Faculty of Engineering
Tokushima University

Bio-Membrane Engineering

Professor Hitoshi Matsuki

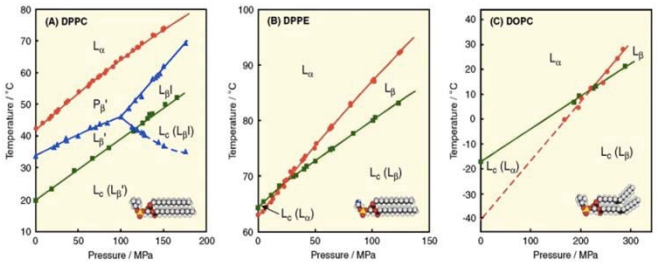

Fig. 1 Barotropic phase behavior of lipid bilayers

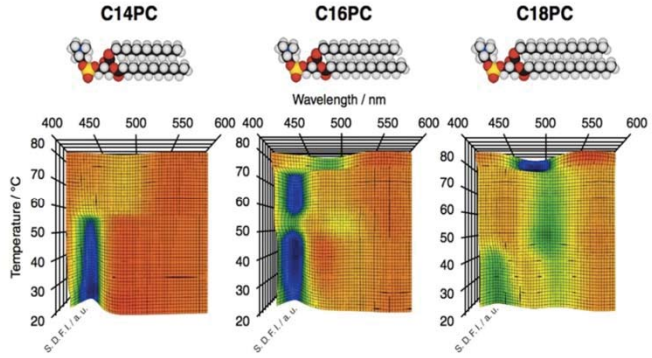

Fig. 2 Imaging of packing states of lipid bilayers

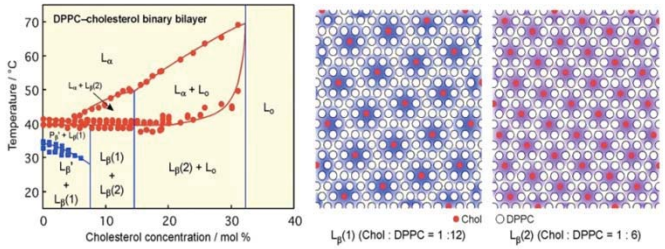

Fig. 3 Miscibility of lipid-cholesterol binary bilayer

Content:

In order to elucidate various phenomena of biological membranes such as phase transitions, nonbilayer formation, lipid raft, membrane fusion and fission, anesthetic action, studies on bio- and model membranes have been made by means of biophysical and surface-science approaches. One of characteristics of the research is that pressure as well as temperature and concentrations is used as an analytical tools for bio-membrane studies. Since the variables like temperature and concentrations always contain a diffusion process, there exist the propagation delay and the local differences. On the other hand, pressure acts uniformly and instantaneously due to Pascal's principle and brings about large mechanical fluctuation on biological membranes. Thereby novel phenomena that are not observable under atmospheric pressure are observable under high pressure. Pressure-induced interdigitation of phosphatidylcholine bilayers and the pressure reversal of anesthesia are the representative examples. Left hand side figures show barotropic phase behavior of lipid bilayers (Fig. 1), imaging of packing states of lipid bilayers (Fig. 2) and miscibility of lipid-cholesterol binary bilayer (Fig. 3), which were revealed recently.

Keywords : lipid bilayer membrane, phase transition, high pressure

E-mail: matsuki@tokushima-u.ac.jp
Tel : +81-88-656-7513
Fax: +81-88-655-3162
HP : http://www.bio.tokushima-u.ac.jp/A1/