

Bending Elasticity of Lipid Membranes in Aqueous Media with Various Chemical Composition and pH Value

Denitsa Mitkova, Victoria Vitkova

Georgi Nadjakov Institute of Solid State Physics, Bulgarian Academy of Sciences, 72 Tzarigradsko Chaussee Blvd., Sofia 1784, Bulgaria

Abstract. Alterations in mechanical properties of biological membranes can affect vital cell functions like division, fusion or cytolysis. In the present study, lipid bilayers were used as a model system of biomembranes [1, 2]. The bending elasticity of phosphatidylcholine lipid membranes (palmitoyl-oleoyl phosphatidylcholine, POPC, and stearyl-oleoyl phosphatidylcholine, SOPC) was measured by analysis of the thermal shape fluctuations, performed on nearly spherical giant lipid vesicles in aqueous surrounding with various chemical composition and pH [3-8]. The bending rigidity of POPC and SOPC bilayers was obtained in the presence of small (≤ 0.1 M) sugar concentrations. The bending modulus of SOPC membranes is reported at several acidities of the aqueous environment.

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References

1. A.G. Petrov, *The Lyotropic State of Matter: Molecular Physics and Living Matter Physics*, CRC Press, Amsterdam, The Netherlands, 1999.
2. Lipowsky, R. and E. Sackmann, eds. *Structure and Dynamics of Membranes*. 1995, Elsevier: Amsterdam.
3. Vitkova, V., J. Genova, M.D. Mitov, and I. Bivas, *Mol. Cryst. Liq. Cryst.*, 2006. **449**: p. 95-106.
4. Vitkova, V. and A.G. Petrov, in *Advances in Planar Lipid Bilayers and Liposomes*, Ales Iglic and J. Genova, Editors. 2013, Academic Press: Burlington. p. 89-138.
5. Mitkova, D., A. Stoyanova-Ivanova, S. Georgieva, P. Todorov, N. Kozarev, Y.A. Ermakov, and V. Vitkova, in *Advances in Planar Lipid Bilayers and Liposomes*, A. Iglic and C.V. Kulkarni, Editors. 2013, Academic Press: Burlington. p. 1-20.
6. Vitkova, V., D. Mitkova, A. Stoyanova-Ivanova, N. Kozarev, and I. Bivas, *C. R. Acad. Bulg. Sci.*, 2012. **65**(3): p. 329-334.

7. D. Mitkova and V. Vitkova, The aqueous surroundings alters the bending rigidity of lipid membranes, Russian Journal of Electrochemistry, 2016 (in press)
8. Genova, J., V. Vitkova, and I. Bivas, Physical Review E, 2013. **88**: p. 022707.