

Supporting Information

for

Planar-bilayer activities of linear oligoester bolaamphiphiles

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Synthesis procedures, spectroscopic characterization of new compounds and voltage-clamp summary activity records

General information

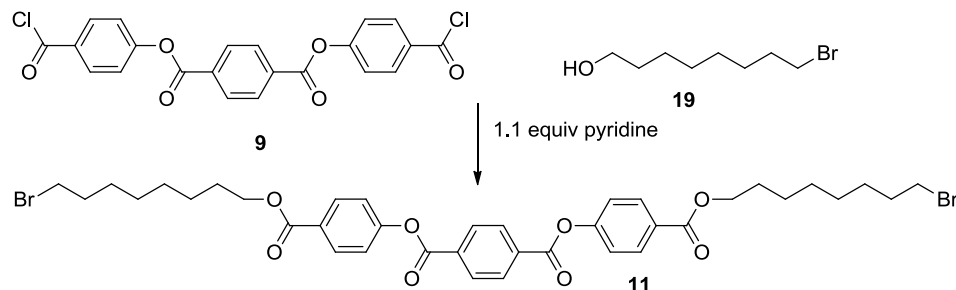
Reagents and general chemicals were purchased from Aldrich. Unless otherwise specified, all solvents were used as supplied without further purification. Analytical thin-layer chromatography (TLC) was performed on E. Merck aluminium-backed silica gel (Silica Gel F254); compounds were identified by charring with a solution of *p*-anisaldehyde in aqueous sulfuric acid and ethanol. NMR spectra were recorded with either (i) a Bruker AMX spectrometer operating at 300 MHz for ¹H nuclei, 75 MHz for ¹³C nuclei, and 282 MHz for ¹⁹F nuclei, or (ii) a Bruker AMX spectrometer operating at 500 MHz for ¹H nuclei, and 126 MHz for ¹³C nuclei. Low resolution mass spectra (accurate to 10⁻¹ amu) were recorded with a Q-TOF II (MicroMass/Waters, Milford MA) with 4000 *m/z* max quadrupole. Samples were prepared as 1 mg/mL solutions in methanol:water, and diluted by a factor of 10, followed by 0.1% trifluoroacetic acid which was added to generate more ions. High resolution mass spectra (accurate to 0.5 ppm) were obtained on an LTQ Orbitrap Velos from Thermo Scientific with

200–2000 mass range and 300 nL/min liquid infusion. Samples were prepared as 10 ng/μL solutions in methanol.

Synthesis of 9

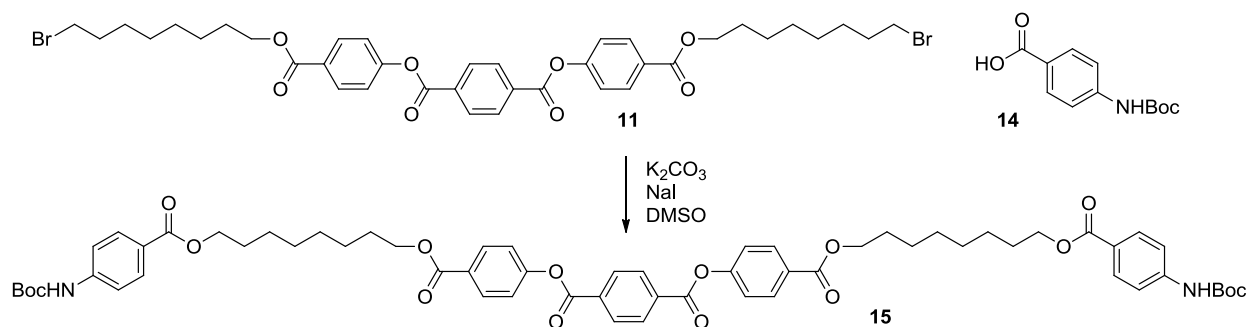
4-Hydroxybenzoic acid was weighed out as a solid (5.78 g, 41.9 mmol, 3.0 equiv) in a 250 mL beaker and dissolved in 58 mL of 1 M NaOH (4.1 equiv) to give a clear, homogenous solution. This was then transferred to a two-neck 250 mL round-bottom flask and cooled to 5 °C in an ice bath. Terephthaloyl chloride (2.89 g, 14.2 mmol, 1.0 equiv) was dissolved in $\text{Cl}_2\text{CHCHCl}_2$ (30 mL), and poured into a dropping funnel attached to the reaction flask. The solution was added dropwise over 1 h while stirring rapidly. The reaction mixture became white and heterogeneous and was stirred at rt. After 4 h, the reaction was quenched by acidifying to pH 2 with concentrated HCl, and then filtered. The precipitate was washed sequentially with water, Et_2O , and EtOH before being dried at 60 °C overnight. Starting material 4-hydroxybenzoic acid was shown to be present by ^1H NMR spectroscopy, and was removed by grinding the solid in acetone and then refiltered, yielding 5.3 g of a white powder (92%; compound **21**). The product was sparingly soluble in common organic solvents and was purified only as the acid chloride.

Coupling of membrane anchor to the triaromatic core 9



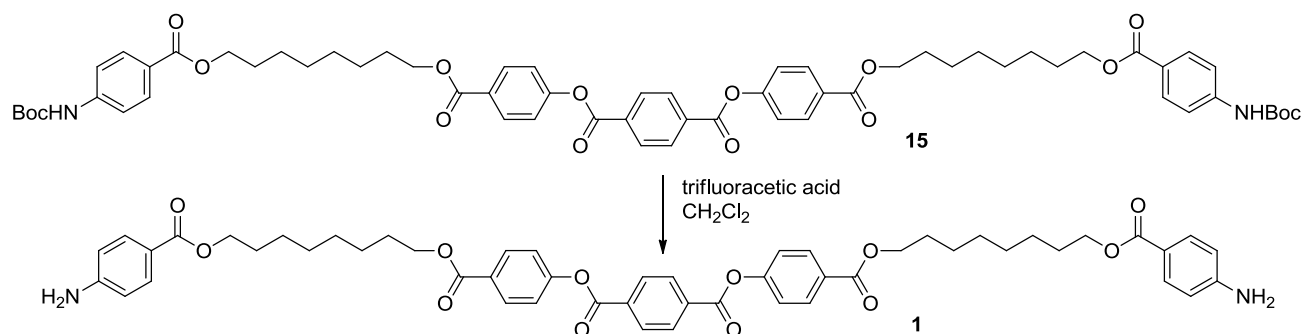
The general procedure is illustrated with compound **11**. A 50 mL round-bottom flask equipped with a stirring bar was flame dried. Upon cooling under a N₂ atmosphere, acyl chloride **9** (211 mg, 0.476 mmol, 1.0 equiv) was suspended in 8 mL of dry CH₂Cl₂. This heterogeneous solution was cooled in an alcohol–ice bath to –4 °C before 8-bromo-1-octanol (199 mg, 0.952 mmol, 2.0 equiv) and 69 µL pyridine (0.95 mmol, 2.0 equiv) were added in that order. The reaction was stirred at 0 °C for 1 h and then allowed to warm to rt. The reaction was diluted with 25 mL of CH₂Cl₂ and washed with brine. The organic solution was dried over MgSO₄, filtered, and concentrated. Column chromatography (silica gel, with 1:4 EtOAc:hexanes as eluent) yielded 149 mg of a white powder (40%). ESI–MS (*m/z*) calculated for [C₃₈H₄₄Br₂O₈+Na]⁺ 809.13; found 809.25; ¹H NMR (300 MHz, CDCl₃) δ 8.28 (s, 4H), 8.08 (d, *J* = 8.9, 4H), 7.27 (d, *J* = 8.9, 4H), 4.27 (t, *J* = 6.6, 4H), 3.35 (t, *J* = 6.8, 4H), 1.82–1.68 (m, 8H), 1.39–1.30 (m, 16H); ¹³C NMR (75 MHz, CDCl₃) δ 163.5, 161.4, 152.1, 131.4, 128.9, 128.3, 126.2, 119.4, 62.8, 31.8, 30.4, 26.9, 26.51, 26.41, 25.7, 23.6.

Esterification by iodide-catalyzed nucleophilic displacement



The general procedure is illustrated with compound **15**. In a 50 mL round-bottom flask equipped with a stirring bar, dibromide **11** (646 mg, 0.819 mmol, 1.0 equiv), protected aniline **14** (447 mg, 1.884 mmol, 2.3 equiv), and sodium iodide (25 mg, 0.164 mmol, 0.2 equiv) were dissolved in DMSO with vigorous stirring. Tetramethylammonium hydroxide (341 mg, 1.884 mmol, 2.3 equiv) was then added, and the cloudy white solution was heated to 60 °C. The reaction was shown by TLC (silica gel, 1:1 EtOAc:hexanes as eluent, UV-254 nm detection) to be complete in 2 h (disappearance of compound **11** at R_f = 0.80). Upon completion of the reaction, the reaction mixture was diluted with 30 mL CH₂Cl₂ and washed with 80 mL water. The aqueous phase was backwashed with 25 mL of CH₂Cl₂, and the combined organic layers were dried over MgSO₄ and filtered to give a clear colorless solution. The solvent was evaporated and solids crystallized from 20 mL of hot CH₂Cl₂-EtOAc to give 740 mg of **15** as a white powder (82%). ESI-MS (m/z) calculated for [C₆₂H₇₂N₂O₁₆+Na]⁺ = 1123.48; found 1123.51; ¹H NMR (300 MHz, CDCl₃) δ 8.28 (s, 4H), 8.08 (d, J = 8.8, 4H), 7.89 (d, J = 8.8, 4H), 7.35 (d, J = 8.8, 4H), 7.26 (d, J = 8.8, 4H), 6.70 (s, 2H), 4.30–4.18 (m, 8H), 1.75–1.63 (m, 8H), 1.45 (s, 18H), 1.40–1.34 (m, 16H); ¹³C NMR (75 MHz, CDCl₃) δ 166.3, 165.9, 163.8, 154.3, 152.2, 142.7, 133.8, 131.4, 130.9, 130.5, 128.5, 124.6, 121.7, 117.3, 81.3, 65.4, 64.9, 29.2, 28.8, 28.3, 26.1.

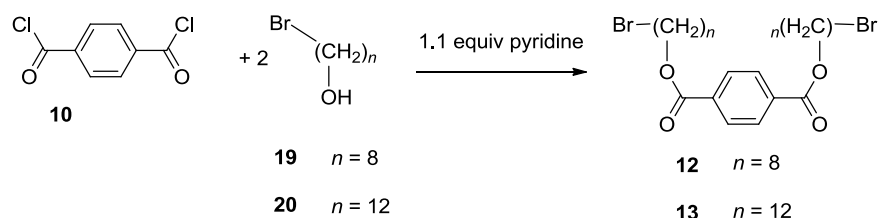
Compound **1** by deprotection of **15**



The ester-linked tri-aromatic core is acid sensitive, and this cleavage condition [3] of the *tert*-butyl carbamate was necessary to preserve the core. The reagent was prepared in a 10 mL batch beforehand: Trimethylsilyl chloride (1.09 g, 10 mmol) was weighed into a 10 mL graduated cylinder and diluted to the 5 mL mark with CH₂Cl₂. Phenol (2.82 g, 30 mmol) was added as a solid, and the solution diluted to the 10 mL mark. In a flame-dried 5 mL round-bottom flask

equipped with a stirring bar, protected aniline **24** (95 mg, 0.086 mmol) was added. To this solid, 2.5 mL of the cleavage reagent (described above) was added, upon which a homogenous solution was obtained. The flask was then capped, sealed with Teflon tape, and stirred for 14 h. The reaction slowly turned cloudy over time. The reaction was quenched by addition of an aqueous solution of saturated K_2CO_3 ; the pH of this solution was around 12 at this point. Repeated extractions with chloroform, followed by drying of the organic layer over MgSO_4 , filtering, and drying gives a white solid. Column chromatography (silica gel, 1% MeOH in chloroform) gave the product contaminated with phenol. This material was dissolved in 3 mL of chloroform and precipitated by 25 mL of ice-cold hexanes, followed by filtration giving 40 mg of **1** as a white powder (51%). HRMS (m/z) calculated for $[\text{C}_{52}\text{H}_{56}\text{N}_2\text{O}_{12}+\text{H}]^+ = 901.3908$; found 901.3899; ^1H NMR (300 MHz, CDCl_3) δ 8.33 (s, 4H), 8.13 (d, $J = 8.9$, 4H), 7.83 (d, $J = 8.8$, 4H), 7.32 (d, $J = 8.8$, 4H), 6.61 (d, $J = 8.8$, 4H), 4.32 (t, $J = 6.7$, 4H), 4.24 (t, $J = 6.5$, 4H), 4.00 (s, br, 4H), 1.77–1.70 (m, 7H), 1.43–1.23 (m, 27H); ^{13}C NMR (126 MHz, CDCl_3) δ 131.8, 131.5, 130.7, 121.8, 114.0, 65.6, 64.7, 29.4, 29.04, 28.95, 26.27, 26.22. Insufficient amount of sample to observe signals from quaternary carbons.

Coupling of membrane anchors to the monoaromatic core



The general procedure is illustrated with compound **13**. In a flame-dried 25 mL round-bottom flask, terephthaloyl chloride (250 mg, 1.23 mmol, 1.0 equiv) was dissolved in 5 mL of dry CH_2Cl_2 . 12-Bromo-1-dodecanol (650 mg, 2.46 mmol, 2.0 equiv) was added, and the solution cooled in an ice-bath. Pyridine (198 μL , 2.46 mmol, 2.0 equiv) was then added by syringe, and the solution became slightly cloudy over 10 min. The reaction was allowed to warm to rt and stirred for 2 h. To quench the reaction, it was first diluted with 20 mL of CH_2Cl_2 before the addition of 30 mL of water. The aqueous portion was washed twice with 20 mL of CH_2Cl_2 , and the combined organic layers were dried over MgSO_4 , filtered, and dried. This solid was

dissolved in a small volume of EtOAc for loading onto a column; column chromatography (silica gel, using 1:9 EtOAc:hexanes as eluent) gave 666 mg of **13** as a white powder (87%).

Characterization for **12**. ESI-MS (m/z) calculated for $[\text{C}_{24}\text{H}_{36}\text{Br}_2\text{O}_4+\text{H}]^+ = 549.10$; found 550.71 ($[\text{M}+\text{H}]^+$). ^1H NMR (300 MHz, CDCl_3) δ 8.03 (s, 4H), 4.27 (t, $J = 6.7$, 4H), 3.33 (t, $J = 6.9$, 4H), 1.83–1.68 (m, $J = 14.2$, 7.2, 8H), 1.37–1.28 (m, 12H); ^{13}C NMR (75 MHz, CDCl_3) δ 165.0, 133.3, 128.6, 64.6, 33.2, 28.70, 28.59, 28.40, 27.96, 27.86, 27.3.

