AFM characterization of phospholipid monolayer/Ca^{2+}/DNA complexes on Langmuir-Blodgett monolayers

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Abstract

Langmuir monolayers have been proposed as an approach to study interfacial adsorption and aggregation phenomena at the air/water interface. Particularly, the DNA binding to negatively charged phospholipid monolayers mediated by Ca^{2+} can be addressed with this experimental technique[1]. To this end, we tracked the changes in the surface pressure-area isotherms induced by the presence of both Ca^{2+} and DNA in the subphase. Additional insight into the rheological properties of the phospholipid monolayer/Ca^{2+}/DNA system can be deduced from the Gibbs elasticity plot. Furthermore, the Langmuir-Blodgett transfer to solid supports allows characterizing the size and morphology of the interfacial aggregates and their mesostructure by means of atomic force microscopy (AFM). These results in combination with other experimental and simulation techniques can contribute to improve the function and stability of lipid vectors for gene therapy purposes.

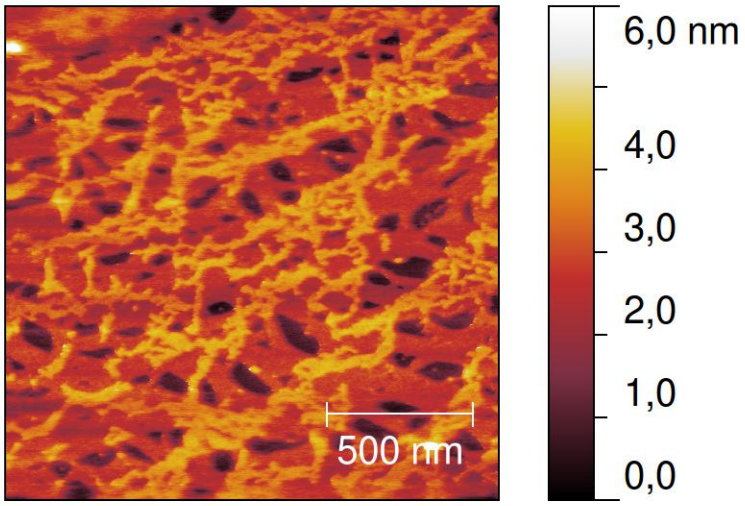

Figure 1. AFM image of phospholipid/Ca^{2+}/DNA interfacial aggregates in a Langmuir-Blodgett monolayer.

[1] Luque-Caballero, G.; Cabrerizo-Vílchez, M.A.; Maldonado-Valderrama, J.; Rodríguez-Valverde, M.A.; Sánchez-Treviño, A.Y.; Martín-Molina, A. AFM characterization of interfacial adsorption of DNA on phospholipid monolayers mediated by Ca^{2+}. Submitted to Langmuir.