

CHLOROPHYLL *a* IN LIPOSOMES - SPECTRAL AND ELECTROCHEMICAL STUDIES

LAURA TUGULEA* and IOAN IACOVACHE

Faculty of Physics, University of Bucharest, Department of Electricity and Biophysics, P.O.Box. MG-11, Bucharest-Magurele, 76900 Romania

Liposomes with chlorophyll *a* are model membranes providing a hydrophobic environment for chlorophyll *a*. Physical and chemical studies on these models could lead to relevant insights for *in vivo* primary reactions in photosynthetic membranes. The objective of our research was to prove that the spectral and electrochemical features of chlorophyll *a* allow it to be used as a fluorescence marker and as a sensor for interactions at the molecular level, inside artificial membranes and biomembranes. Small unilamellar and multilamellar vesicles with chlorophyll *a* were prepared. The mechanical dispersion method was used to obtain multilamellar vesicles. Unilamellar liposomes were obtained from multilamellar vesicles through bath sonication for 30 minutes. Liposomes were prepared using Chl *a*/lipid films with a specific molar ratio (1/10 and 1/100) and different lipids (DMPC, DPPC, DOPC). The films were dispersed in buffer solutions of different pH (6.2 - 7.6). The Chl *a* was freshly extracted from spinach leaves and separated by chromatography.

Visible absorption and emission studies confirm the localisation of the porphyrin ring at the lipid-water interface. Liposomes with Chl *a* were exposed to electromagnetic fields (light, microwaves). Chl *a* and lipid modifications in the bilayer were monitored by absorption spectroscopy in the UV-VIS range and using electrochemical methods (cyclic voltammetry, amperometry). Chl *a* was proved to be an excellent molecular sensor in absorption, fluorescence and electrochemical studies on liposomes. Interesting applications for further studies concerning specific interactions occurring inside different membranes exposed to electromagnetic fields (light and microwave exposure) were also outlined.

* E-mail: ltugulea@hotmail.com