Biophysical Journal, Volume *111*

Supplemental Information

Modulating Vesicle Adhesion by Electric Fields

Jan Steinkühler, Jaime Agudo-Canalejo, Reinhard Lipowsky, and Rumiana Dimova

Supporting Information

Modulating vesicle adhesion by electric fields

J. Steinkühler, J. Agudo-Canalejo, R. Lipowsky and R. Dimova*

Max Planck Institute of Colloids and Interfaces, Science Park Golm, 14424 Potsdam, Germany

* Corresponding author: dimova@mpikg.mpg.de

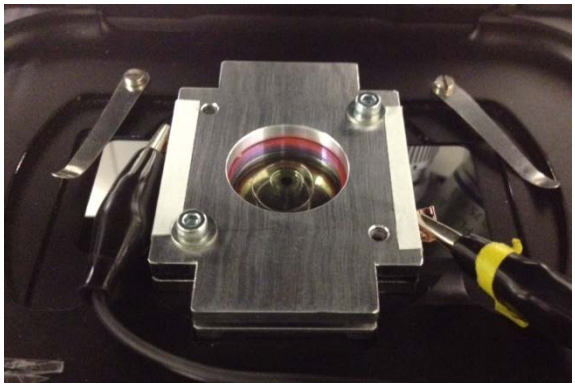

Figure S1. Picture of the experimental chamber fixed on an inverted confocal microscope. Connectors to left and right lead to the DC-voltage source. The transparent ITO glasses can be seen in the middle of the picture. The red spacer is not in contact with the vesicle suspension.

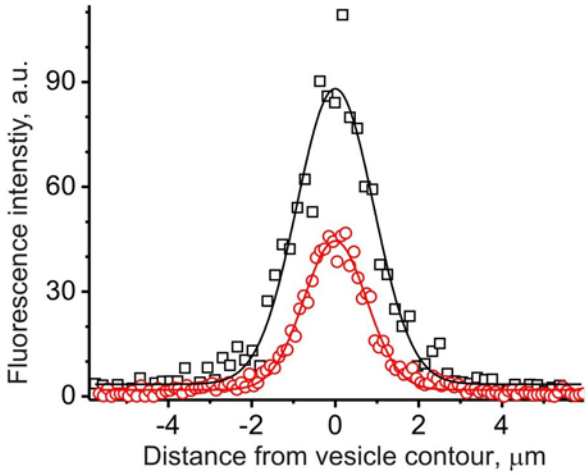

Figure S2. Examples for the intensity profiles across the membranes of an unquenched vesicle (red diamonds) and a quenched vesicle (black squares) adhering to the ITO glass. The profiles were fitted with a Gaussian (OriginPro 8.6) and the peak value taken as an indicator of dye concentration.

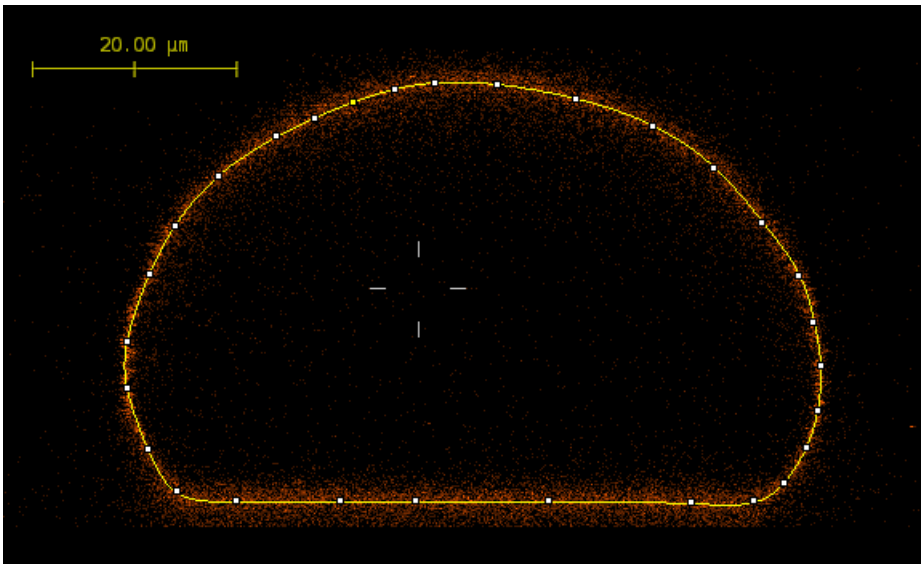

Figure S3. Image of a vertical cross section of an adhering vesicle (at 1V) as obtained by confocal microscopy. The manually determined contour (yellow) is used to compute the vesicle area and volume.

