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Abstract

It has been attempted to apply bottom-up artificial cells, developed for understanding biological phenomena, as micro-sized molecular-driven robots. One such application involves incorporating molecular computing and sensing functions into these artificial cells to achieve biomarker sensing. However, electrophysiological assays using channel-type membrane proteins for sensing present challenges when applied to giant unilamellar vesicles (GUVs), the chassis of artificial cells. The patch-clamp technique, which is effective for electrophysiological evaluation in GUVs, tends to cause structural collapse of GUVs due to their lack of a cytoskeleton, in contrast to cells. Here, we aim to improve the mechanical stability of GUVs and enable the application of the patch-clamp technique by encapsulating a cytoskeletonmimicking substance into liposomes. In this study, we developed GUVs containing agarose gel as an internal skeleton and attempted to form giga-seals using pipette electrodes in the patchclamp method.