

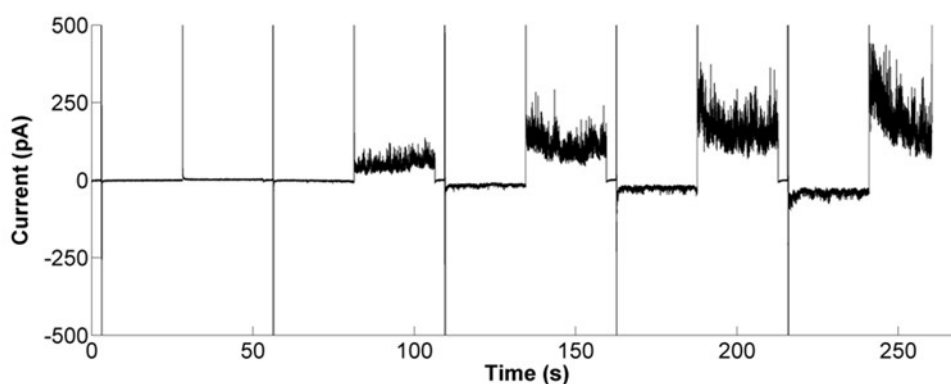
## Electronic Supplementary Information

### Nanoparticle-Lipid Bilayer Interactions Studied with Lipid Bilayer Arrays

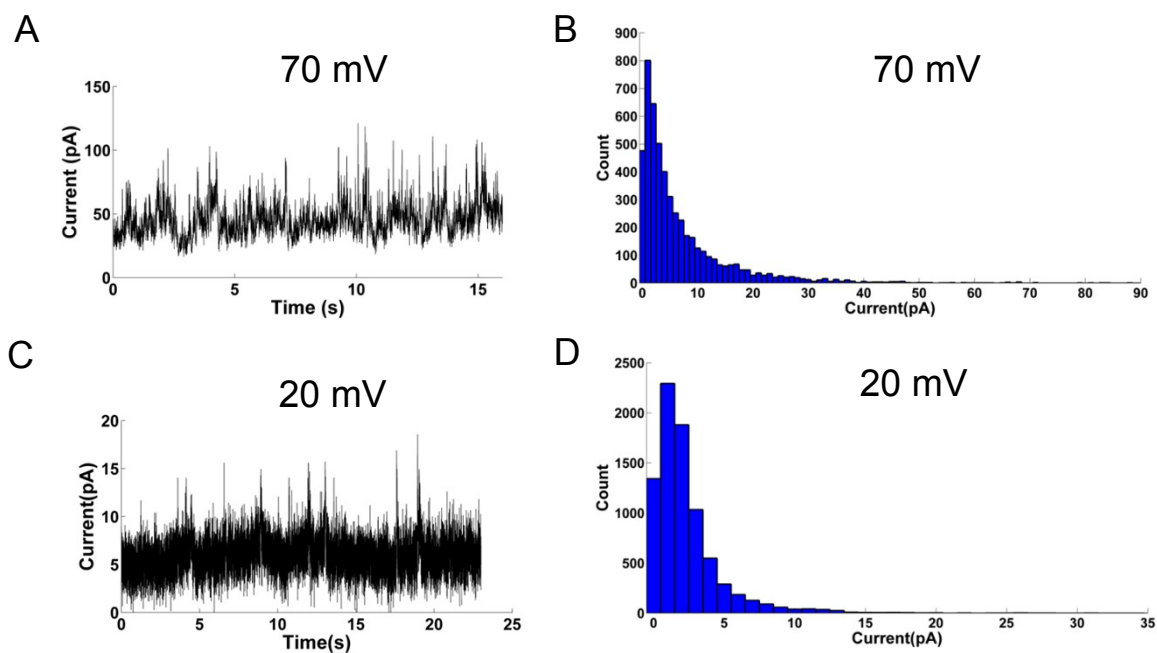
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**Table S1** Impact of ionic strength on particle-membrane interaction in POPC:POPE:Chol:POPS (3:1:1:1) bilayers.