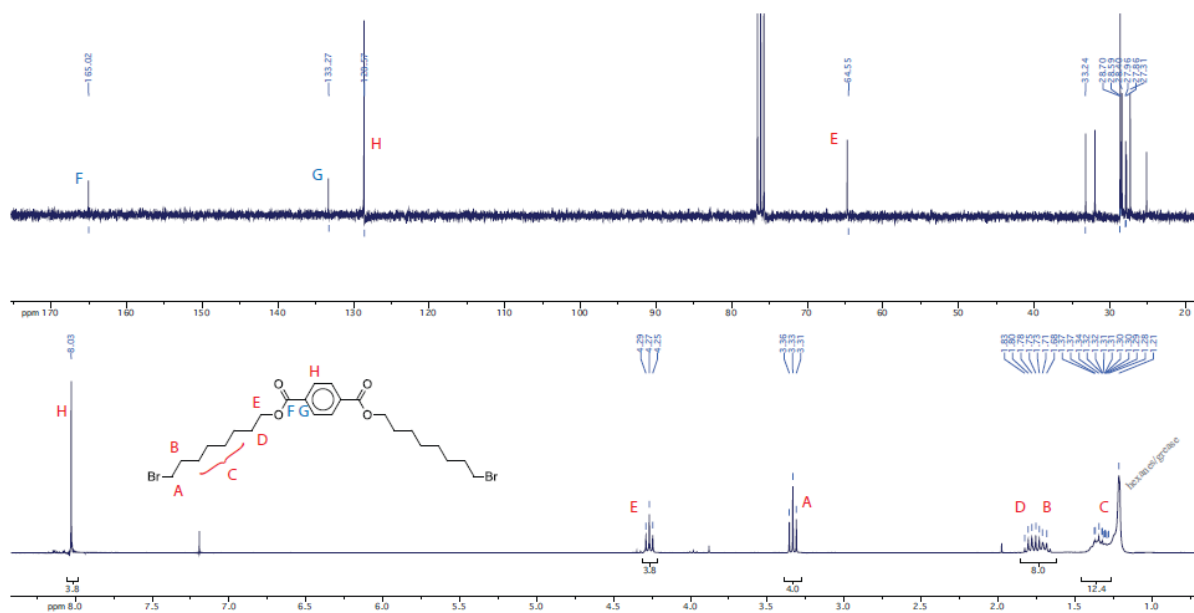


Figure S1: NMR spectra of **12**.

Characterization for **13**. ESI-MS (m/z) calculated for $[C_{32}H_{52}Br_2O_4+H]^+ = 661.229$; found 661.32 ($[M+H]^+$). 1H NMR (300 MHz, $CDCl_3$) δ 8.02 (s, 4H), 4.26 (t, $J = 6.7$, 4H), 3.33 (t, $J = 6.9$, 4H), 1.80–1.70 (m, $J = 7.0$, 8H), 1.37–1.21 (m, 32H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 165.9, 134.2, 129.5, 65.6, 34.0, 32.8, 29.49, 29.41, 29.25, 28.75, 28.65, 28.2, 26.0.

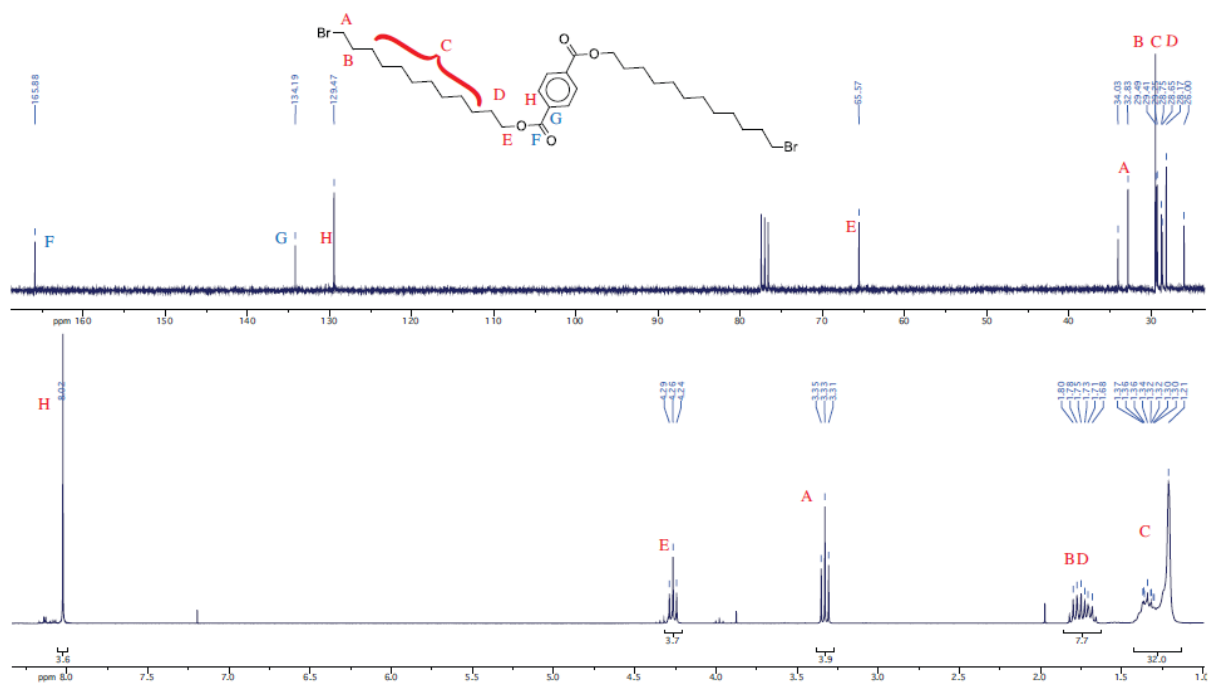
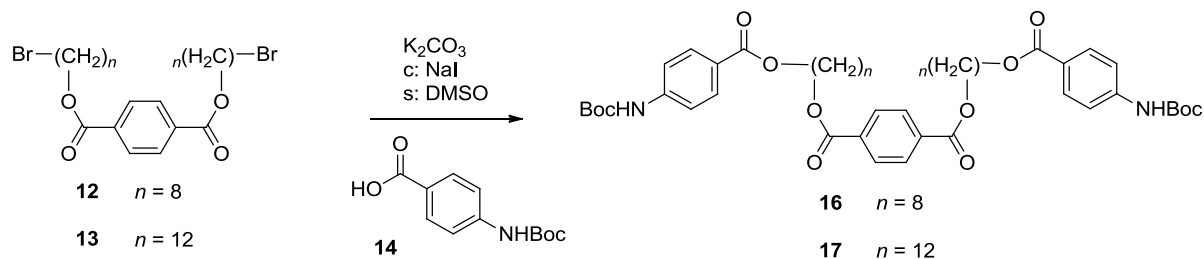


Figure S2: NMR spectra of **13**.

Iodide-catalyzed nucleophilic displacement to give **16** and **17**



General procedure illustrated with compound **16**. In a 10 mL round-bottom flask, dibromide **12** (503 mg, 0.937 mmol, 1.0 equiv), OC-protected *p*-aminocarboxylic acid **14** (478 mg, 2.02 mmol, 2.2 equiv), and NaI (28 mg, 0.19 mmol, 0.2 equiv) was dissolved in DMSO. Tetramethylammonium hydroxide (367 mg, 2.02 mmol, 2.2 equiv) was added, and the reaction was stirred at 70 °C for 1 h, after which TLC (silica gel, 1:1 EtOAc:hexanes, UV-254 nm visualization) indicated that the reaction was completed. The reaction was quenched in 120 mL of distilled water, extracted thrice with 50 mL of chloroform. (Addition of brine was necessary in some cases for clear separation of the organic and aqueous layers.) The combined organic layers were washed with 30 mL water, dried over $MgSO_4$, filtered, and evaporated to afford a yellow oil. This yellow oil was chromatographed (silica gel, with chloroform as eluent) to give 593 mg of a white solid (66%).

Characterization for **16**. ESI-MS (m/z) calculated for $[\text{C}_{48}\text{H}_{64}\text{N}_2\text{O}_{12}+\text{Na}]^+ = 883.4358$; found 883.6. ^1H NMR (300 MHz, CDCl_3) δ 8.02 (s, 4H), 7.89 (d, $J = 8.8$, 4H), 7.36 (d, $J = 8.8$, 4H), 6.71 (s, 2H), 4.26 (t, $J = 6.7$, 4H), 4.21 (t, $J = 6.7$, 4H), 1.73–1.66 (m, 8H), 1.45 (s, 18H), 1.36–1.18 (m, 16H); ^{13}C NMR (126 MHz, CDCl_3) δ 166.4, 166.0, 152.2, 142.7, 134.1, 130.8, 129.5, 124.6, 117.3, 81.2, 65.6, 64.9, 29.2, 28.80, 28.68, 28.3, 26.1.

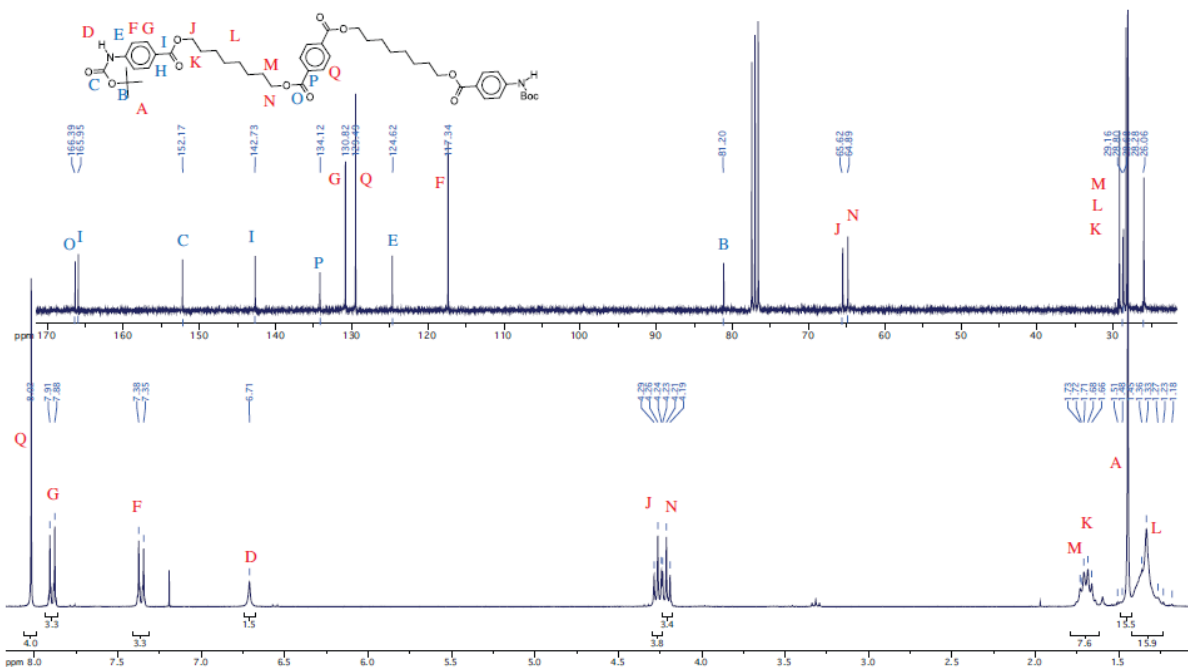


Figure S3: NMR spectra of **16**.

Characterization for **17**. ^1H NMR (300 MHz, CDCl_3) δ 8.02 (s, 4H), 7.89 (d, $J = 8.8$, 4H), 7.36 (d, $J = 8.8$, 4H), 6.71 (s, 2H), 4.26 (t, $J = 6.7$, 4H), 4.21 (t, $J = 6.7$, 4H), 1.73–1.66 (m, 8H), 1.45 (s, 18H), 1.36–1.18 (m, 32H).

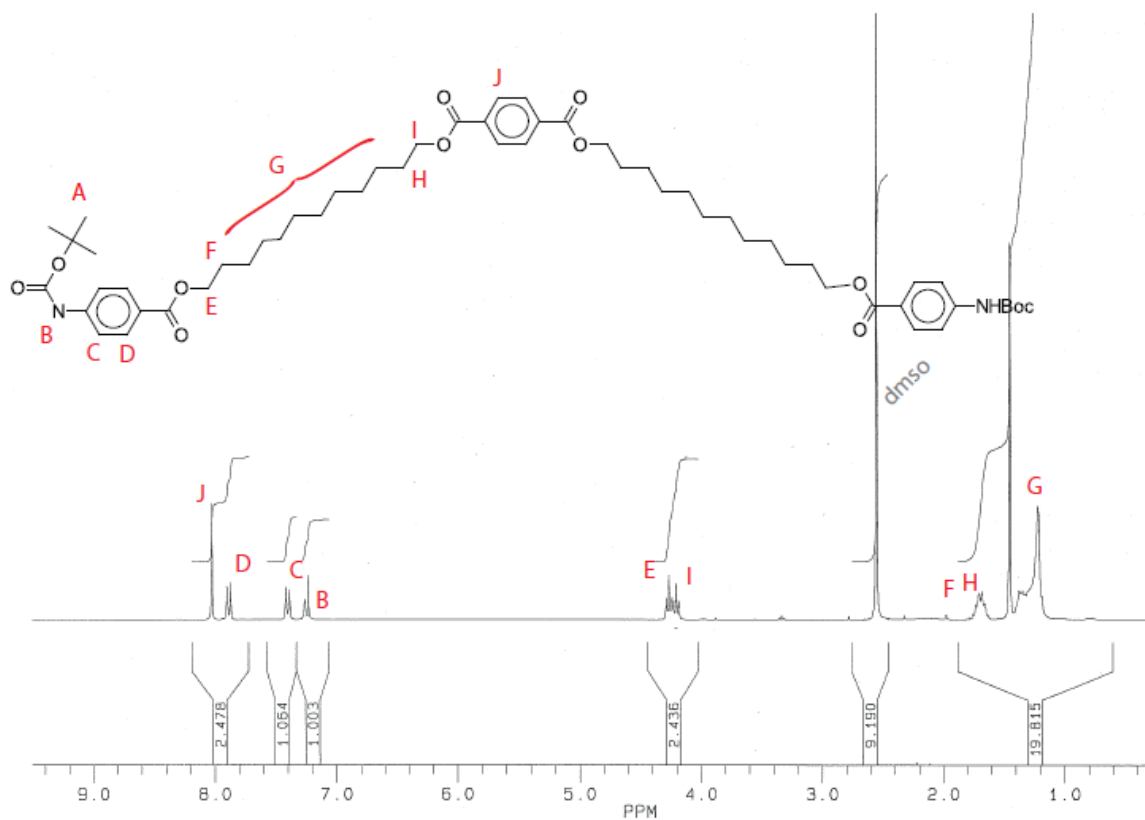
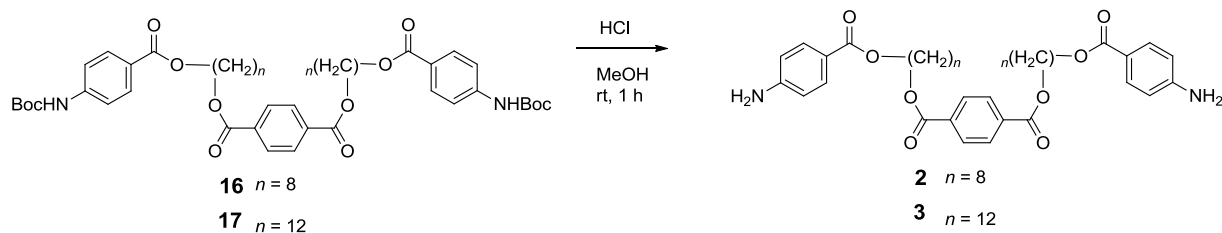


Figure S4: ^1H NMR spectrum of **17**.

Deprotection to give bolaamphiphiles **2** and **3**



Deprotection of the suite of mono-aromatic compounds proceeded with the same TMSCl/phenol reagent as reported above for the deprotection of compound **1**.

Characterization for **2**. HRMS (m/z) calculated for $[\text{C}_{38}\text{H}_{48}\text{N}_2\text{O}_8+\text{H}]^+ = 661.349$; found 661.3485.

^1H NMR (300 MHz, CDCl_3) δ 8.02 (s, 4H), 7.80–7.75 (m, 4H), 6.58–6.54 (m, 4H), 4.26 (t, $J = 6.6$, 4H), 4.18 (t, $J = 6.6$, 4H), 3.97 (s, br, 4H), 1.71–1.67 (m, 8H), 1.39–1.33 (m, 16H); ^{13}C NMR (126 MHz, CDCl_3) δ 167.0, 165.5, 150.0, 134.7, 131.5, 129.4, 119.7, 113.7, 66.2, 64.4, 29.3, 28.1, 26.4.

