**Dataset: Bao, Peng (2016) Data Associated with ‘*Controlling Transmembrane Protein Concentration in Supported Lipid Bilayers’.* University of Leeds. [Dataset**] <https://doi.org/10.5518/70>1

**Figure Captions**

***Figure 1.*** FRAP results for pR-Alexa488 in a DOPC lipid bilayer formed on glass substrate. The recovery curve for FRAP of pR-Alexa488 (hollow dots: experiment results; red line: fitting curve). Inset: False-color fluorescence image of pR-Alexa488 in lipid bilayer under FITC filter: Left) immediately after photobleaching; right) 700 s after photobleaching.

***Figure 2.*** pR-containing lipid bilayer formation.a) The force-separation curve showing “punch-through” to determine lipid bilayer thickness; Inset: schematic of the AFM on a supported lipid bilayer containing proteorhodopsin. b) AFM height image of pR-Alexa488 containing DOPC lipid bilayer on glass (1µm scan). c) AFM height image of pR-Alexa488 containing DOPC lipid bilayer on mica (1µm scan). d) The height profile along the dotted line in the height image in Fig. 1c. e) The histogram of center height of pRs on mica, with fit to two peaks located at 0.8 and 1.3 nm.

***Figure 3.*** Electrophoresis of pR-Alexa488 in the DOPC lipid bilayer (brighter color regions) in “DC-trap” structures of different lengths (labeled as 1-6) formed by microcontact-printed fibronectin (darker color region) on a glass substrate. a) Schematic showing the uniform distribution of pR in lipid bilayer before the application of *E*-field. b) Schematic showing the concentration of pR in lipid bilayer under an *E*-field. False-color fluorescence image of pR-Alexa488 in patterend lipid bilayers using a FITC filter: c) Before application of *E*-field; d) 180 min after application of *E*-field; e) Accumulation of pR-Alexa488 in the trap heads (regions defined by dashed lines in Figure 3c) as a function of time. The star in Figure 3d indicates where the AFM images were taken following the application of *E*-field.

***Figure 4.*** AFM image of pR-Alexa488 molecules in DOPC lipid bilayer located at the trap head-region in the longest trap (trap 6 in Figure 3), after the application of an *E*-field of 180 min. a) topology; b) formation of regular oligomer clusters – hexagons (n > 105), triangles (n>80) structures; c) histogram of center height of particles in the AFM image. (Scale bar is 20 nm in Figure 4b).

**Zip file contents**

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| Description | Content type | Filename |
| Data in Figure2.zip (raw data for figure2a) | TXT | Figure 2a-ForceReviewGraph |
| Data in Figure2.zip (raw data for figure2b) | Nanoscope AFM file | Figure 2b-20160824pr488-glass.016 |
| Data in Figure2.zip (raw data for figure2c) | Nanoscope AFM file | Figure2c-pr488.013 |
| Data in Figure2.zip (raw data for figure2d) | TXT | figure2d-pr488.013 - NanoScope Analysis |
| Data in Figure2.zip (raw data for figure2e) | TXT | Figure2e-waveheight\_Hist-binsize0p05nm |
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| Data in Figure3.zip (vedio for figure3) | avi | Figure3-video-200V-3min gap-pR488 |
| Data in Figure3.zip (raw data for figure 3e) | TXT | Figure3e-builtup curve and exp fitting |
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| Data in Figure4.zip (raw data for figure4a) | ibw  | Figure4a-Image0046 |
| Data in Figure4.zip (raw data for figure4c) | txt | center height histogram |
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| Data in FigureS1.zip (video for the frap curve) | nd2 | Figure1s-Frapvideo-3s3m10s-x32-1sb2-30um-pr4881 |
| Data in FigureS1.zip (raw data for the plot of frap curve) | TXT | Figure1s |
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| Data in FigureS2.zip (raw AFM image data) | Nanoscope AFM file | Figure-S2a-20160824.016 |
| Data in FigureS2.zip (raw AFM image data) | Nanoscope AFM file | Figure-S2b-20160824.047 |
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| Data in FigureS3.zip (raw AFM image data) | Nanoscope AFM file | Figure-S3a-dopc-glass.043 |
| Data in FigureS3.zip (raw AFM image data) | Nanoscope AFM file | Figure-S3b-glass |
| Data in FigureS3.zip (line profile for DOPC bilayer on glass) | TXT | Figure-S3c-profile-dopc-glass |
| Data in FigureS3.zip (line profile for glass substrate) | TXT | Figure-S3d-profileglass |
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| Data in FigureS4.zip (raw AFM image data) | Nanoscope AFM file | Figure-s4a-pr488.054 |
| Data in FigureS4.zip (raw AFM image data) | Nanoscope AFM file | Figure-s4b-pr488.039 |
| Data in FigureS4.zip (raw AFM image data) | Nanoscope AFM file | Figure-s4c-pr488.020 |
| Data in FigureS4.zip (raw AFM image data) | Nanoscope AFM file | Figure-s4d-pr488.062 |
| Data in FigureS4.zip (raw data for histogram of height of pRs) | TXT | Figure-s4e-waveheight\_Hist-binsize0p05nm |
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| Data in FigureS5.zip (raw AFM image data in Figure 5Sa) | Nanoscope AFM file | FigureS5a-dopc-mica.020 |
| Data in FigureS5.zip (raw data for lineproflie in Figure 5Sb) | TXT | FigureS5b-dopc-mica.020' - NanoScope Analysis |
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| Data in FigureS6.zip (video for tirf images in FigureS6) | avi | grpr-30msnobin7p3-60mWfr7-10sx298-005 |
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| Data in FigureS7.zip (raw data for histogram of height of pRs in Figure S7) | TXT | center height histogram |