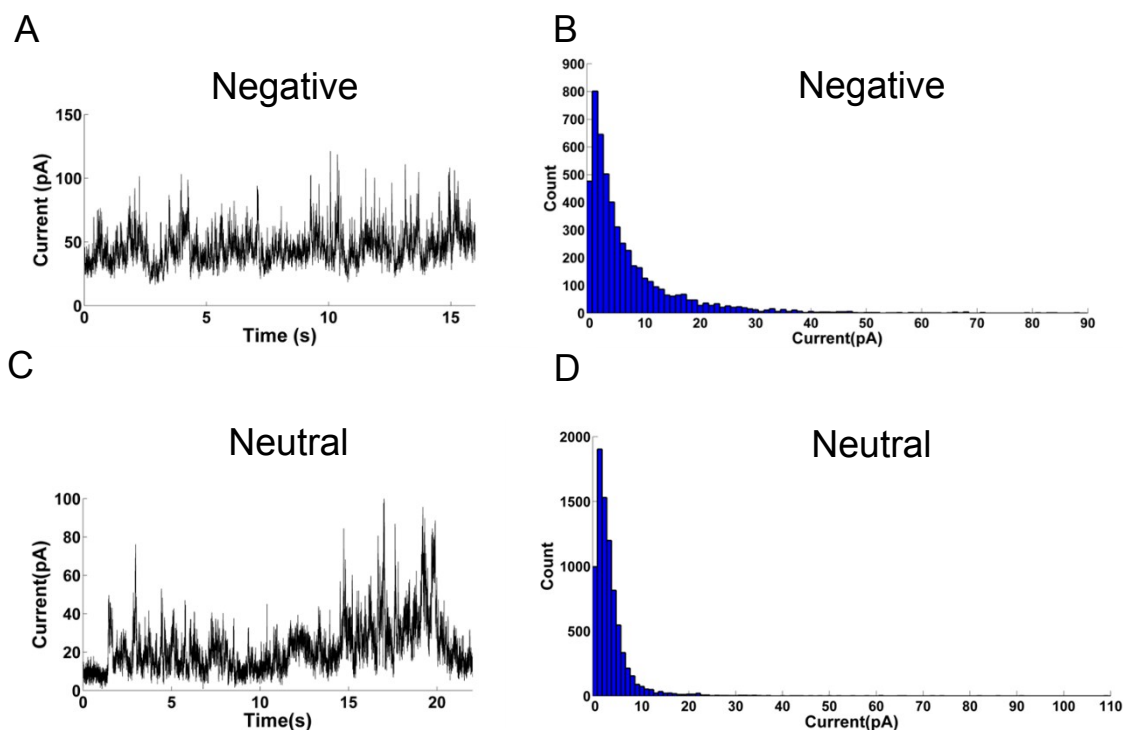
NH <sub>2</sub> NP concentration [μg/ml]	Ionic strength [mM]	Bilayer rupture rate in 2 hours	Time to rupture [min]
25	5	100%, 7/7	2
25	150	30%, 3/10	54
100	150	100%, 11/11	44



