Supporting Information of

Magnetically Immobilized Nanoporous Giant Proteoliposomes as a Platform for Biosensing

By Tse-Ming Hsin, Kan Wu and Gowri Chellappan

Experimental Conditions for Figure 3

For the comparison of MNP-containing and biotinylated liposomes, high concentrations of reagents were used during vesicle synthesis owing to low sensitivity in spectrofluorometers. In both cases, MNP-liposomes contained 0.1 mg/mL MNP. As for biotinylated liposomes, 1 % and 5 % (mol/mol) biotin-lipids were used with 99 % and 95 % soybean PC to maintain lipid concentrations.

Figure 3a: glucose sensors

In the synthesis of liposomes, 2000 µL lipids and 4000 µL of aqueous solution were used. The aqueous solution contained 10 µM resazurin, 2.0 U/mL diaphorase and 2000 µL of glucose HK assay reagents. After dialysis, 1000 µL of liposomal solution was mixed with glucose and aHL. The final concentration of glucose was 8 mM and that of aHL was 0.72 µM during incubation. The total volume for fluorimetric determination was 2.5 mL.

Figure 3b: ethanol sensors

In the synthesis of liposomes, 2000 µL lipids and 4000 µL of aqueous solution were used. The aqueous phase contained 25 µM resazurin, 5.0 U/mL diaphorase, 0.03 g NAD⁺, and 5.0 U/mL ADH. After dialysis, 1000 µL of liposomal solution was mixed with ethanol and aHL. The final concentration of ethanol was 27.42 mM and that of aHL was 0.72 µM. The total volume for fluorimetric determination was 2.5 mL.
Figure S1. Control experiments for biosensing. The increased signals were attributed to translocation of analytes by pores of aHL. (a) Effect of MNP on vesicles. The fluorescence signals from MNP-liposomes and control experiments were the same, before and after the addition of porin. (b) Effect of biotin-lipids on vesicles. Introduction of biotin to vesicle affects both encapsulation efficiency and translocation of analytes by aHL. Comparison of background fluorescence signals without aHL indicated that encapsulation became less efficient when higher concentration of biotinylated lipid was used. Effect of biotin on aHL’s porin activity was evaluated by taking the difference of signals before and after the introduction of aHL.
Figure S2. Experimental setup consisted of an inverted microscope, a He-Ne (543-nm) laser, and a CCD camera. The 100X objective was used for single-vesicle investigations while 10X and 5X objectives were used for signal collection in biosensing. M: mirror. DC: dichroic mirror. BP: band-pass filter.
Figure S3. TEM micrograph of MNP used in the experiments. The average size of MNP is $10 \pm 3$ nm, based on measurements of one hundred particles.