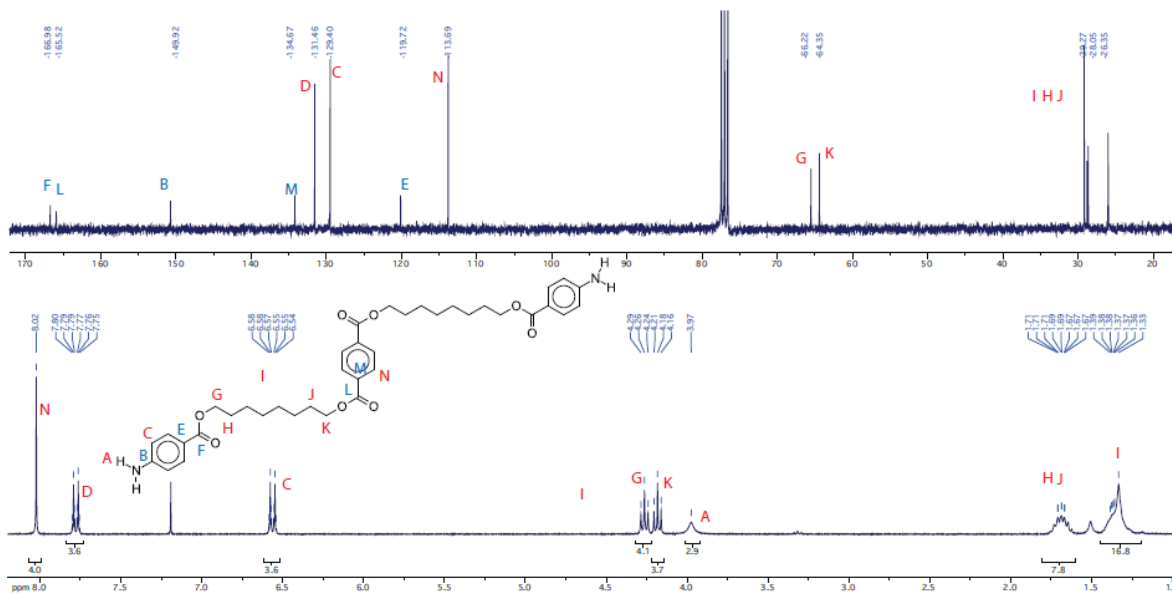


Figure S5: NMR spectra of **2**.

Characterization for **3**. HRMS (m/z) calculated for $[C_{46}H_{64}N_2O_8+H]^+ = 773.474$; found 773.4720. 1H NMR (300 MHz, $CDCl_3$) δ 8.03 (s, 4H), 7.78 (d, $J = 8.8$, 4H), 6.57 (d, $J = 8.8$, 4H), 4.26 (t, $J = 6.7$, 4H), 4.18 (t, $J = 6.7$, 4H), 3.98 (s,br, 4H), 1.75–1.61 (m, 8H), 1.37–1.22 (m, 32H); ^{13}C NMR (75 MHz; $CDCl_3$) δ 166.8, 165.9, 150.8, 134.2, 131.6, 129.6, 120.1, 113.8, 65.7, 64.5, 29.6, 29.3, 28.9, 28.6, 26.13, 25.96.

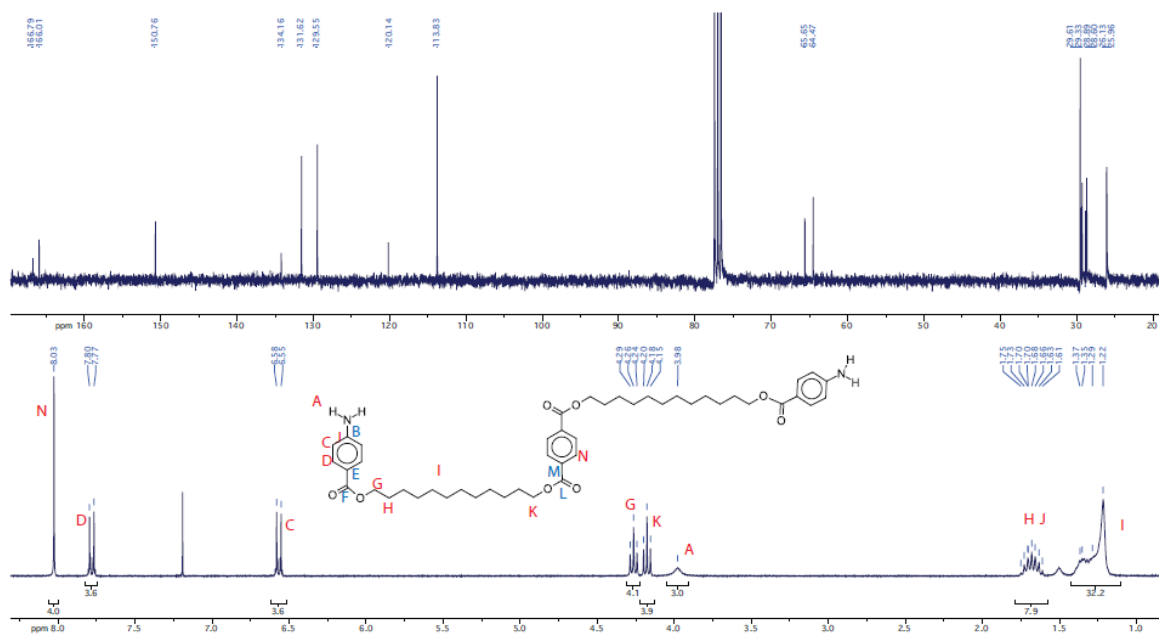


Figure S5: NMR spectra of **3**.

Voltage-clamp experiment

A model BC-525A bilayer clamp (Warner Instrument Corp.) was used for planar bilayer experiments. The analogue output was filtered with an 8-pole bessel filter (Frequency Devices, model 902) and digitized with a 333 kHz digitizer (Axon Instruments, Digidata 1200A). Data acquisition was controlled by the pClamp8 software package (Axon Instruments). Data were collected at 10 kHz, analogue filtered at 1 kHz, and digitally filtered at 50 Hz. The headstage and the bilayer chamber (3 mL polystyrene cuvette with 250 μ m diameter aperture held in a 5 mL PVC holder) were placed on a floating table and electrically shielded by a grounded aluminum Faraday cage. Agar salt bridges (2 M KNO_3 in 1% Agar) were used to stabilize junction potentials and were employed between the electrolyte in each well of the cell and Ag/AgCl electrodes. Electrolyte solutions were prepared from high purity salts and nanopure water.

A stock solution of diphytanoyl phosphatidylcholine (diPhyPC) in chloroform (Avanti Polar Lipids; shipped on dry ice) was divided into sealed glass vials under an argon atmosphere and stored at -12°C . For use in an experiment, a stream of dry nitrogen was passed through the vial for 1 h. The dried lipid was diluted with decane to give a solution concentration of 25 mg/mL lipid.

Bilayers were formed by either brushing or dipping: After lipid in decane was introduced by brushing, a lipid/decane film formed on the surface of the electrolyte, and bilayers could then be formed by withdrawal of 2–3 mL of electrolyte from the cell holder by syringe to expose one face of the aperture to the air–water interface held in the cell holder, followed by reintroduction of the electrolyte to oppose monolayers across the aperture of the cuvette. Bilayer quality was monitored through the capacitance and stability under the applied potential, with respect to the criteria previously described [4]. The measured voltage was applied with respect to the trans (cuvette) side of the bilayer, making the trans side the relative ground. Digitized data files were analyzed with the pClamp10 suite of programs.

The compounds are introduced to the membrane in different ways depending on the solubility of the compound. Solid-phase derived oligoesters were introduced by the electrolyte-mixing method, where compounds were premixed into a small volume of electrolyte, and this homogenous doped electrolyte solution was introduced to the bilayer. With the direct-injection method, aliquots (1–5 μL) of transporter solutions in MeOH were injected with a microliter syringe as close as possible to the bilayer in the free well of the cuvette holder (cis side), and gently stirred with a stream of nitrogen for 5 min. Experiments with both the electrolyte-mixing or direct-injection methods utilized bilayers that were apparently stable at 100 mV for periods of 20 min or more. In the physical transfer method, 1 mol % of compound (in CDCl_3 or $\text{MeOH-}d_4$) was added to the diPhyPC/ CHCl_3 solution, the solvent removed with a stream of N_2 , and the bilayer membrane prepared by brushing/dipping as described above. Most of the bilayers formed with this method gave bilayers with good quality.

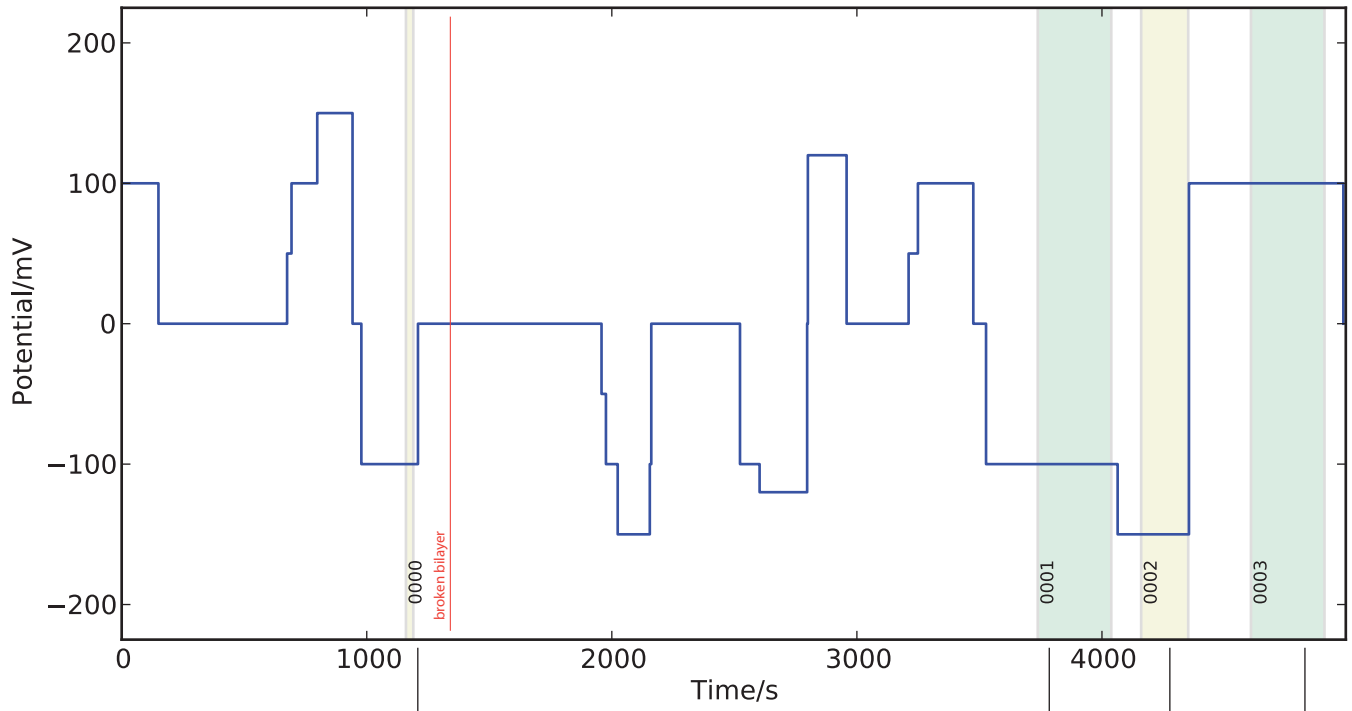
Voltage-clamp records of linear bolaamphiphiles

In the following sections, annotated activity grids, as well as full conductance records (and expansions where appropriate), are provided for every compound studied. These are arranged

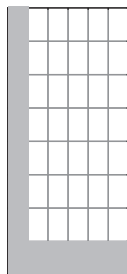
first by compounds, then individual experiments. Within each experiment, the first page(s) summarizes the experimental conditions as well as activity grids charted; subsequent pages show the full conductance record as the top panel, with expansions indicated by the corresponding letters. For the aromatic bolaamphiphiles, traces were acquired prior to establishing a protocol for the automated acquisition of potential—time records, and the data analysis were performed by hand.

References

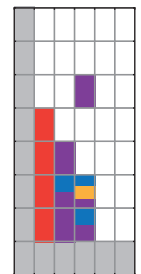
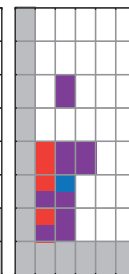
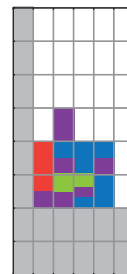
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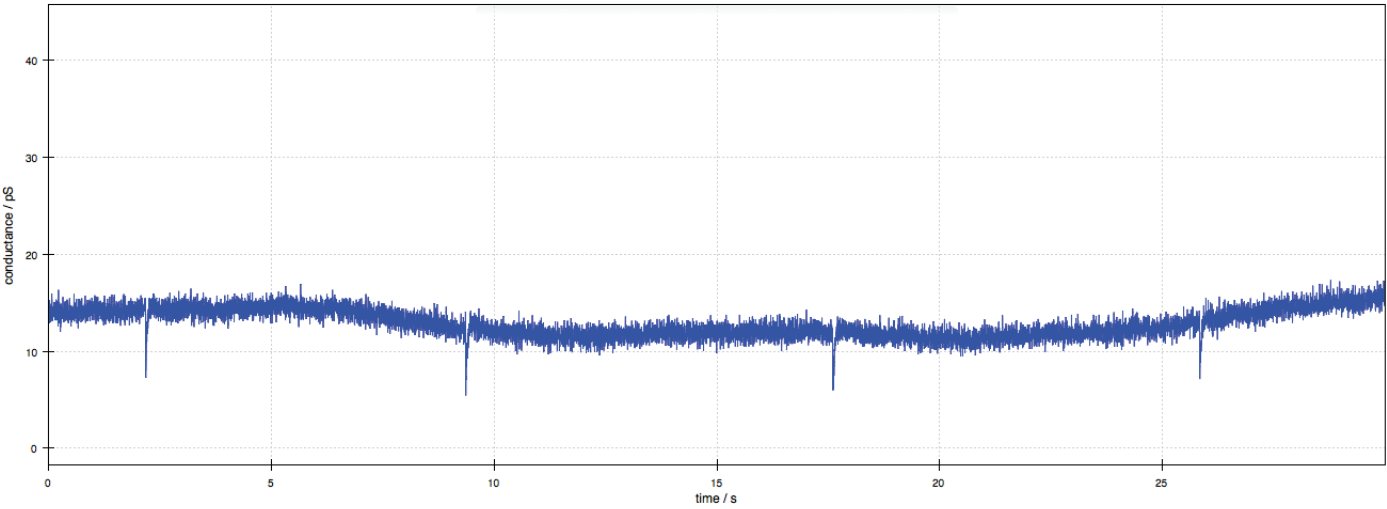


