Supporting Information for:

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

Antoine Diguet\textsuperscript{1,2,3}, Miho Yanagisawa\textsuperscript{4}, Yan-Jun Liu\textsuperscript{1,2,3}, Elodie Brun\textsuperscript{1,2,3}, Sacha Abadie\textsuperscript{1,2,3}, Sergii Rudiuk\textsuperscript{1,2,3} and Damien Baigl\textsuperscript{1,2,3}\textsuperscript{*}

\textsuperscript{1} Department of Chemistry, Ecole Normale Supérieure, 24 rue Lhomond, 75005 Paris, France.

\textsuperscript{2} Université Pierre et Marie Curie Paris 6, 4 place Jussieu, 75005 Paris, France.

\textsuperscript{3} UMR 8640, CNRS, France.

\textsuperscript{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/

CONTENTS

- Materials and methods
- Figure S1
- Legend of Movie S1
- References
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.* The protocol is the same as that described for AzoTAB homologs. The purity of the final product was checked by 250 MHz ¹H and ¹³C NMR spectroscopy.

**Electroformation.** For all experiments, the same electroformation 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 NaN₃ (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), NaN₃ (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.

**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

(1) Hayashita, T.; Kurosawa, T.; Miyata, T.; Tanaka, K.; Igawa, M. *Colloid Polym. Sci.* **1994**, 272, 1611–1619

(2) Diguet, A.; Mani, N. K.; Geoffroy, M.; Sollogoub, M.; Baigl, D. *Chem. Eur. J.* **2010**, *16*, 11890-11896

(3) Angelova, M. I.; Dimitrov, D. *Faraday Discuss. Chem. Soc.* **1986**, *81*, 303–311.

(4) Baumgart, T.; Hess, S. T.; Webb, W. W. *Nature* **2003**, *425*, 821–824