Supporting Information for:

UV-Induced Bursting of Cell-Sized Multi-Component Lipid Vesicles in a Photosensitive Surfactant Solution

Antoine Diguet[1,2,3], Miho Yanagisawa[4], Yan-Jun Liu[1,2,3], Elodie Brun[1,2,3], Sacha Abadie[1,2,3], Sergii Rudiuk[1,2,3] and Damien Baigl[1,2,3]*

[1] *Department of Chemistry, Ecole Normale Supérieure, 24 rue Lhomond, 75005 Paris, France.*

[2] *Université Pierre et Marie Curie Paris 6, 4 place Jussieu, 75005 Paris, France.*

[3] *UMR 8640, CNRS, France.*

[4] *Department of Physics, Faculty of Sciences, Kyushu University, Fukuoka 812-8581, Japan.*

***Corresponding author**

E-mail: damien.baigl@ens.fr; Fax: +33 1 4432 2402; Tel: +33 1 4432 2405

Website: http://www.baigllab.com/

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1. Materials and method

Materials. 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC), 1,2-dipalmitoyl-*sn*-glycero-3-phosphocholine (DPPC), 1,2-dipalmitoyl-*sn*-glycero-3-phosphoethanolamine-N-(lissamine rhodamine B sulfonyl) (ammonium salt) (rhodamine-DPPE) and cholesterol were purchased from Avanti Polar Lipids. All other chemical were from Sigma. Ultrapure water (Millipore, 18 MΩ.cm) was used for all experiments.

AzoTAB synthesis. Azobenzene trimethylammonium bromide (AzoTAB) synthesis was adapted from the method that was described by Hayashita *et al.*[1] The protocol is the same as that described for AzoTAB homologs.[2] The purity of the final product was checked by 250 MHz ^{1}H and ^{13}C NMR spectroscopy.

Electroformation. For all experiments, the same electroformation[3] procedure was applied. First, 4 µL of a 10 $mg.mL^{-1}$ solution containing the mixture of DOPC/DPPC 1:1 + cholesterol in chloroform was spread at a constant speed with a solvent safe micropipette tip (Eppendorf) on a indium tin oxide (ITO) electrode previously cleaned by isopropyl alcohol and acetone. After the phospholipid film was dried, ~400 µL of a swelling aqueous solution containing sucrose (≈ 0.1 M) and NaN_3 (4.6 mM) was introduced between the two electrodes separated by a 1 mm thick spacer. Electroformation was performed using a sinusoidal AC field (2 V, 10 Hz) for 3 h.

Sedimentation. The vesicle suspension was then extracted under low shear stress and mixed in a PDMS well with the same volume of a solution containing glucose (≈ 0.1 M), NaN_3 (4.6 mM) and the desired AzoTAB concentration. This solution was previously adjusted to have the same osmolarity as that of the sucrose solution (112 mOsm), which was measured using a cryoscopic osmometer (Löser). The vesicles mixed with the glucose solution were then collected by gravity on a microscope glass slide after 2 h of sedimentation and observed by

optical microscopy. For the experiment involving sedimentation in a glucose solution containing *cis*-AzoTAB, the glucose/AzoTAB solution was previously exposed under UV illumination (365 nm for 15 min) using a 6 W UV lamp (Vilber Lourmat) placed 5 cm above the sample. The sedimentation was then performed in the dark.

Microscopy. Phase-contrast microscopy was performed with an Axioobserver D1 inverted microscope (Zeiss), equipped with a EM-CCD camera (Photonmax 512B, Princeton Scientific). For UV and visible illuminations, the light of a mercury lamp was filtered with a 365+/- 40 nm and a 475 +/- 20 nm bandpass filter (Zeiss), respectively. A 10x objective was used for collective illumination (Figures 2-5) and a 100x objective, coupled to a 1.6x relay lens, was used for the selective destruction of individual target GUVs (Figure 7). The bursting rate (Y_{burst}) was calculated by comparing the number of GUV before and after UV illumination on the same observation field. At least 50 vesicles were taken into account for each Y_{burst} value reported in Figure 3. Membrane domains were observed by confocal microscopy using a LSM 710 microscope (Zeiss). Liquid-ordered and liquid-disordered domains were dyed using rhodamine-DPPE (2 mol%) and perylene (0,5 mol%), respectively.[4]

Centrifugation assay and UV-Vis spectroscopy. For Figure 5 and Figure S1, centrifugation was performed using a 5424R centrifuge (Eppendorf) and UV-Vis spectra were recorded using a Synergy HT microplate reader (Biotek).

2. Supplementary Figure

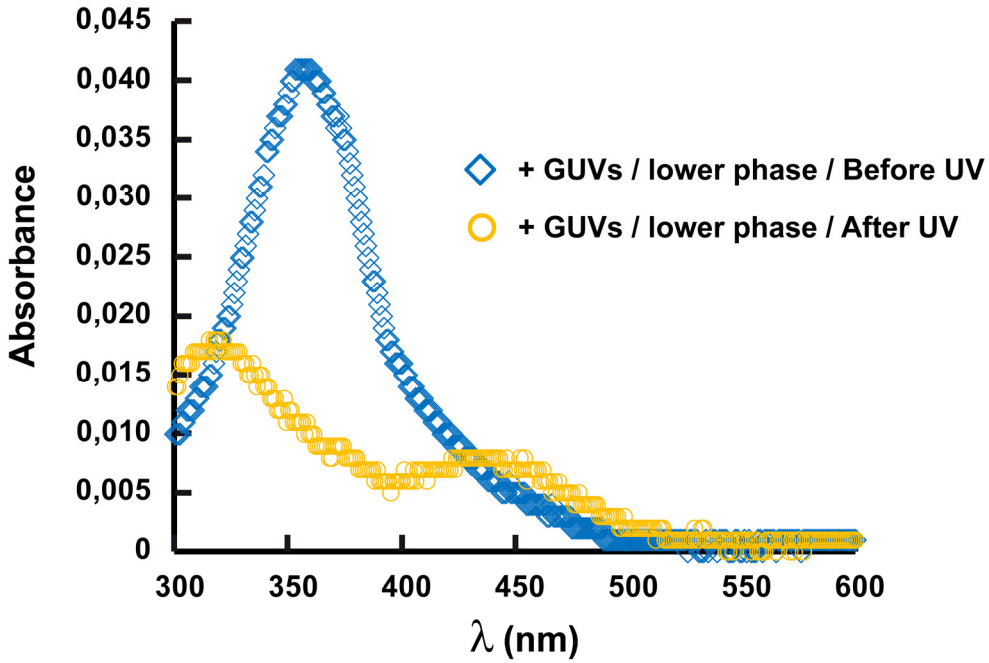

Figure S1. UV-induced *trans-cis* isomerization of AzoTAB in GUV membrane. Same as in Figure 5B (*trans*-AzoTAB) but before and after UV irradiation (365 nm) of the lower phase sample in the presence of GUVs.

3. Movie legend

Movie S1. Real time observation of the effect of UV (365 nm) applied on GUVs composed of 1:1 DOPC/DPPC and 20 mol% cholesterol.

4. References

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