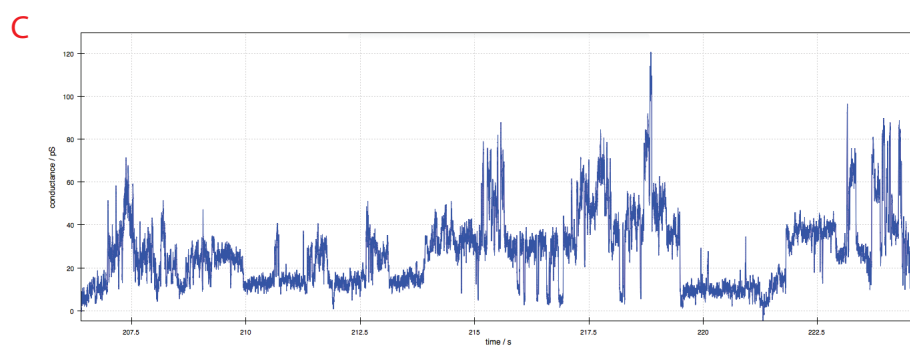
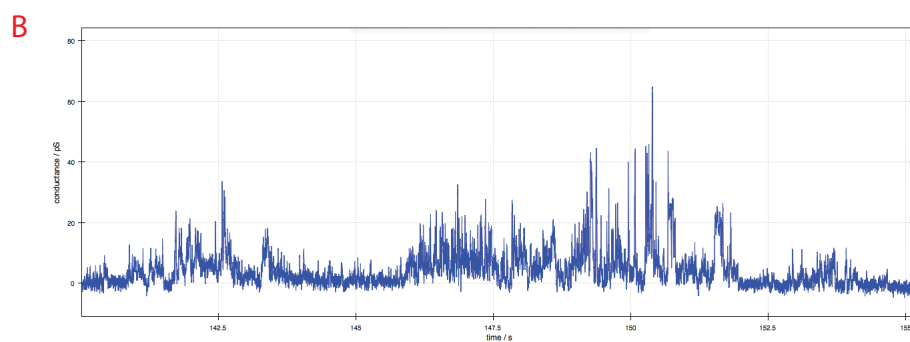
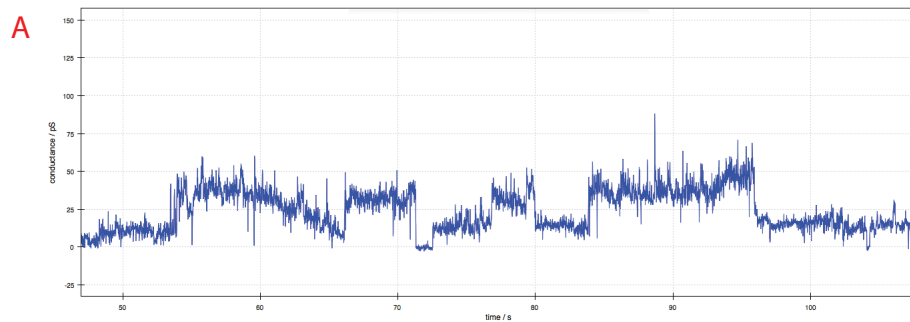
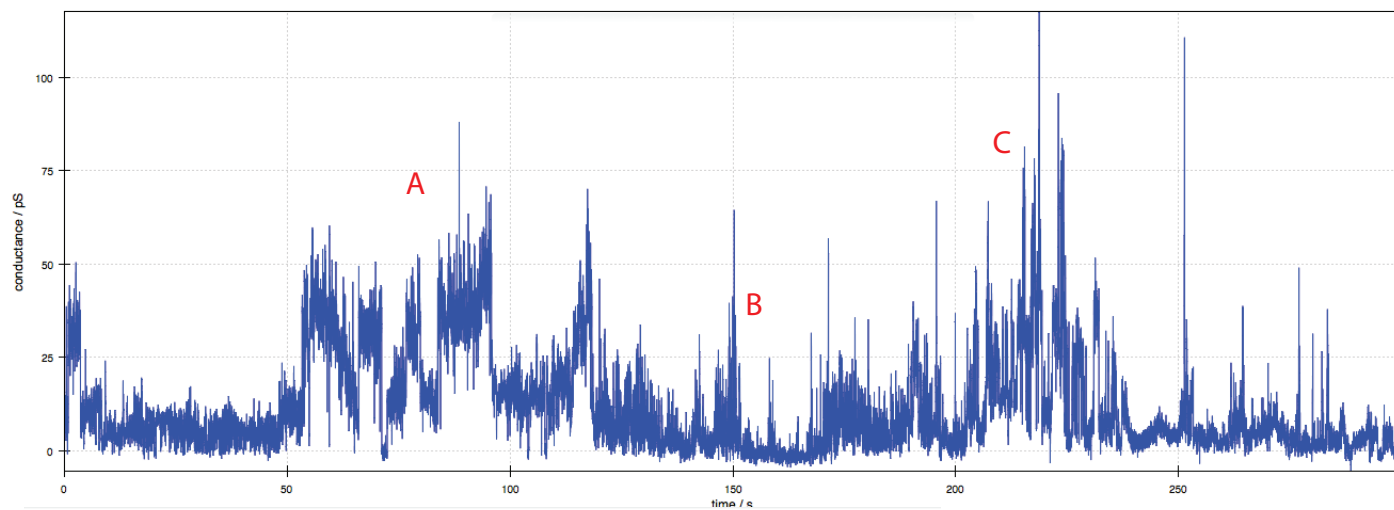
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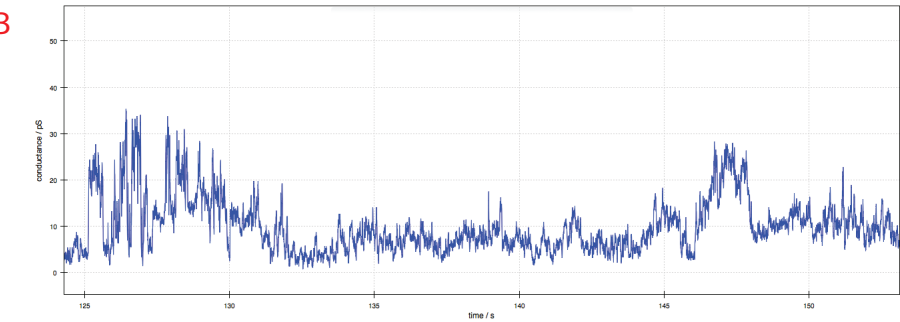
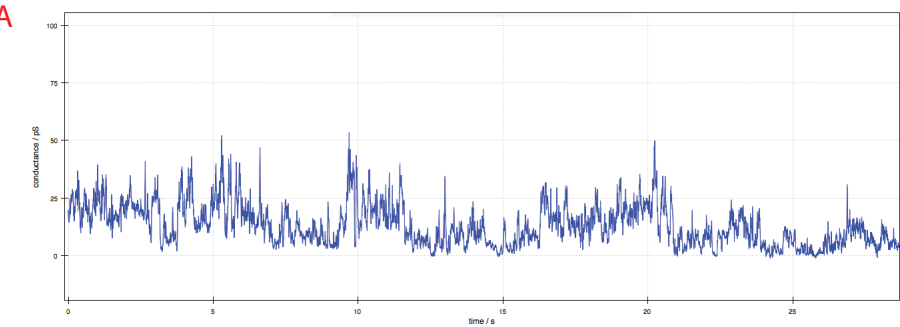
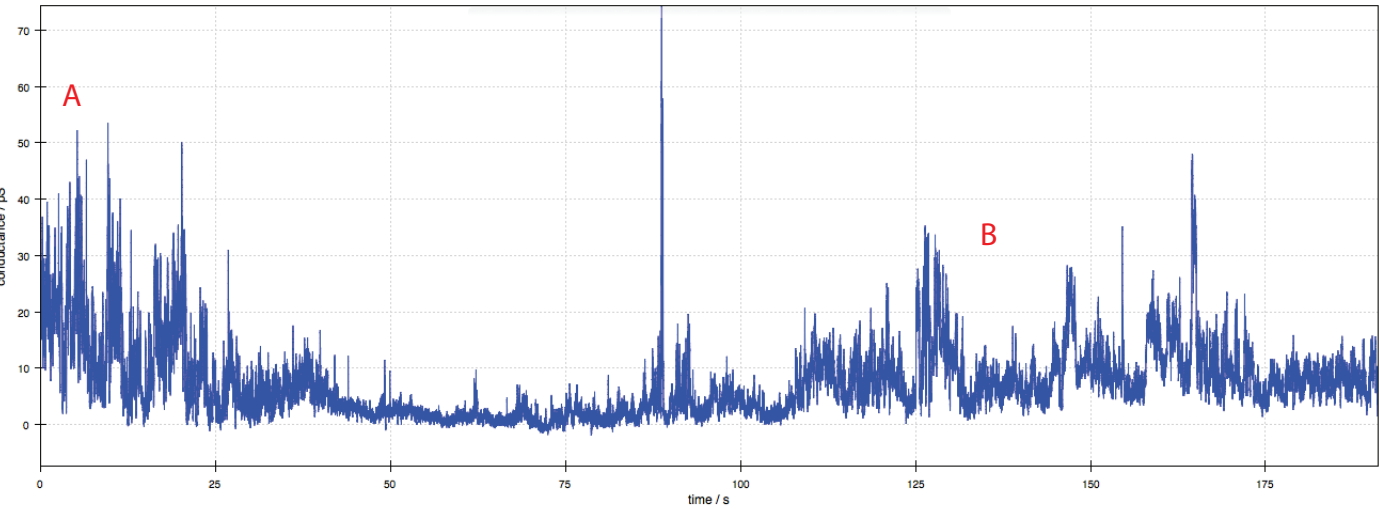


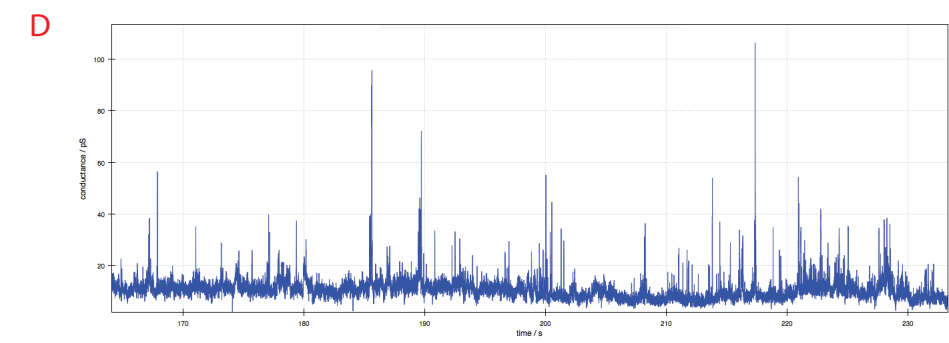
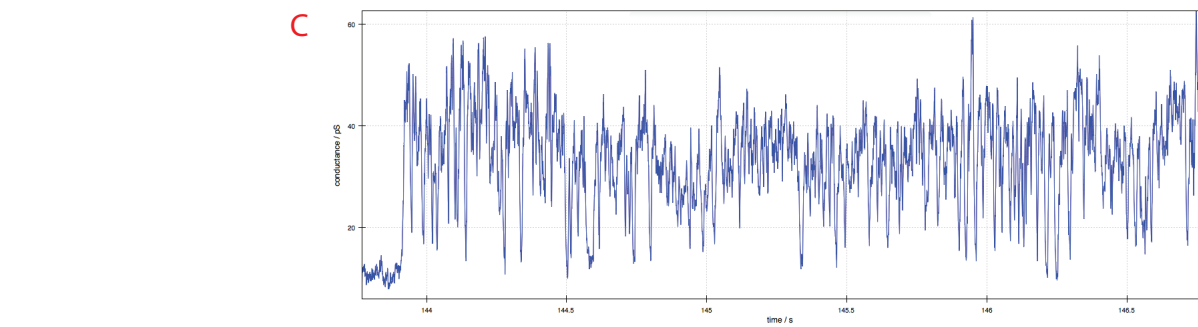
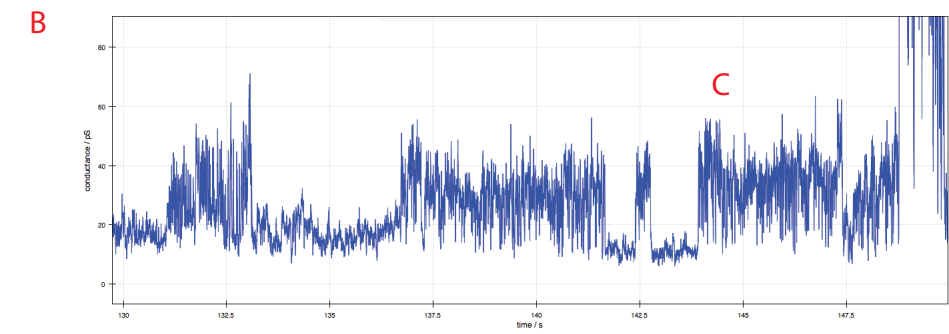
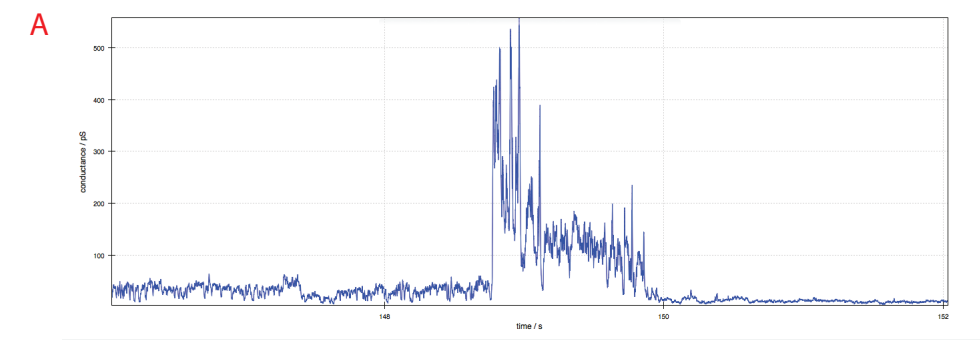
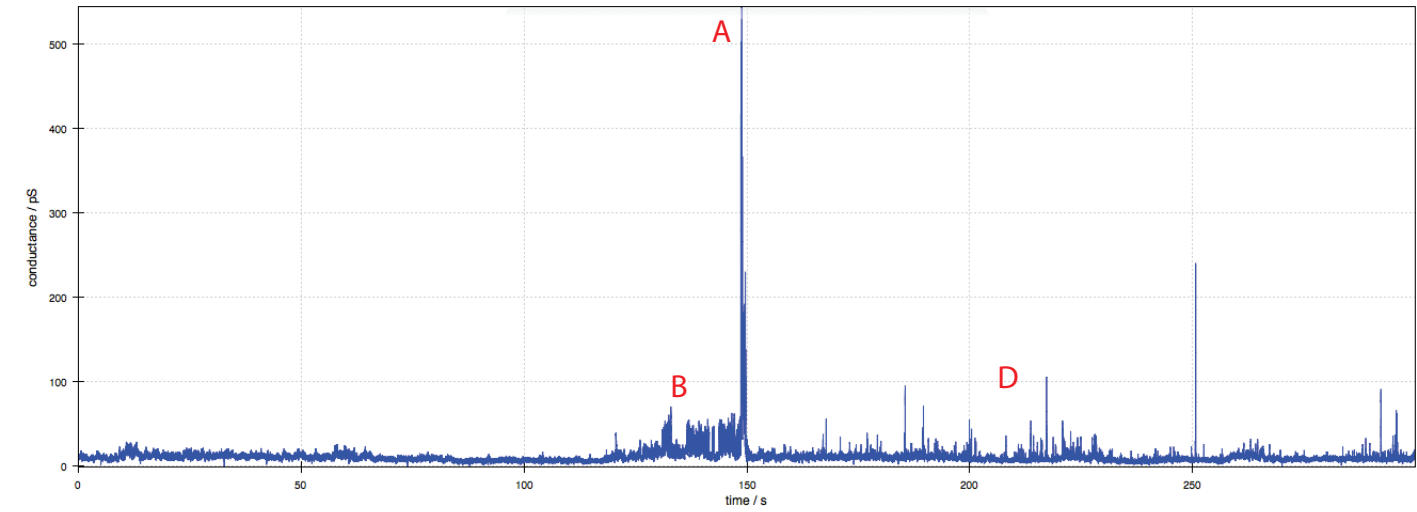
baseline drift 10-18pS;
no activity otherwise



