Electronic Supplementary Information: Kinetic evolution of DOPC lipid bilayers exposed to α-cyclodextrins

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June 19, 2018

Supplementary figures:

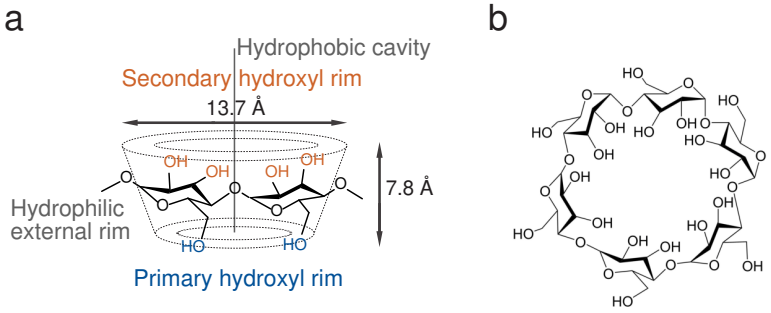


Figure S1. Chemical structure of α-cyclodextrin a) 2D structure of α-cyclodextrin showing the arrangement of glucose monomers b) α-CD containing 6 glucose units.

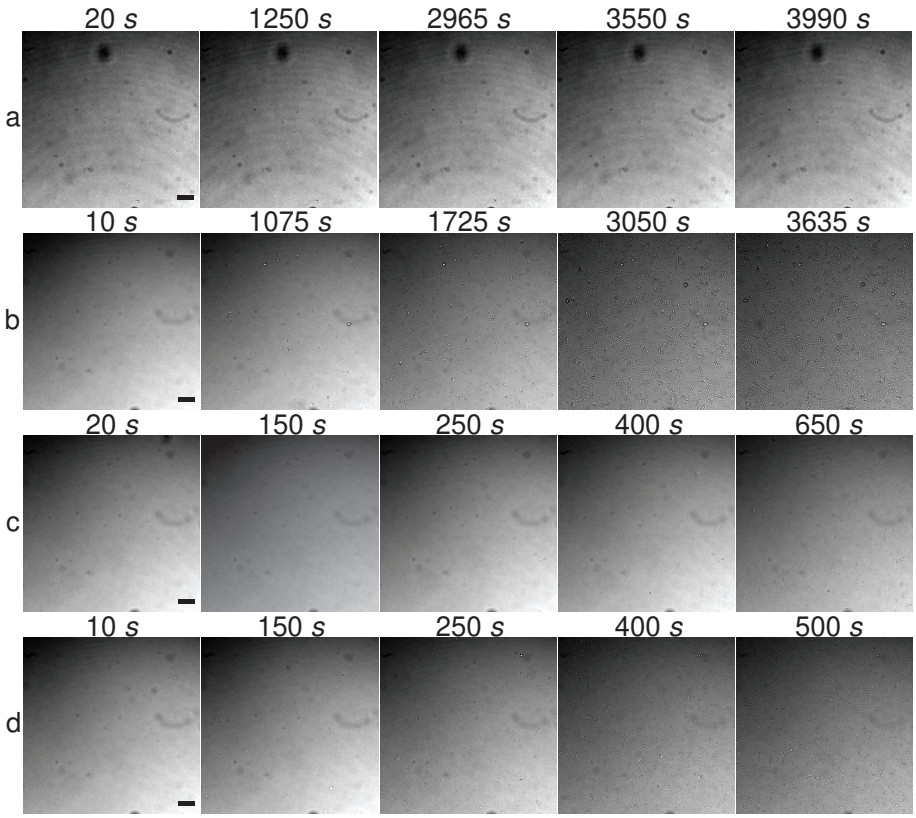


Figure S2. Bright field images of DOPC SLB marked with DiI at various αCD concentrations: a) 5mM b) 10mM c) 15mM d) 20mM. There is a 120s lag time between the injection of αCD into the measuring chamber and the beginning of the microscopy acquisition.

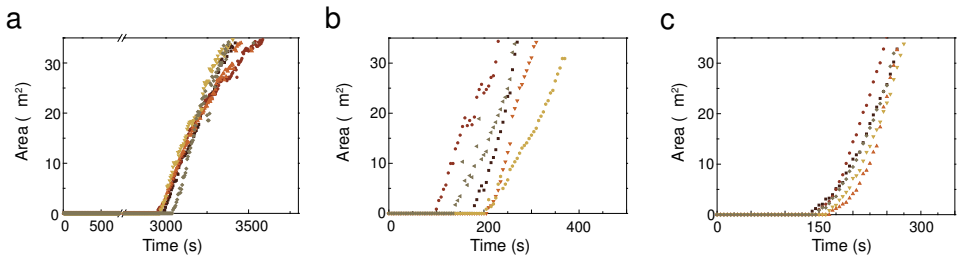


Figure S3. Time evolution of the single hole areas on SLBs upon interaction with a) 10mM b) 15mM c) 20mM αCD.