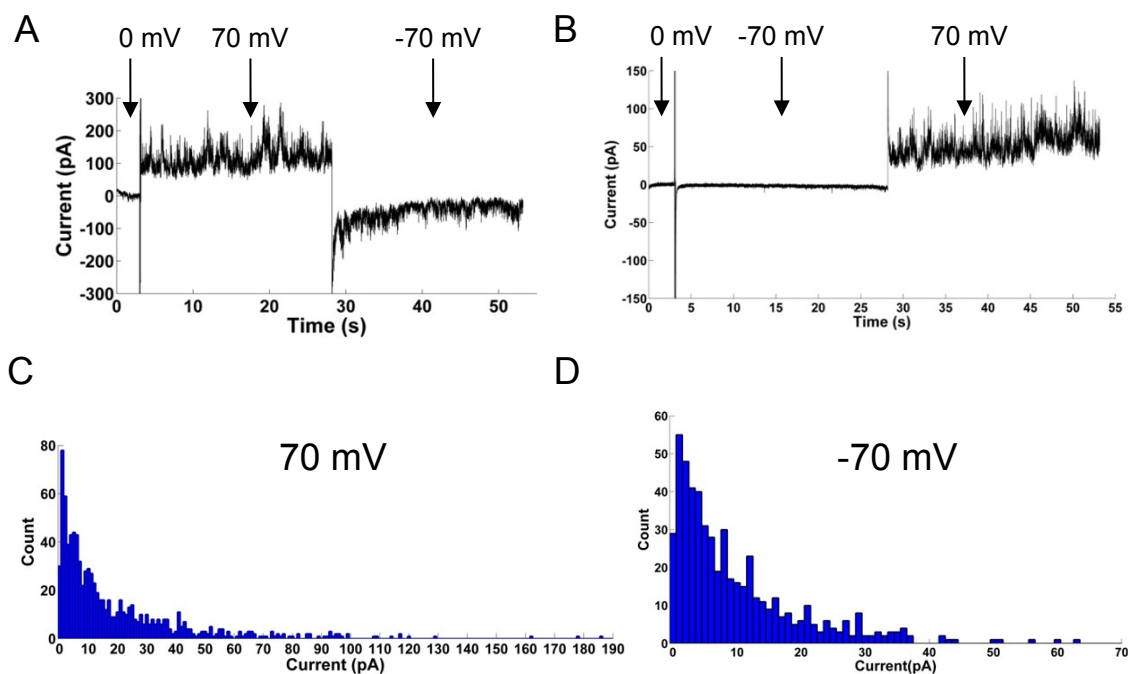
**Fig. S1** Bilayer measurements with NH<sub>2</sub>-NP under multiple positive and negative voltage cycles. Bilayer composition: POPC/POPE/Chol/POPS/CB (3:1:1:1:1); Buffer: 150 mM NaCl, pH 7; Particle concentration: 100 μg/ml. Voltage protocol: for each voltage cycle, 0 mV was applied first for 3 seconds, then followed by -70 mV for 25 seconds and +70 mV for another 25 seconds. Five cycles are shown.



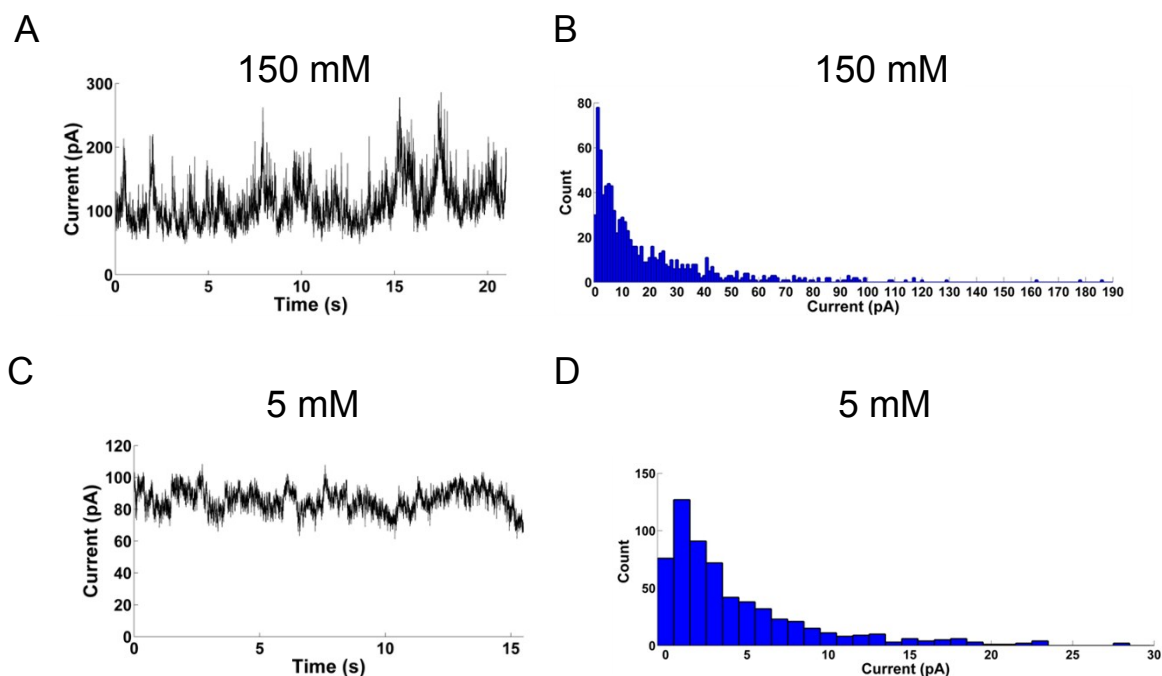
**Fig. S2** Impact of voltage magnitude. Representative traces at 70 mV (A) and 20 mV (C). The averages of the traces were subtracted from the currents and histogrammed: 70 mV (B) and 20 mV (D). Bilayer composition: POPC:POPE:Chol:POPS:CB:BMP (3:3:3:1:2:2), Buffer: 80 mM NaCl, 5 mM Tris-HCl, pH 4.5,  $\text{NH}_2\text{-NP}$  concentration: 100  $\mu\text{g/ml}$ .