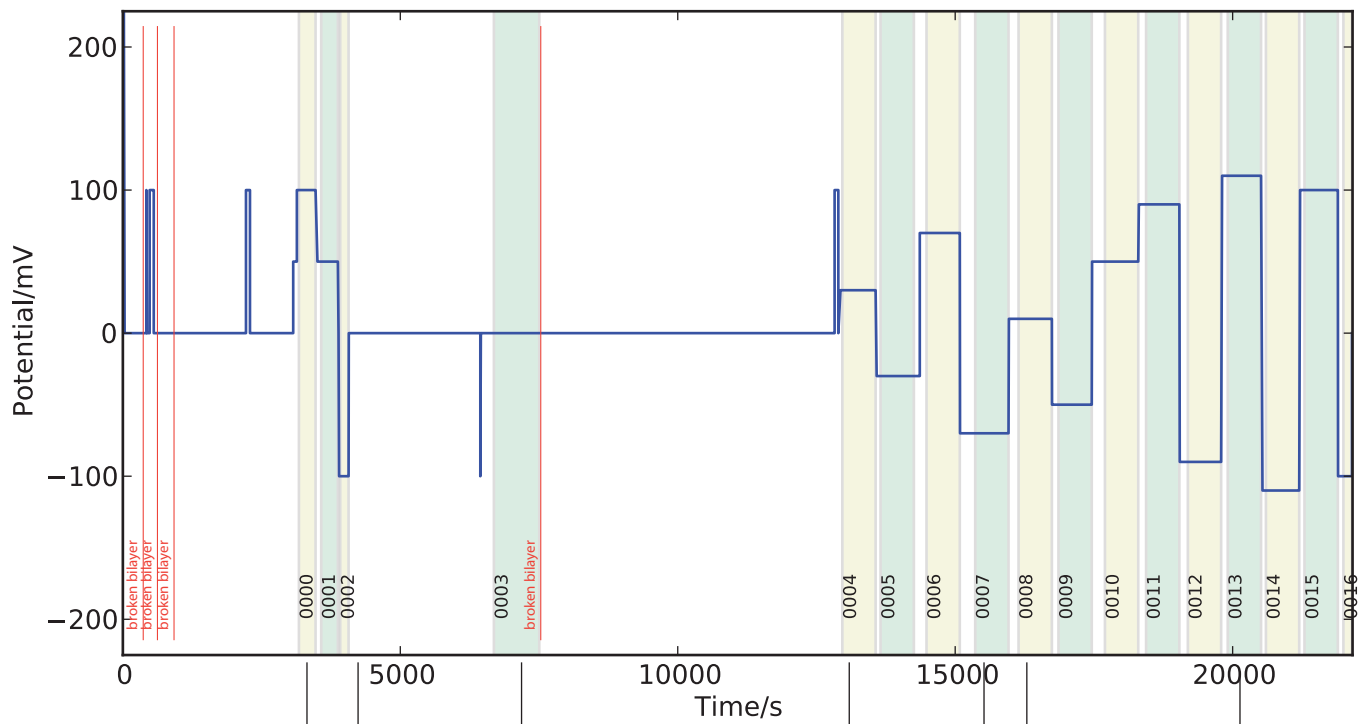




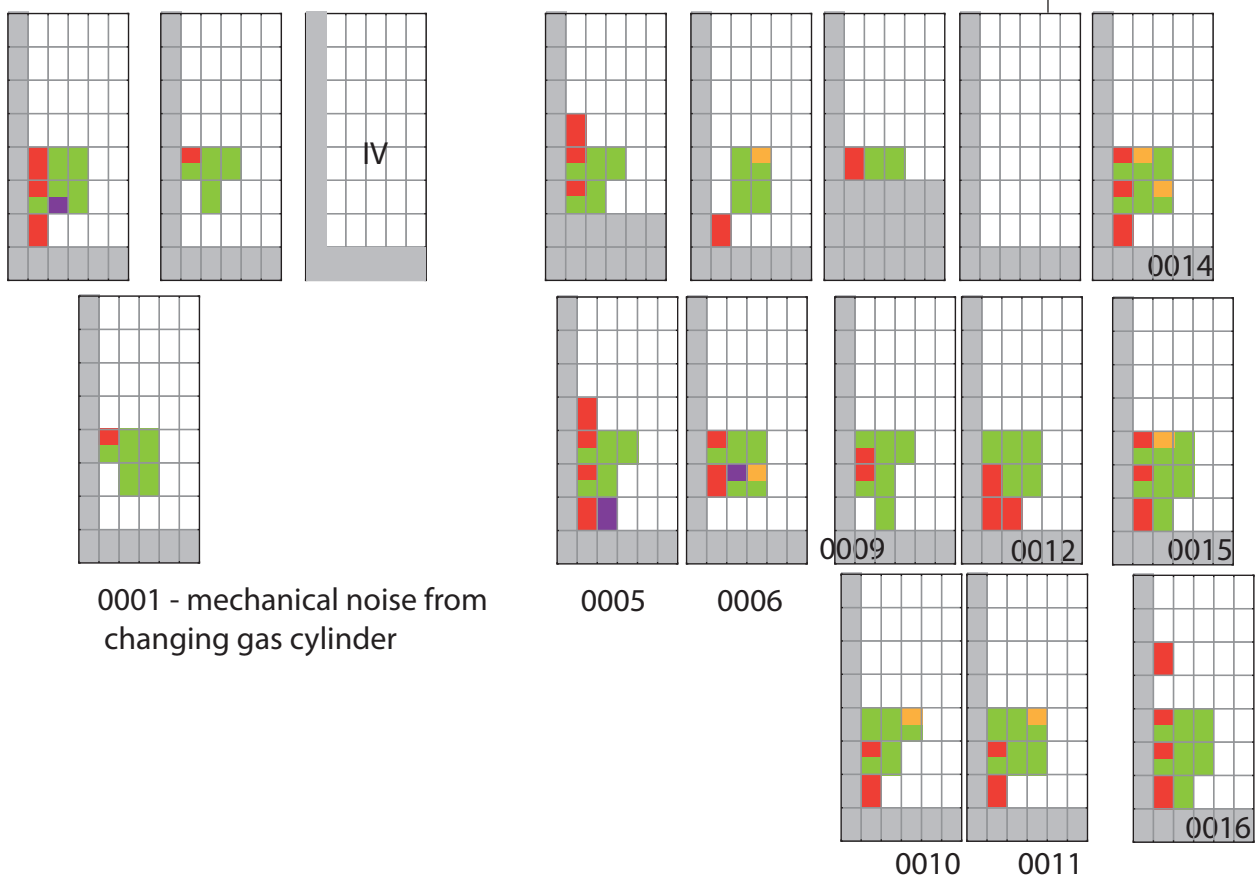


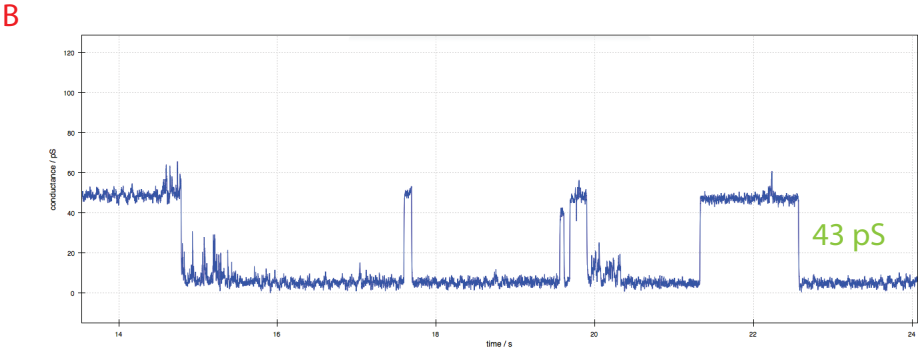
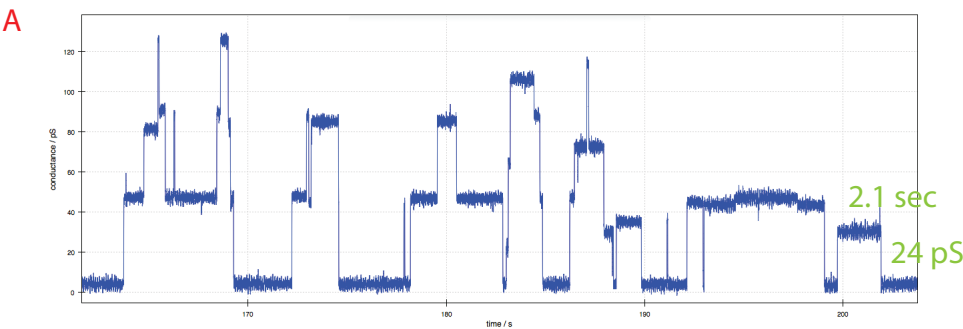
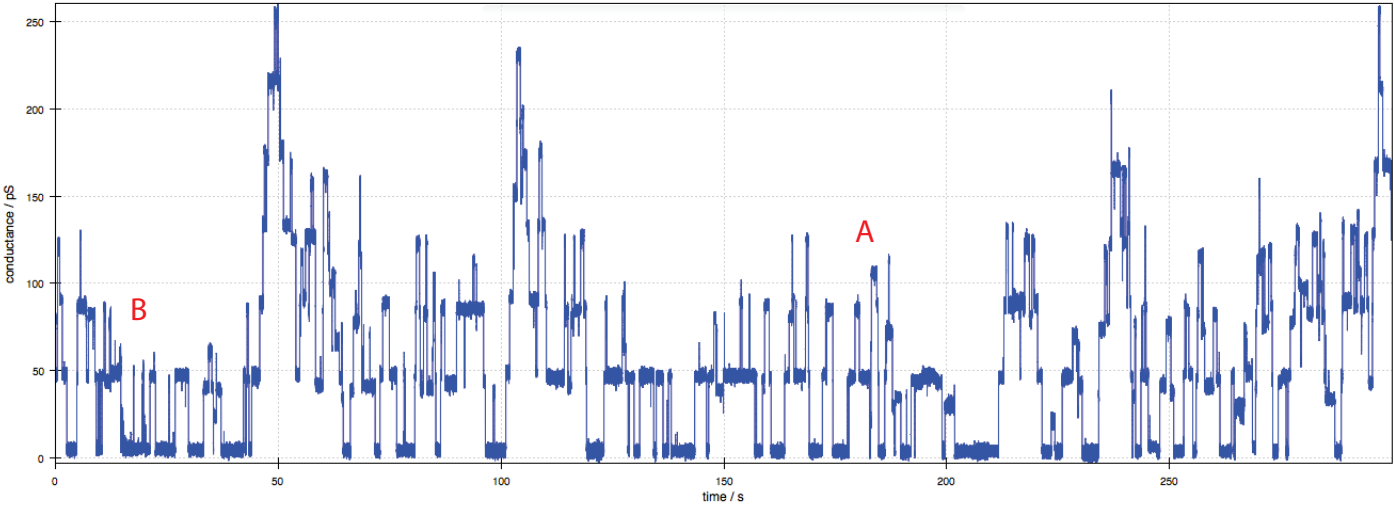


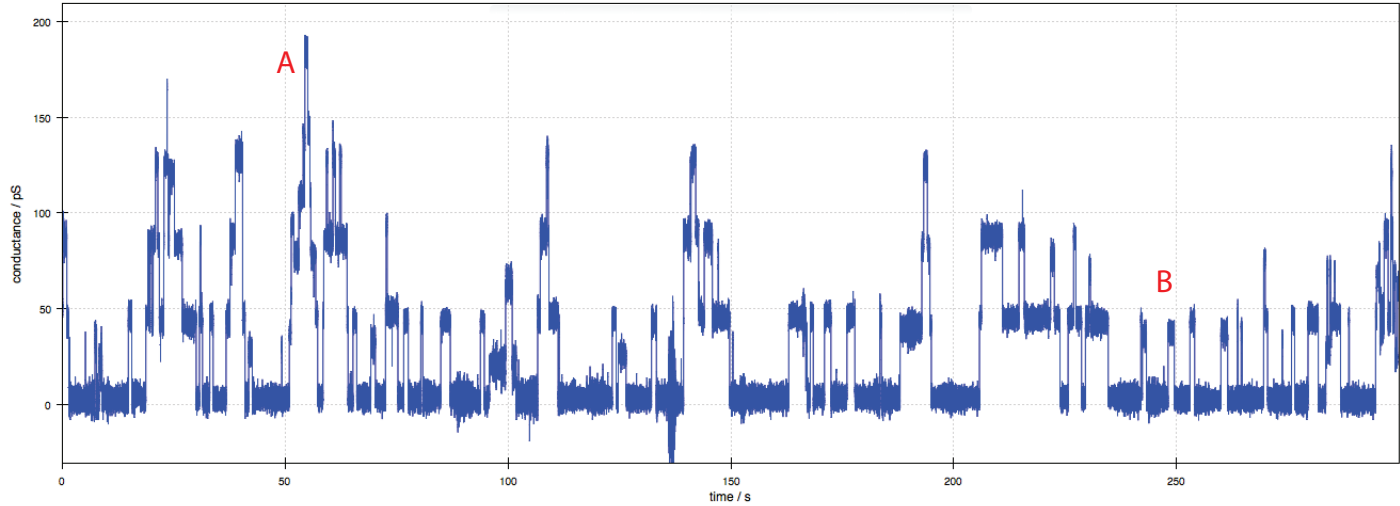
[JC-98] 8-12-8-G 1M CsCl pH 7 homoAdd



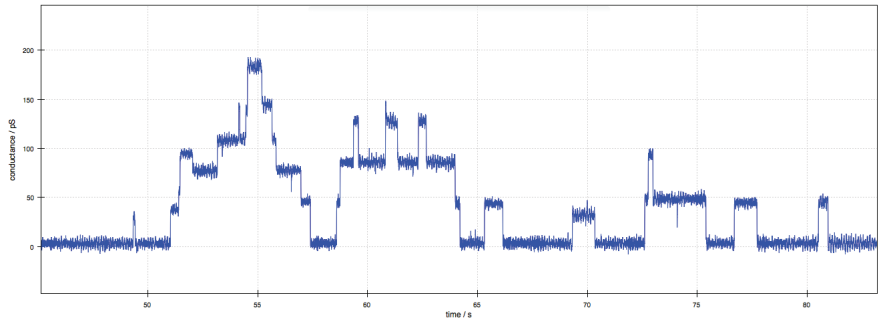
lipid
electrolyte 17/25uM
contact injection
brush transfer



