Paper ID	1570763414
Title	Effect of the amount of carbon nanotubes introduced into liposomes on membrane permeability
Author	Shoichiro Kanno and Zugui Peng (Tokyo Institute of Technology, Japan); Kenta Shimba (The University of Tokyo, Japan); Yoshitaka Miyamoto (National Center for Child Health and Development, Japan); Tohru Yagi (Tokyo Institute of Technology, Japan)
Email	kanno.s.ad@m.titech.ac.jp

Abstract

Single-walled carbon nanotubes (SWNTs) are tubular nanocarbons with a diameter of a few nm made of a single layer of carbon. Recently, it has been shown that SWNTs can be spontaneously inserted into lipid membranes, which are the basic elements of cell membranes, by cutting them into lengths of about 10 nm. Furthermore, SWNTs are able to transport ions through their structures. Therefore, SWNTs are expected to be applied to sensors and drug delivery systems by incorporating them into spherical artificial lipid membranes (liposomes). Currently, the transport of ions through SWNTs is measured optically using fluorescent probes in liposomes. On the other hand, SWNTs inserted into membranes change the shape and mechanical properties of the membranes, and there is a possibility of ion influx from defects in the membranes derived from these changes. Therefore, it is not possible to determine whether the change in fluorescence intensity is due to SWNTs or liposome deformation only by measuring the fluorescence intensity. The liposomes used in the existing method have a particle diameter of several hundred nm, and it is difficult to confirm the state of the membrane. To confirm the membrane condition, it is necessary to use micrometer-sized liposomes (GUVs) that can be observed under a microscope. In this study, we used a fluorescence microscope and GUVs to simultaneously measure the state of the liposome membrane and the fluorescence intensity inside the liposome. In addition, the number of SWNTs introduced into the liposome was varied to observe the change in ion transport process depending on the concentration of SWNTs.