micromachines

*Supplementary Materials*

# A Lipid-Bilayer-On-A-Cup Device for Pumpless Sample Exchange

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## S1. Correlation between fluorescence intensity and concentration of calcein

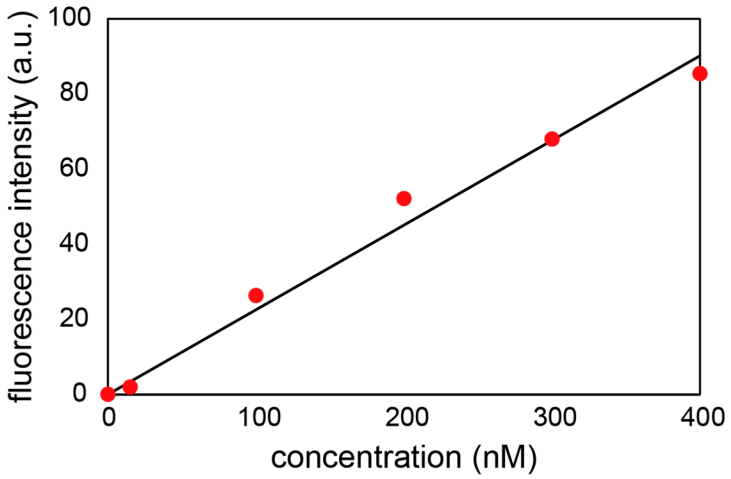


**Figure S1.** Correlation between fluorescence intensity and concentration of calcein. The fluorescence intensities of calcein at respective concentrations were measured using a fluorescence microscopy. The concentration inside of the mini-cup was then estimated using the calibration curve.

## S2. One-dimensional diffusion model

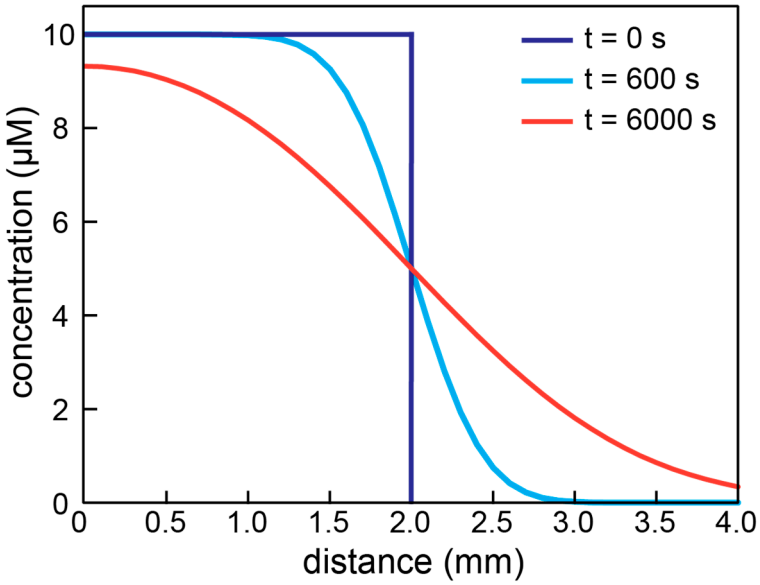


**Figure S2.** Diffusion of a molecule over time. A molecule held in a mini-cup ($0 < x < 1$, $C_0 = 10$ μM) diffuses by the fusion with a reservoir ($1 < x$). The model does not consider convection flow.

Crank showed one-dimensional diffusion model similar to our system.

$$C(x,t) = \frac{C_0}{2}\left[\mathrm{erf}\left(\frac{x+h}{2\sqrt{Dt}}\right) - \mathrm{erf}\left(\frac{x-h}{2\sqrt{Dt}}\right)\right] \quad (1)$$

where we applied the following parameters [1].

$$C_0 = 10\ \mu M \quad (2)$$

$$D = 1.0\times10^{-10}\ m^2/s \quad (3)$$

$$h = 2\ mm. \quad (4)$$

1. CRANK, J. *The Mathematics of Diffusion*. Oxford university press: Oxford, England, 1975.