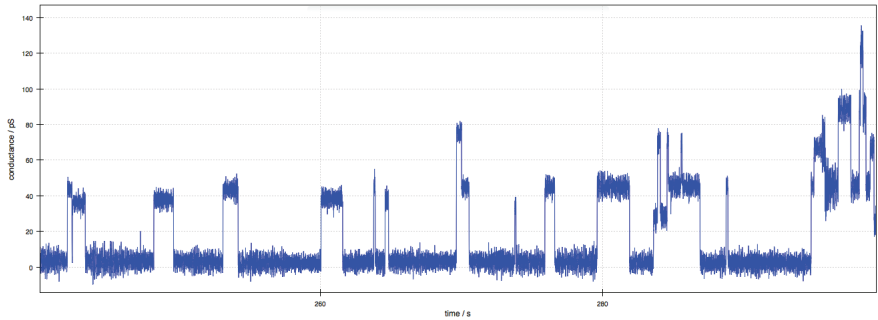


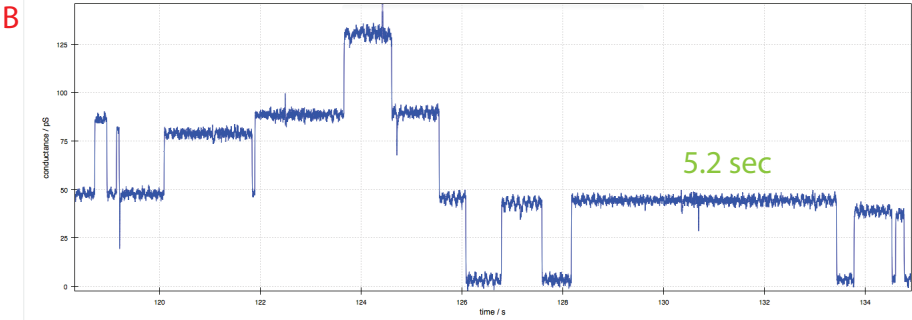
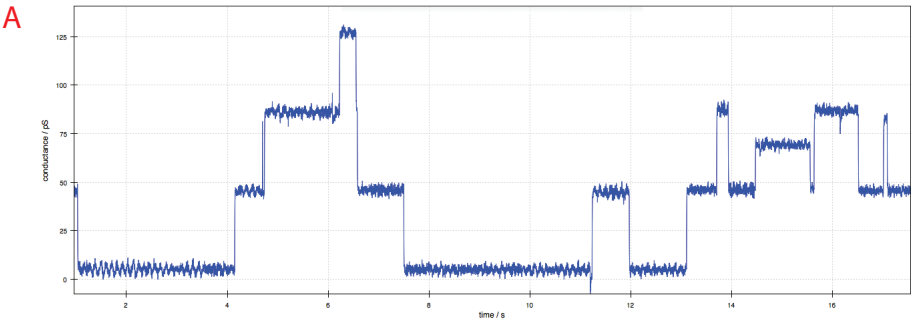
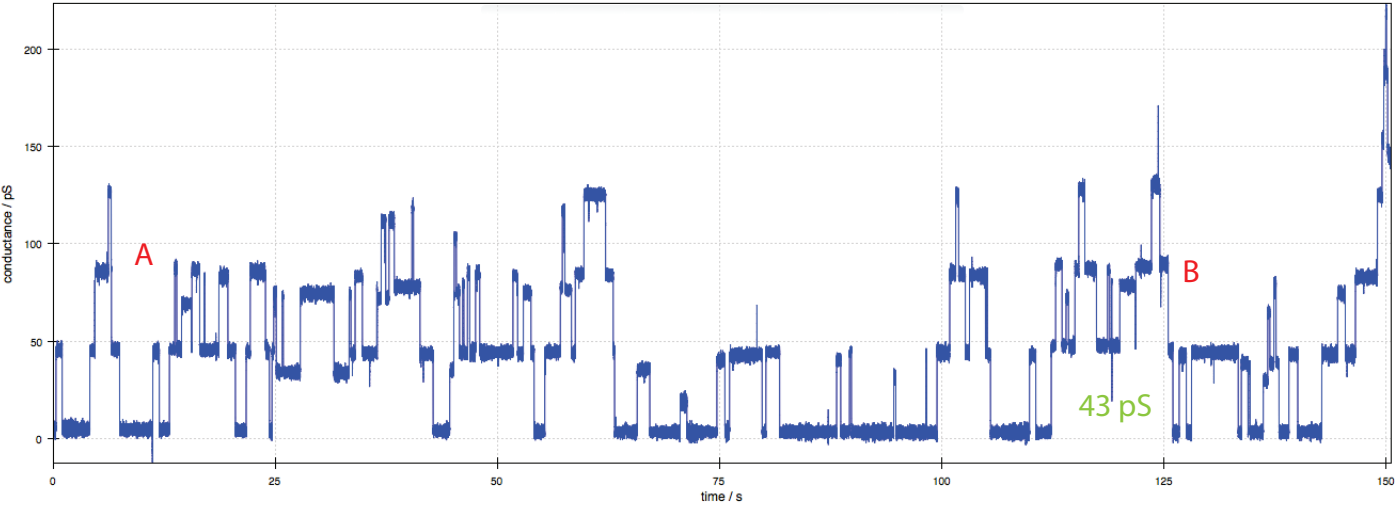


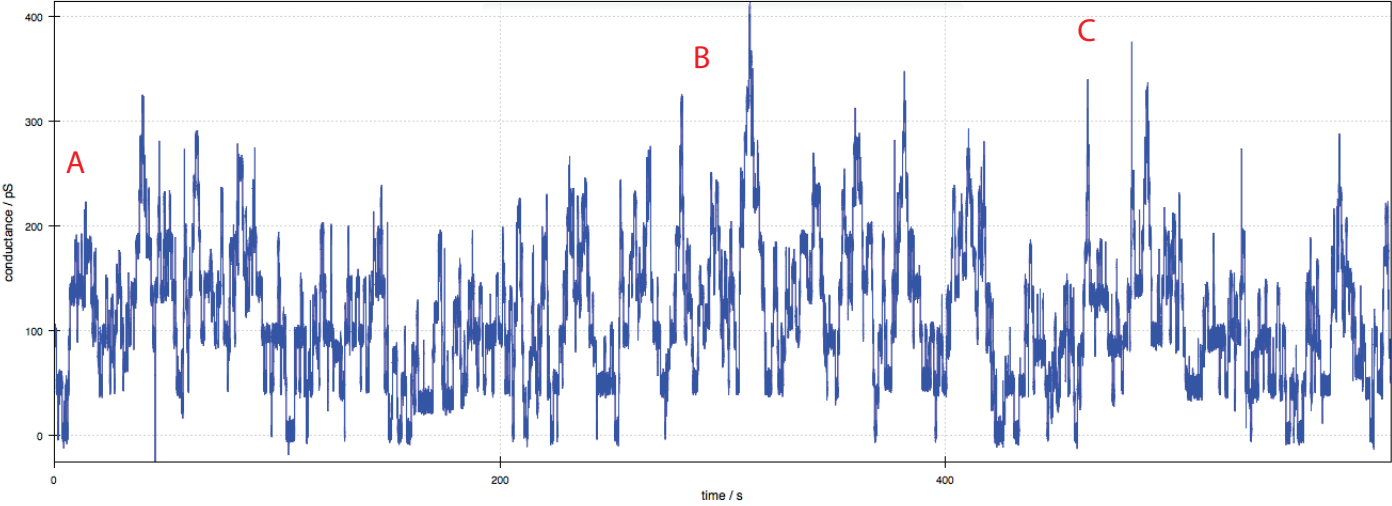
A



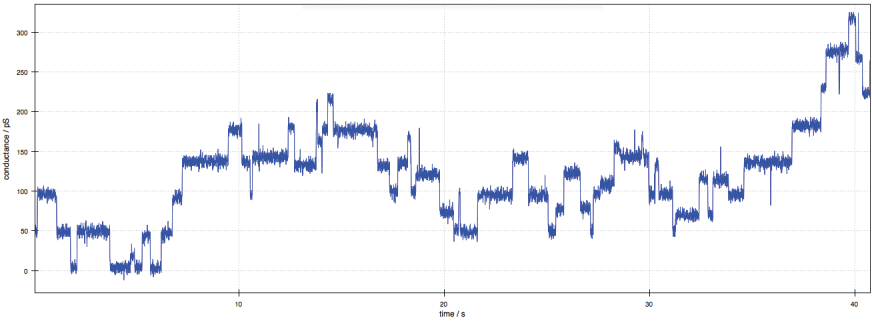
B



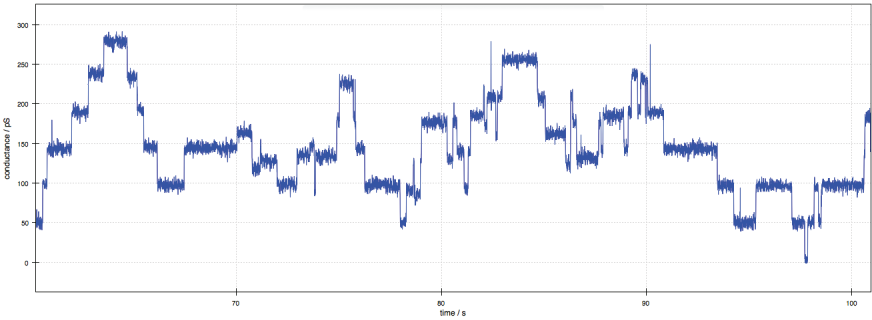




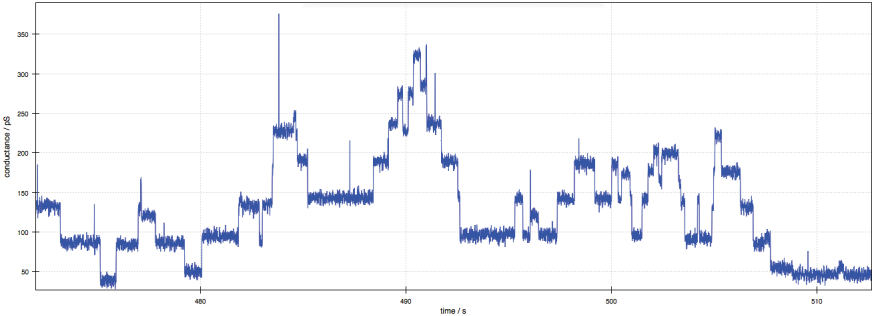
A

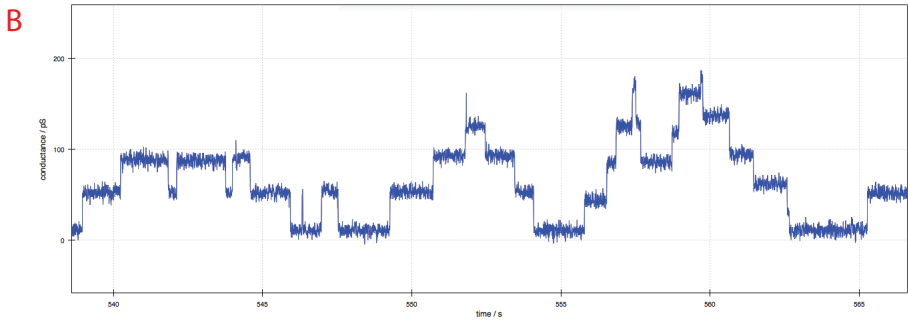
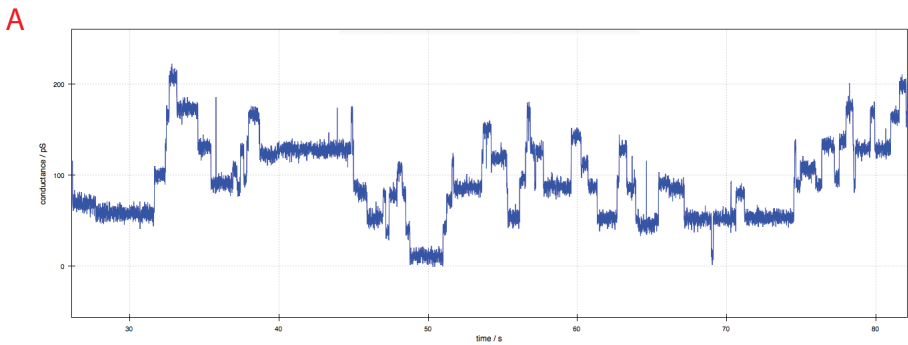
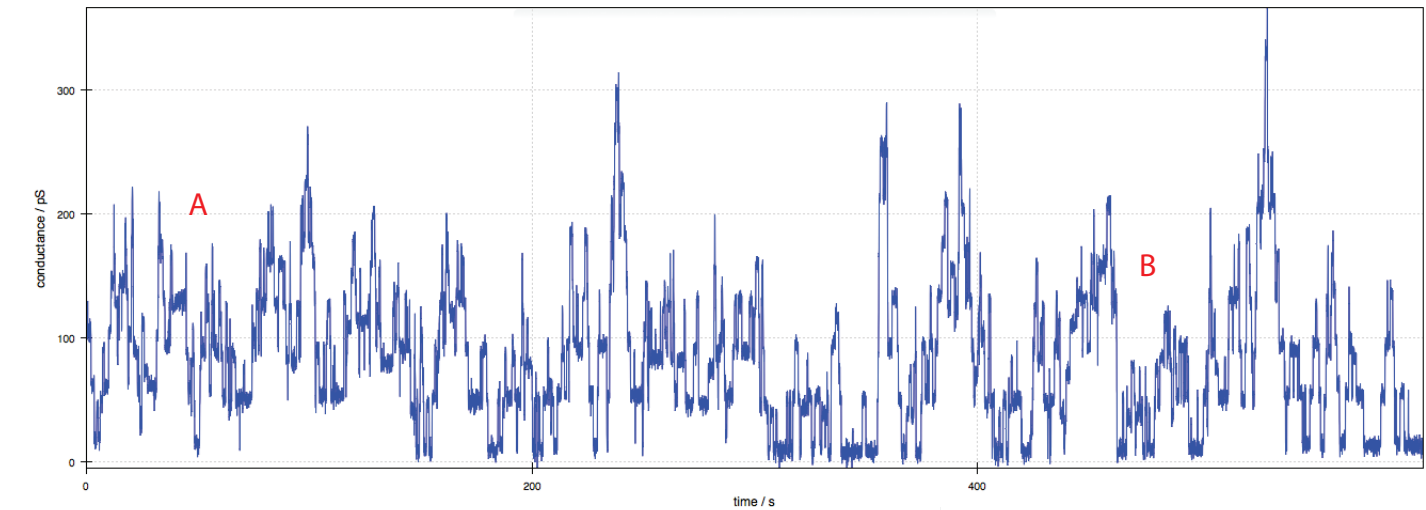


