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Study on size variations of liposomes under osmotic pressure using asymmetrical flow Field-Flow Fractionation (AsFIFFF) - Multi Angle Light Scattering (MALS)

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Liposome has been used for drug delivery, cosmetics, and foods due to easy control of the size, robust similarity to biological membrane, and low toxicity. Especially, the size and stability of liposomes under osmotic stress are of great importance because of leakage of contents and vesicle disruption in drug delivery. Measurement of the size and shape of liposome has been usually performed using Transmission Electron Microscope (TEM) and Atomic Force Microscopy (AFM), etc. However, its cost and complicated process has limited facile characterization of liposome. Thus, we have utilized asymmetrical flow Filed-Flow Fractionation (AsFIFFF) and Dynamic Light Scattering (DLS) for the facile prediction of size, its distribution and shape variations. In this study, we confirmed the size and shape variations of liposomes using AsFIFFF-MALS, DLS-Zeta and Cryo-SEM under osmotic pressure. The stability of liposome was enhanced as the lipid concentration is higher and the storage temperature is lower. The results of AsFIFFF showed that, the liposome turned into a rod-like shape in the hypertonic condition and a sphere-like one in the hypotonic solution. Based on these results, we assessed the correlation between the shape of liposome and efficiency of its cell membrane fusion in various osmosis conditions by encapsulating fluorescence dyes in liposomes. This study gave us the insight into both the stability of liposome and its release efficiency under osmotic pressure, in addition to optimal conditions for liposome preparation when it is used for a practical drug formulation.

Biography

Minwook Kim has earned his undergraduate course in Chemistry at Hannam University, Republic of Korea . Presently he is a graduate student of Chemistry at Hannam University.

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