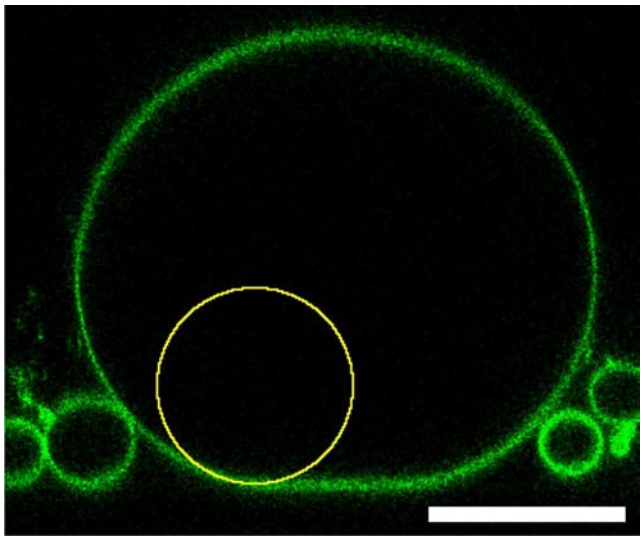

Figure S4. Measuring the contact curvature radius, R_{co}. Circle of best fit (yellow) in the contact zone of an adhering vesicle (confocal side view). The scale bar is 25µm.

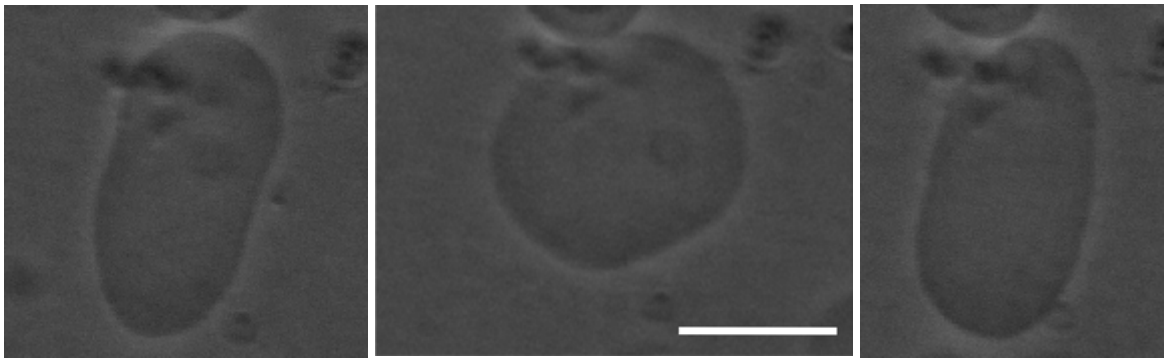

Figure S5. Phase contrast images of a very deflated vesicle consecutively exposed (from left to right) to 0V, 1.2V and 0V external voltage undergoing reversible shape changes from prolate to adhering back to prolate shape. Note the preserved contrast of the vesicle, which indicates that there is no significant leakage, consistent with the finding that the vesicle volume is preserved. Scale bar corresponds to 20µm.

