: +55 16 2713616. E-mail: chu@if.sc.usp.br.
[†] Departamento de Física, IBILCE, UNESP
[‡] Instituto de Física de São Carlos, USP

10.1021/jp0011903 CCC: $20.00
Published on Web 12/20/2000