

Studying Membrane Structure by Small Angle X-ray Scattering

Shiuan-Shiaou Wu (吳軒孝)¹, Wei-Yu Lin (林威佑)¹, Yi-Ting Sun (孫亦廷)^{1,2},
Kuan-Rong Lee (李寬容)², and Ming-Tao Lee (李明道)^{1,3}

¹National Synchrotron Radiation Research Center, Hsinchu, Taiwan

²Institute of Molecular Medicine, National Tsing Hua University, Hsinchu, Taiwan

³Department of Physics, National Central University, Chungli, Taiwan

As a key component of cell, membrane is not only a “Wall” to support and protect the cell but also the interface to control the materials to go in and out. By interacting with membrane directly, biological molecules can change either its structure or membrane structure to work well. For example, membrane proteins can fold to functional structure with suitable membrane structure and pore formation protein can change membrane structure to form pore structure to be ion channel or kill the cell. More and more studies shows that many biological processes will accompany structure change of membrane, such as membrane fusion and cell apoptosis. Therefore, the structure determination of membrane is key issue to study these processes. Typically, Lamellar X-ray Diffraction (LXD) was used to determine membrane structure in high resolution. The sample used in LXD is multi lamellar film on substrate. It is close to materials rather than living cell in solution. In this study, Small Angle X-ray Scattering (SAXS) is used to probe membrane thickness of vesicle sample in solution. The results are consistent with LXD. By this powerful technique, we can study not only the membrane structure but also the interaction between biological molecules and vesicles in solution.

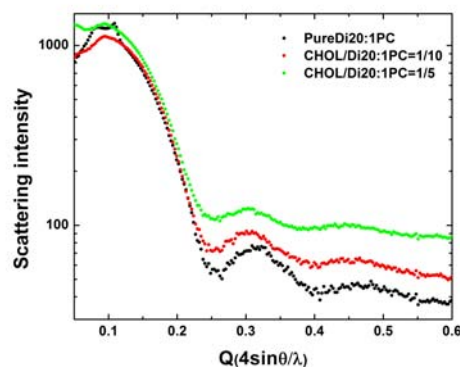


Fig. 1: Scattering curve of cholesterol adding to Di22:1PC vesicles in water

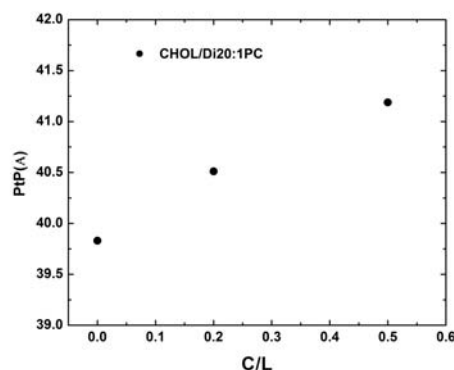


Fig. 2: Membrane thickness change induced by cholesterol binding to vesicles in water