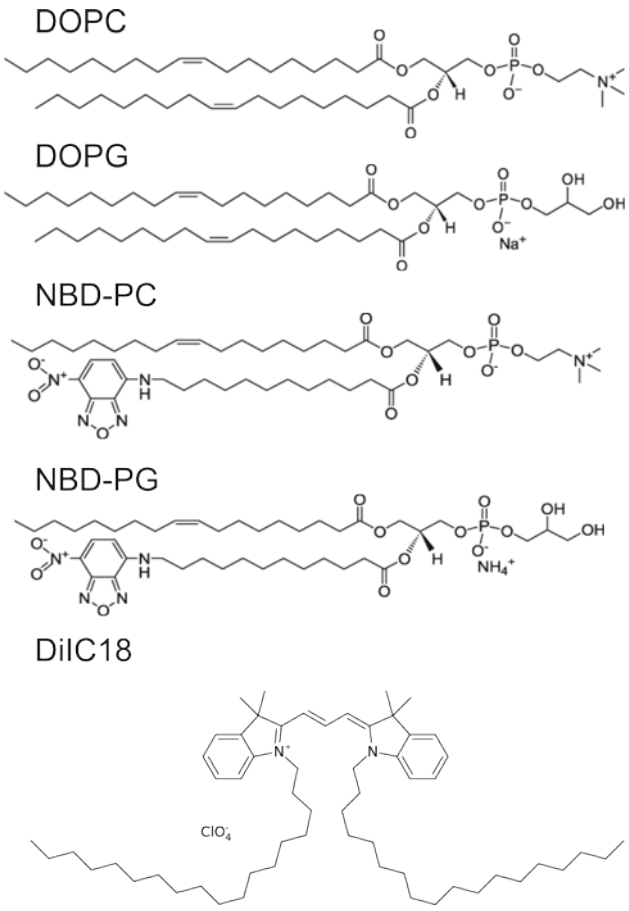

Figure S6. Structures of the lipid molecules and main fluorophores employed in this study.

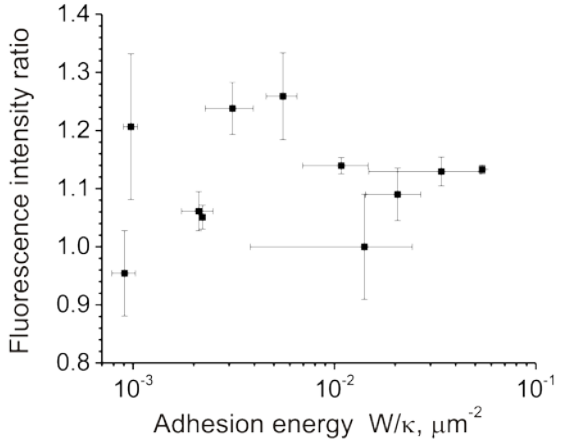

Figure S7. Fluorescent intensity ratio of adhering vesicles obtained in the same way as in Figure 6 but using a NBD labeled PC lipid analog (same label position in the acyl chain, see Fig. S6). The expected slight increase of a few percent is hidden by the uncertainty of the measurement. The absence of fluorescence quenching of NBD due to adhesion is clearly demonstrated.

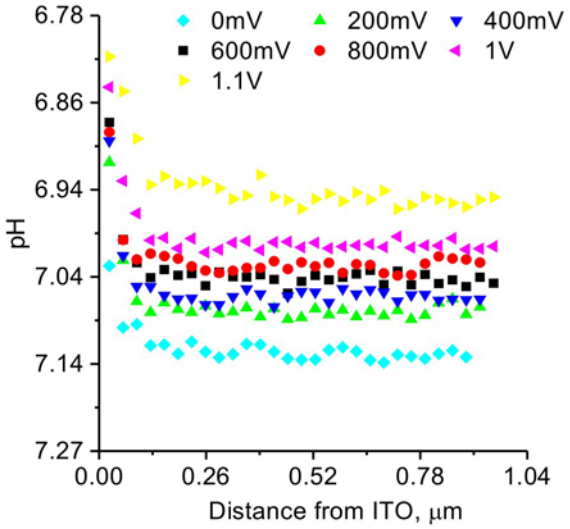

Figure S8. The pH change in the buffer near the bottom ITO glass as a function of the external potential was measured using the pH-sensitive dye SNARF (seminaphthorhodafluor, Life Technologies) which was added at concentration of 10 μM to the buffer. The intensity ratio between the green and red peak signal of the dye was converted to pH based on calibration measurements in solutions of known pH. The maximal decrease in pH was measured directly (sub μm distance) at the ITO glass surface but is still above pH 6.