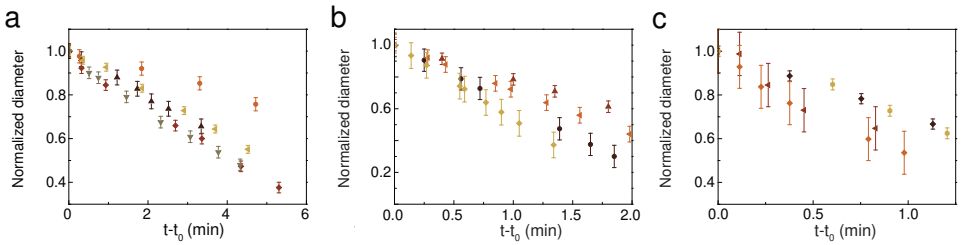


Figure S4. Changes in diameter of 3 individual GUVs upon interaction with αCD at various concentrations: a) 10mM b) 15mM c) 20mM.

Additional note on the quartz crystal microbalance with dissipation measurements (QCM-D)

The QCM-D technique measures the shift in frequency and the width of the resonance curve of the overtones of a vibrating resonant quartz crystal. The adsorption of a mass Δm onto the vibrating quartz results in a negative shift $\Delta f_n/n$ of the resonant frequency of the overtone n. The Sauerbrey equation relates the frequency variation $\Delta f_n/n$ to the mass variation Δm, in the case of rigid film adsorption:

$$\frac{\Delta f_n}{n} = \frac{-2f_1^2}{A\sqrt{\rho_q \mu_q}}\Delta m \tag{1}$$

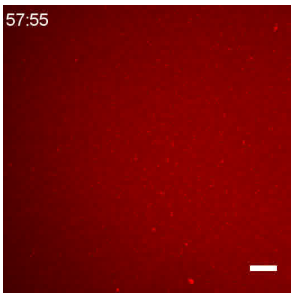
where f_1 is the resonant frequency of the quartz crystal (5 MHz), A is the piezoelectrically active crystal area, ρ_q is the density of quartz (2.648 g/cm^3) and μ_q is a shear modulus of the crystal ($2.947{\cdot}10^{11}$ g/cm$\cdot$s^2) in the transverse orientation.

In the case of soft films, the Sauerbrey equation must be adjusted to reflect the viscoelastic response of the film coupled to the surrounding bulk solution. This can be achieved by introducing a complex resonant frequency. The amount of dissipation D is then defined as the inverse of the quality factor:

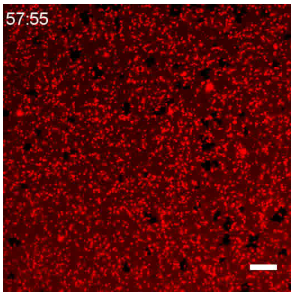
$$D = \frac{2\Gamma}{f}, \tag{2}$$

with Γ the half-width of the resonant intensity curve and f the resonant frequency. Small Ds correspond to highly resonant devices and low losses. Large Ds corresponds to the opposite wide and low amplitude resonance limit [D. Johannsmann, Springer Ser. Chem. Sens. Biosoens. (2007) 5,49-109].

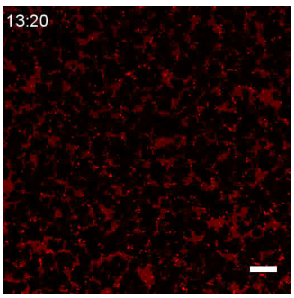
Movies



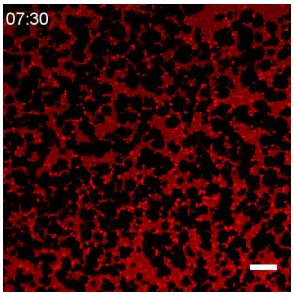
Movie 1. Evolution of a fluorescent SLB exposed to a 5 mM αCD solution. Scale bar 20 μm, frame rate: 1 frame every 25 s. Top left clock: elapsed time in minutes:seconds format.



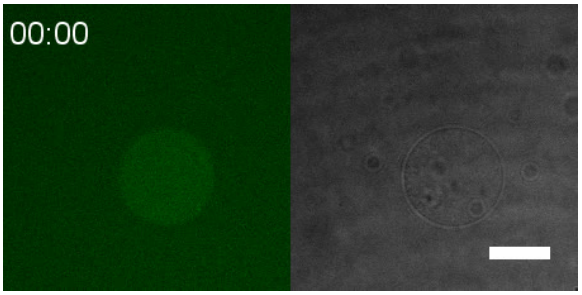
Movie 2. Evolution of a fluorescent SLB exposed to a 10 mM αCD solution. Scale bar 20 μm, frame rate: 1 frame every 25 s. Top left clock: elapsed time in minutes:seconds format.



Movie 3. Evolution of a fluorescent SLB exposed to a 15 mM αCD solution. Scale bar 20 μm, frame rate: 1 frame every 5 s. Top left clock: elapsed time in minutes:seconds format.



Movie 4. Evolution of a fluorescent SLB exposed to a 29 mM αCD solution. Scale bar 20 μm, frame rate: 1 frame every 5 s. Top left clock: elapsed time in minutes:seconds format.



Movie 5. Evolution of a non fluorescent GUV embedded in a 10 mM αCD solution containing the HPTS fluorescent dye. Scale bar 10 μm, frame rate: 1 frame every 6 s. Top left clock: elapsed time in minutes:seconds format.