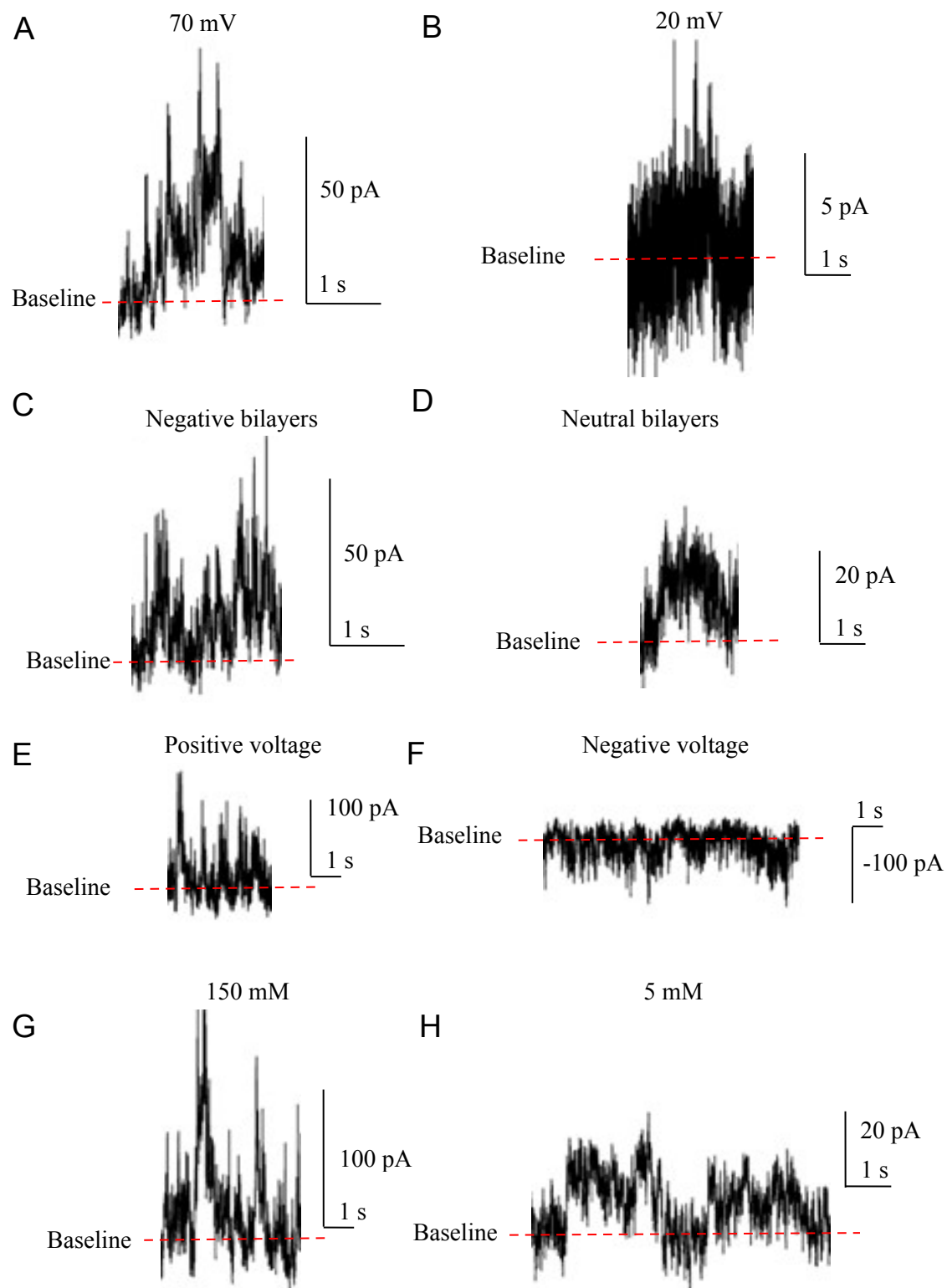
**Fig. S3** Impact of bilayer charge. Representative traces with negative bilayers (A) and neutral bilayers (C). The averages of the traces were subtracted from the currents and histogrammed: negative bilayers (B) and neutral bilayers (D). Bilayer composition: negative bilayers: POPC:POPE:Chol:POPS:CB:BMP (3:3:3:1:2:2), neutral bilayers: POPC:POPE:Chol:CB:BMP (3:3:3:2:2), Buffer: 80 mM NaCl, 5 mM Tris-HCl, pH 4.5,  $\text{NH}_2\text{-NP}$  concentration: 100  $\mu\text{g/ml}$ . Applied voltage: 70 mV.