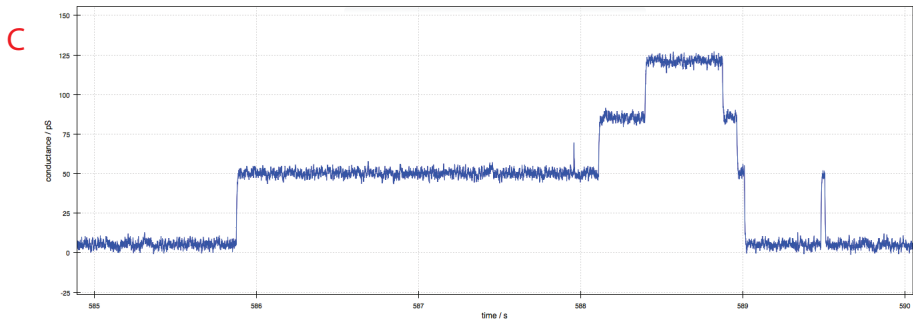
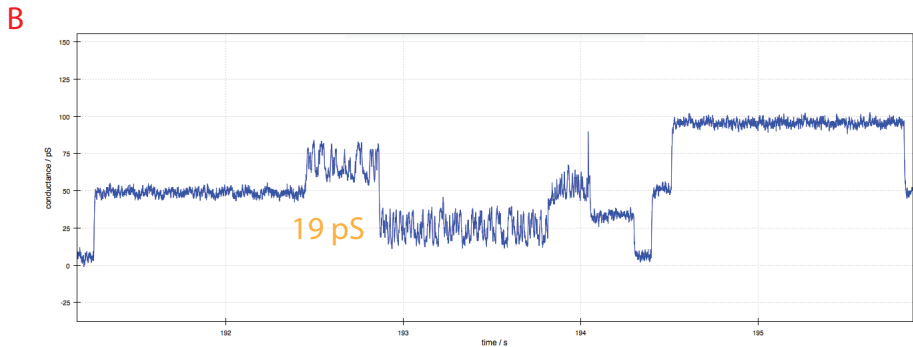
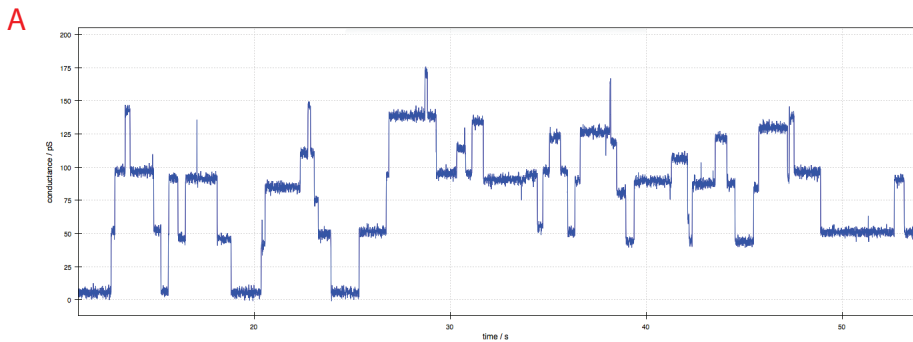
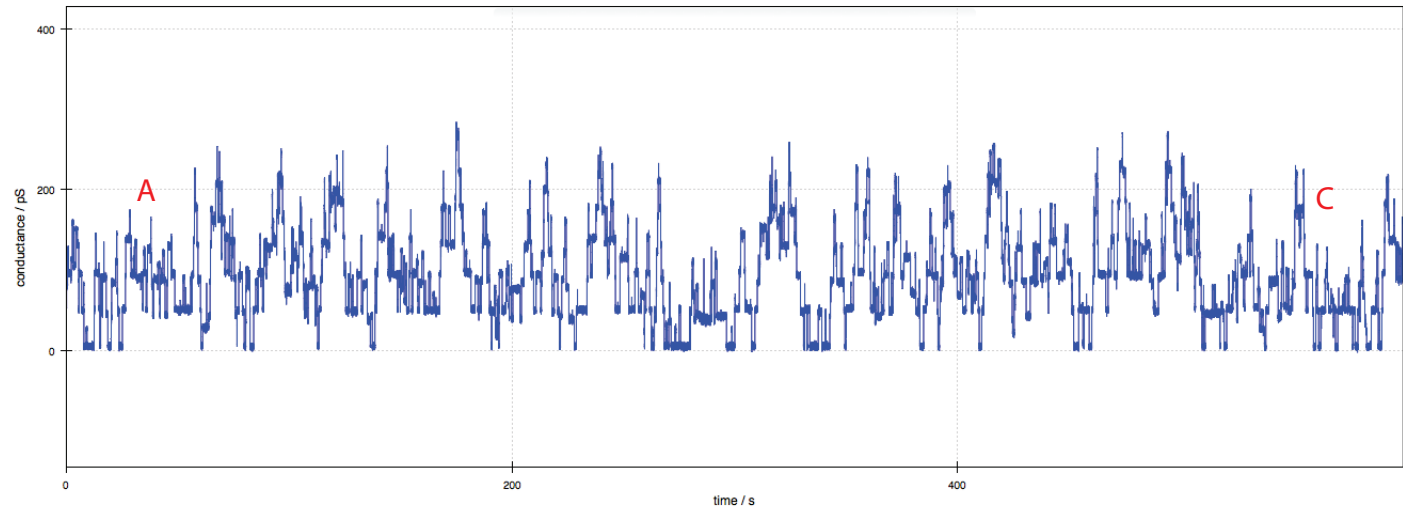
B

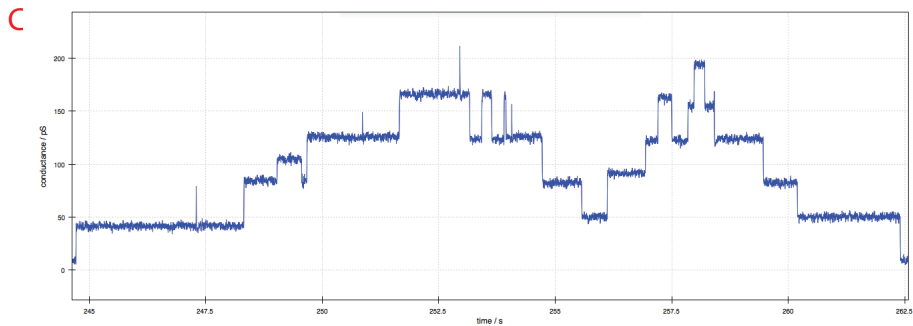
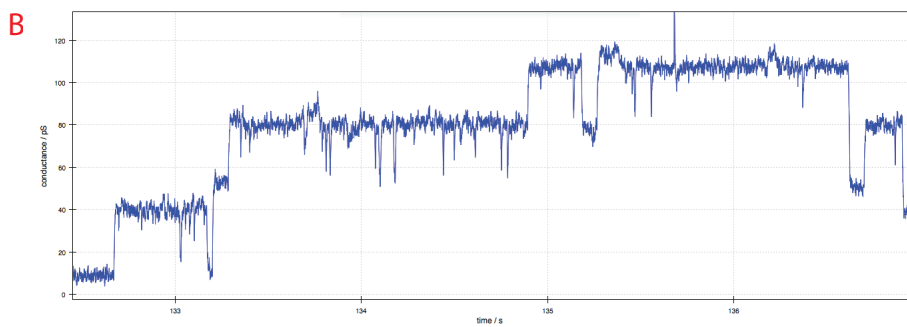
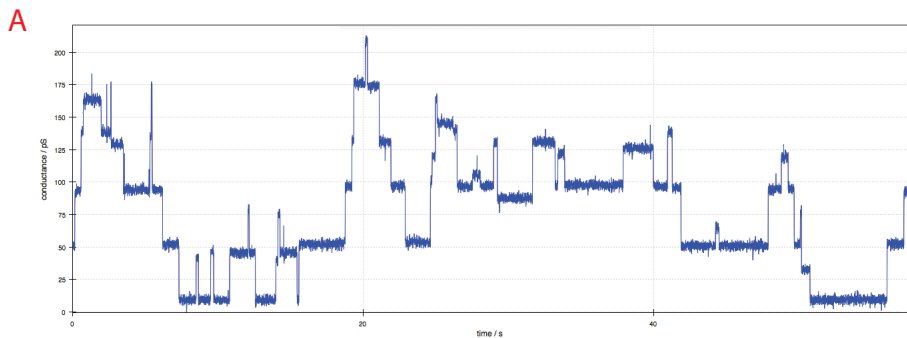
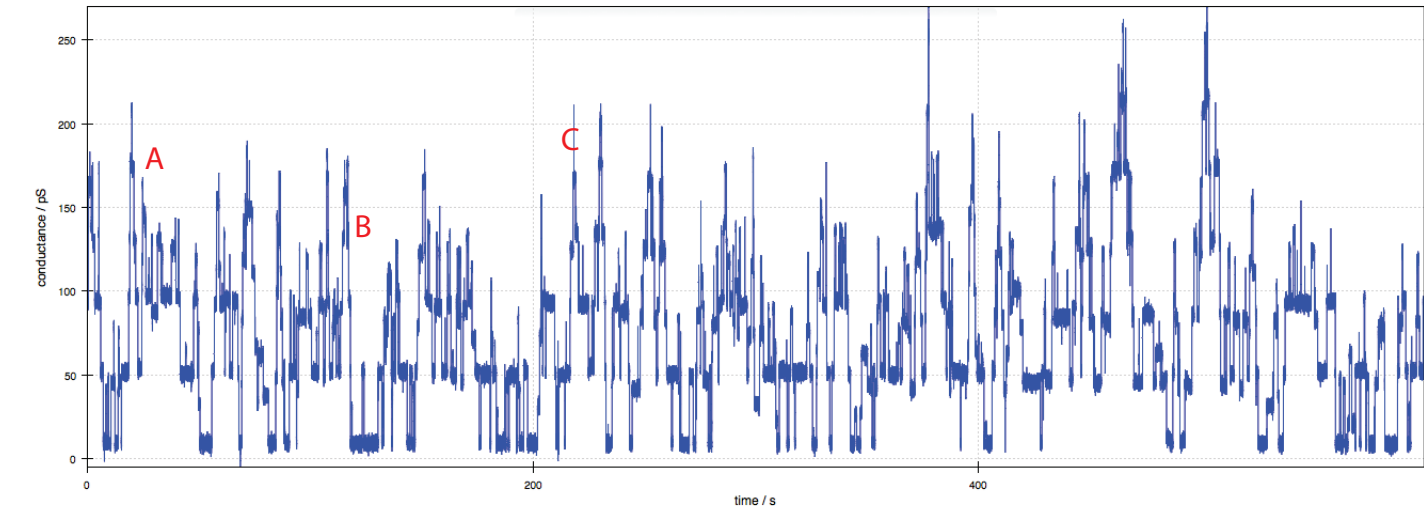


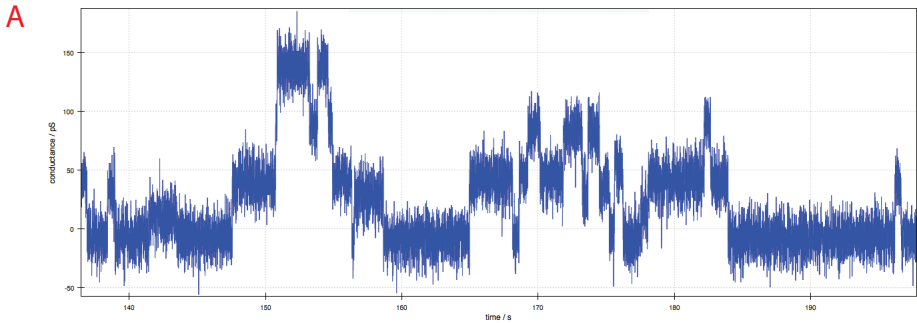
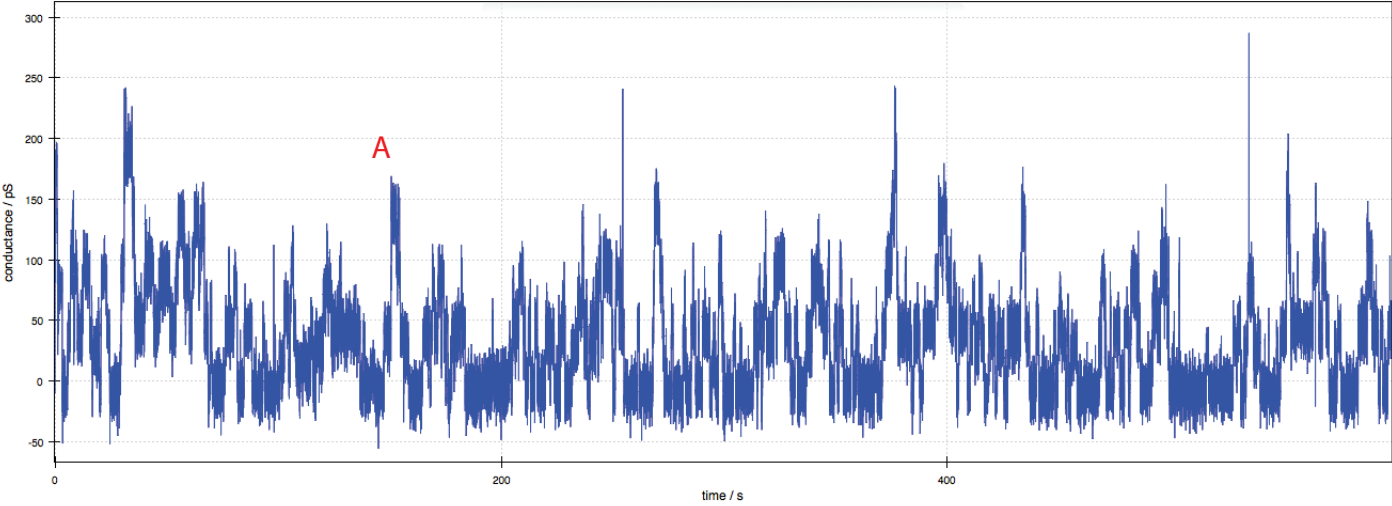
C

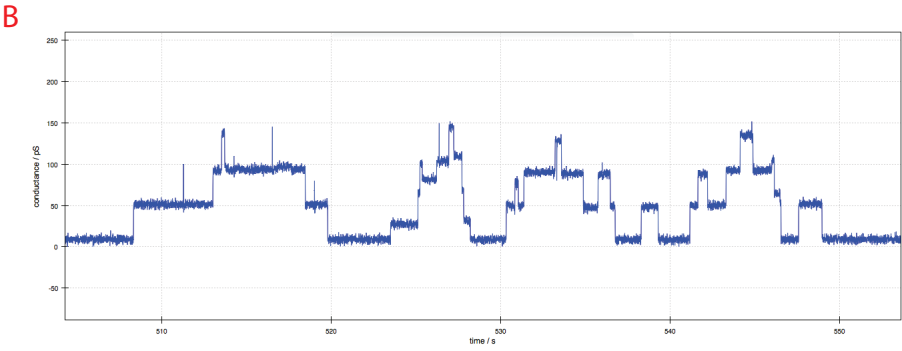
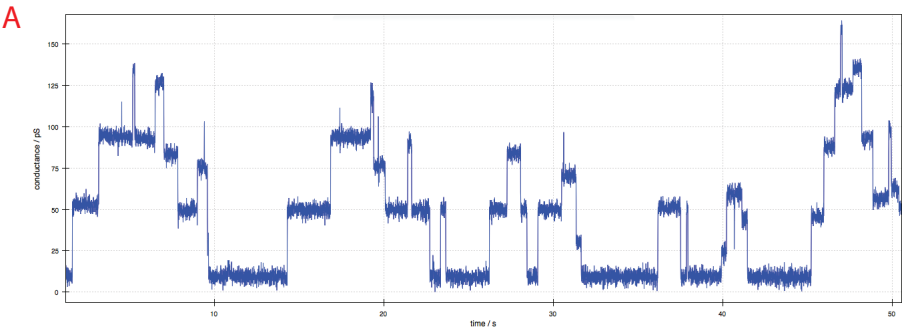
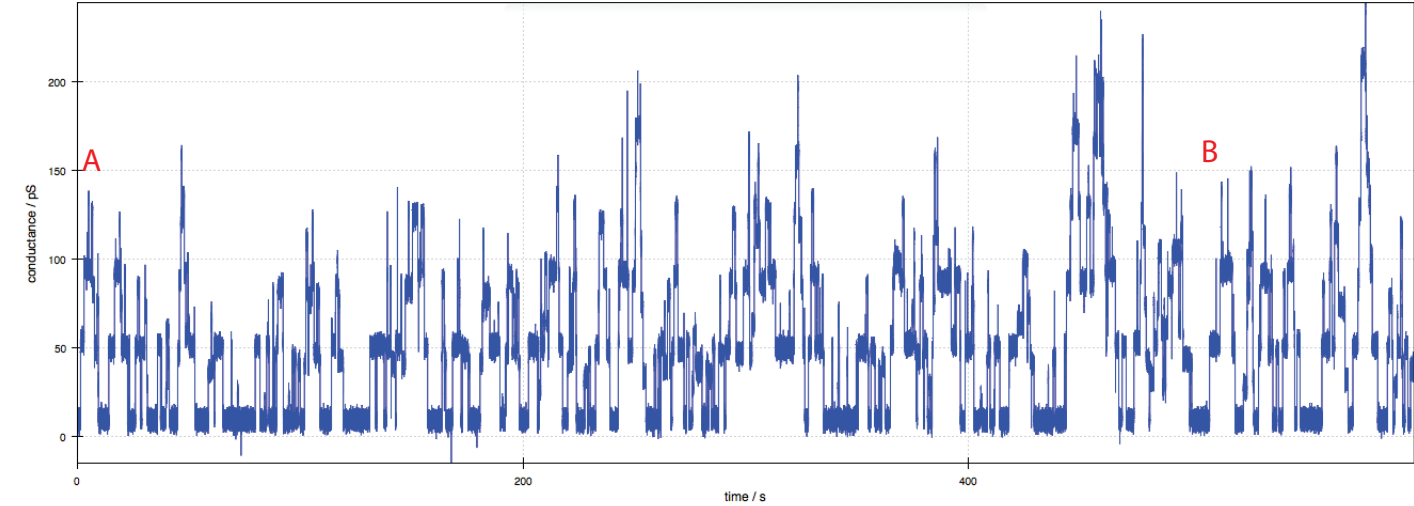


