ABSTRACT

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Title of Thesis: Effect of the number of lipid layers on the properties of thin films as skin barrier models

The uppermost layer of the skin, the *stratum corneum* (SC), primarily serves a barrier function that is essential for human survival on dry land. The SC is composed of flattened dead cells, corneocytes, which are surrounded by an extracellular lipid matrix. The composition and arrangement of SC lipids are closely related to the proper structure and function of the skin, and their disruption can lead to the development of certain skin diseases.

The study aimed to determine the effect of the number of lipid layers on the properties of thin films as skin barrier models. The method used for the preparation of the models was the deposition of thin films by the Langmuir-Blodgett technique. Mono-, tri- and five-layer models were prepared. The deposited sample was a mixture simulating the composition of skin lipids and containing ceramides, cholesterol and a mixture of fatty acids in a molar ratio of 1:0.45:1. These models were then evaluated by atomic force microscopy (AFM) and Raman microspectroscopy. During the experiments, reorganization of the lipids into higher structures was observed and was determined to be spontaneous and may occur shortly after preparation. To demonstrate that the higher structures were not external impurities, a new lipid mixture containing deuterated fatty acids in addition to ceramides and cholesterol was prepared. After deposition, the models of this mixture were again evaluated by Raman spectrometry, which showed that the mentioned higher structures originated from the deposited lipid mixture.