**Fig. S4** Impact of voltage sign. A and B are representative traces with sequential application of both positive and negative voltages. The average of the measured +70 mV trace in A was subtracted from the current and histogrammed (C). The average of the measured -70 mV trace in A was subtracted from the current and histogrammed (D). Bilayer composition: POPC:POPE:Chol:POPS:CB:BMP (3:3:3:1:2:2), Buffer: 80 mM NaCl, 5 mM Tris-HCl, pH 4.5,  $\text{NH}_2\text{-NP}$  concentration: 100  $\mu\text{g/ml}$ .



**Fig. S5** Impact of ionic strength. Representative traces at 150 mM (A) and 5 mM (C). The averages of the traces were subtracted from the currents and histogrammed: 150 mM (B) and 5 mM (D). Bilayer composition: POPC:POPE:Chol:POPS:CB:BMP (3:3:3:1:2:2), Buffer: 150 mM or 5 mM NaCl, 5 mM Tris-HCl, pH 4.5,  $\text{NH}_2\text{-NP}$  concentration: 100  $\mu\text{g/ml}$ .



**Fig. S6** Single pore events of  $\text{NH}_2$ -NP and bilayer interaction under different conditions.  $\text{NH}_2$ -NP 100  $\mu\text{g}/\text{ml}$ , Bilayer composition: A-C & E-H: POPC:POPE:Chol:POPS:CB:BMP (3:3:3:1:2:2), D: POPC:POPE:Chol:CB:BMP (3:3:3:2:2); Buffer: A-F: 80 mM NaCl, 5 mM Tris-

HCl, pH 4.5, G: 150 mM NaCl, 5 mM Tris-HCl, pH 4.5, H: 5 mM NaCl, 5 mM Tris-HCl, pH 4.5;  
Voltage protocol: C-E & G-H: 70 mV, F: - 70 mV.