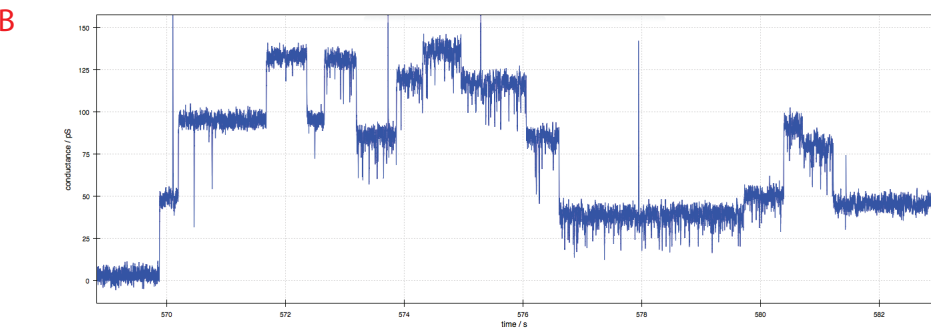
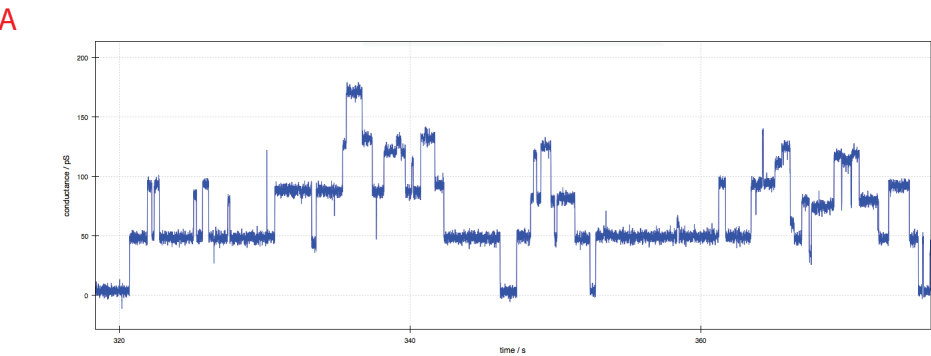
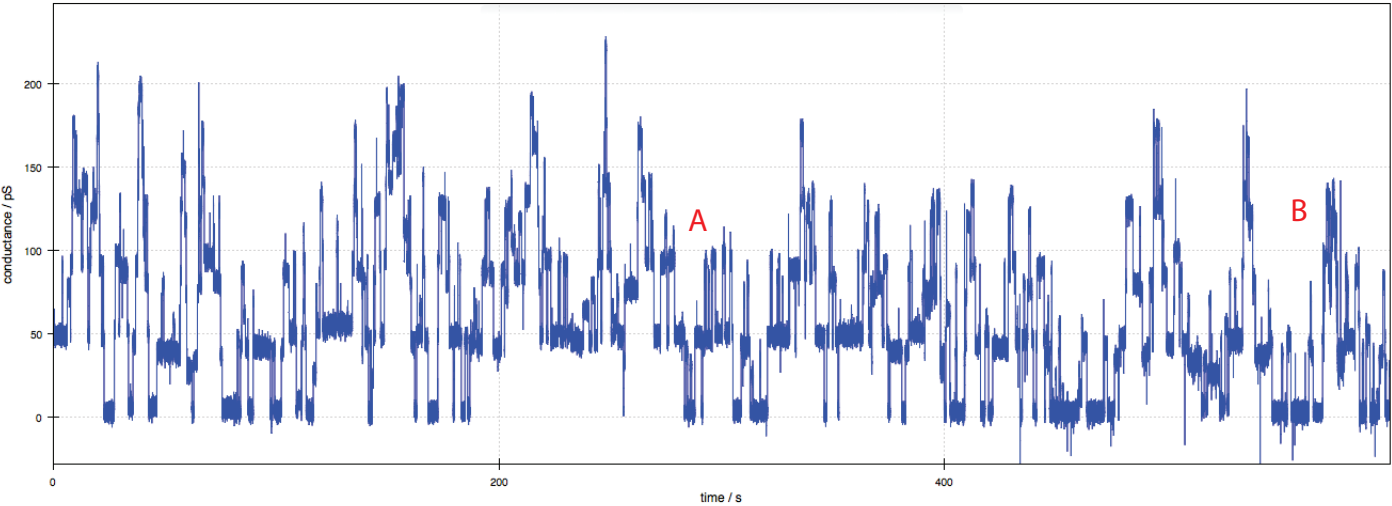


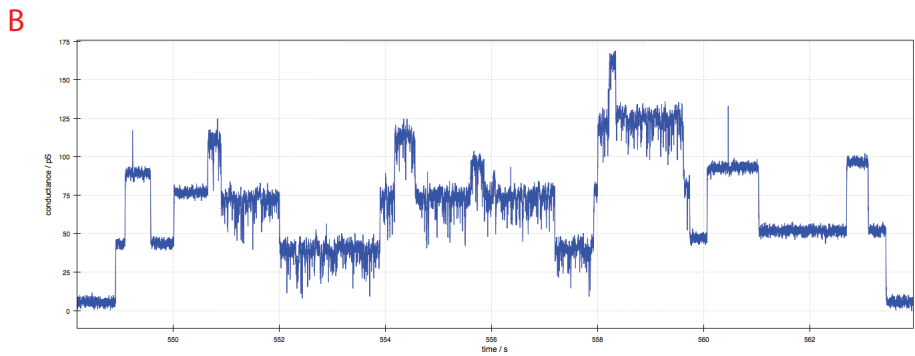
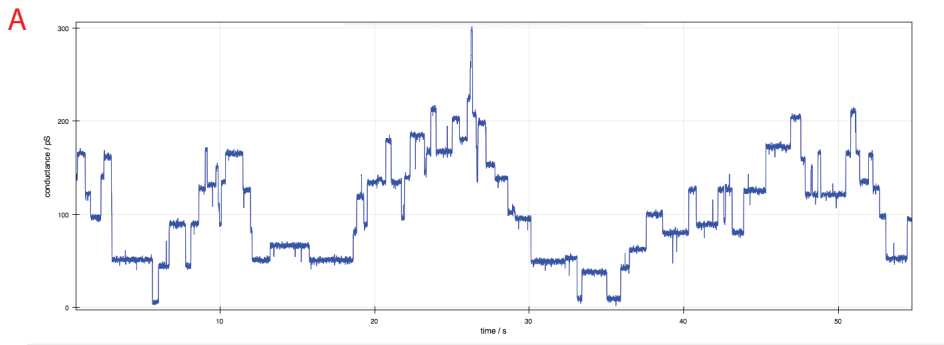
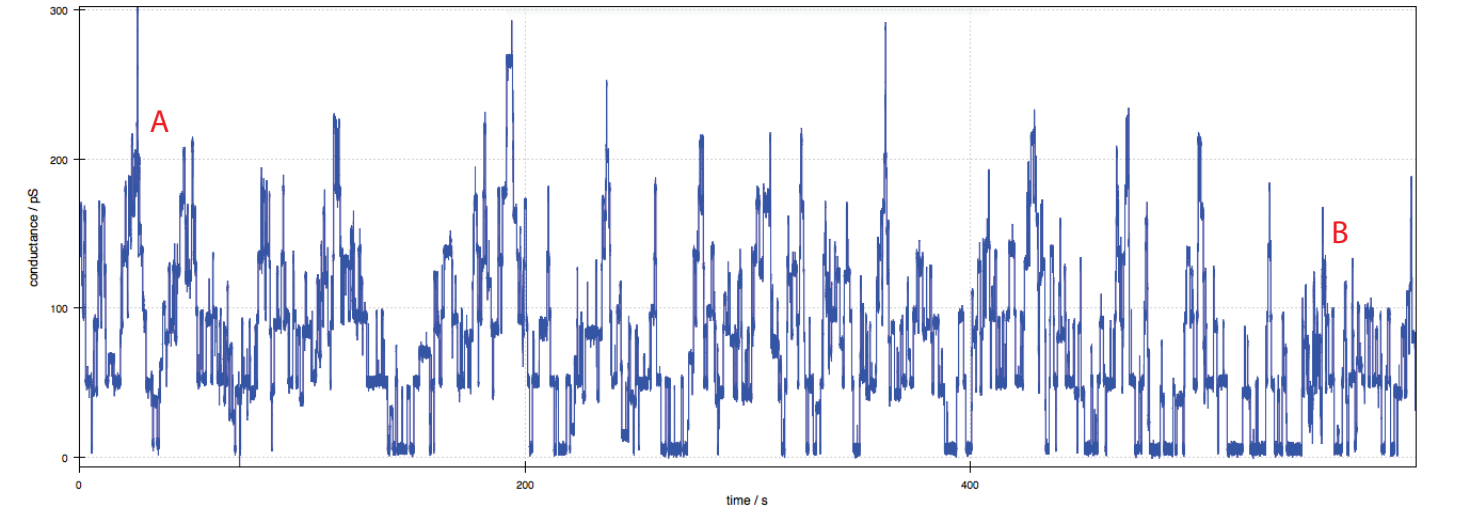


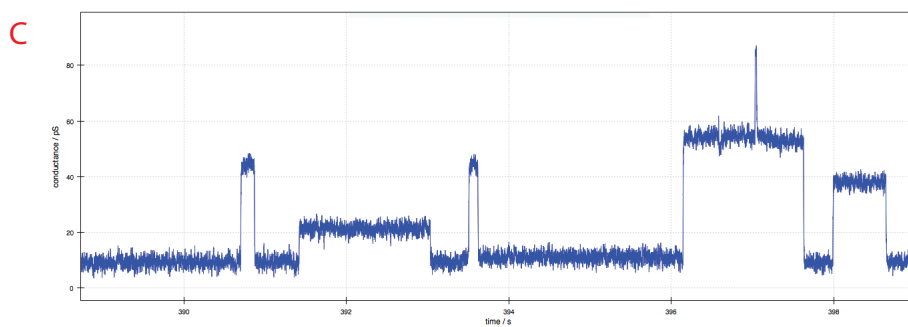
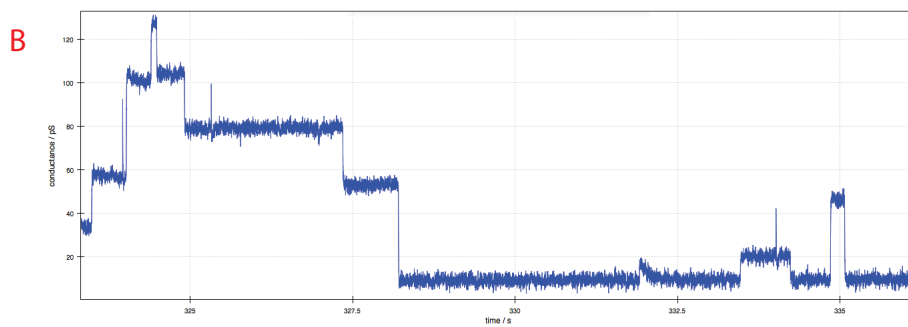
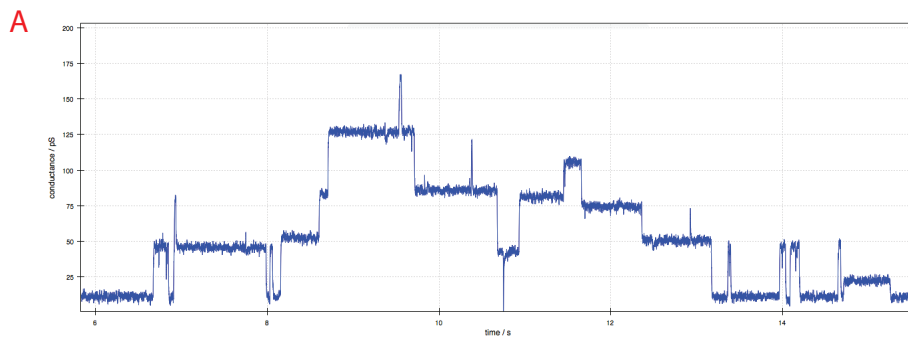
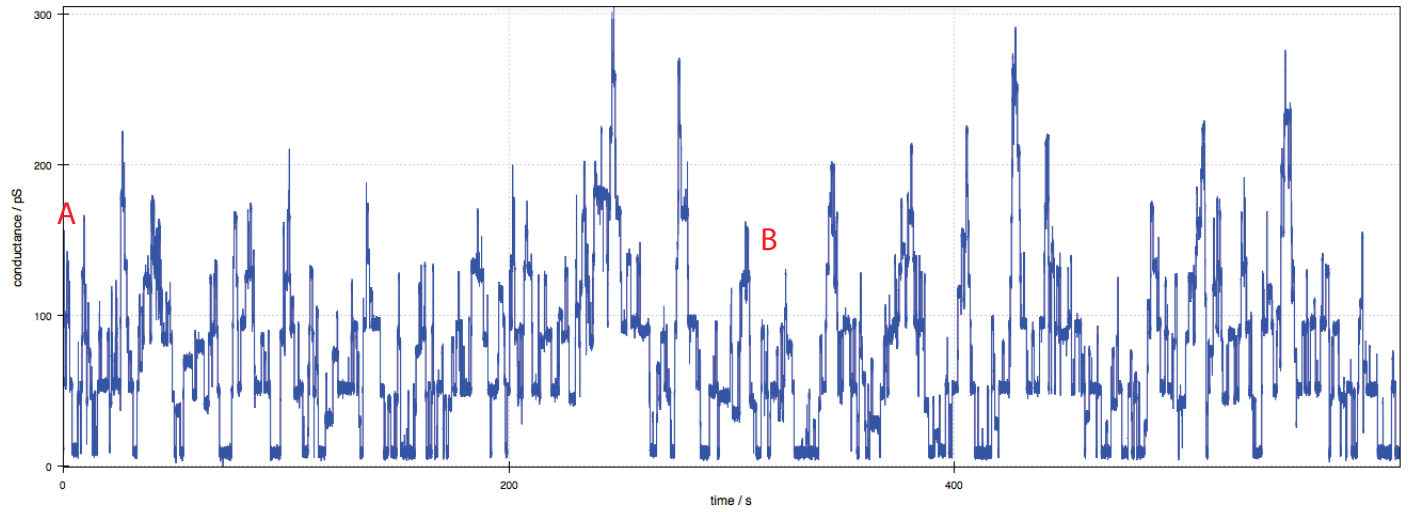




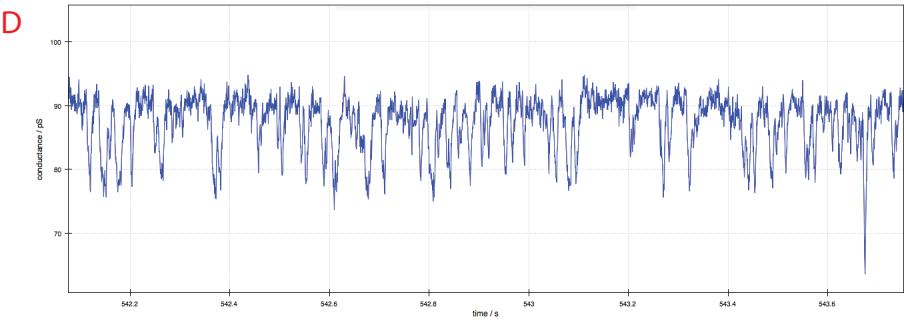
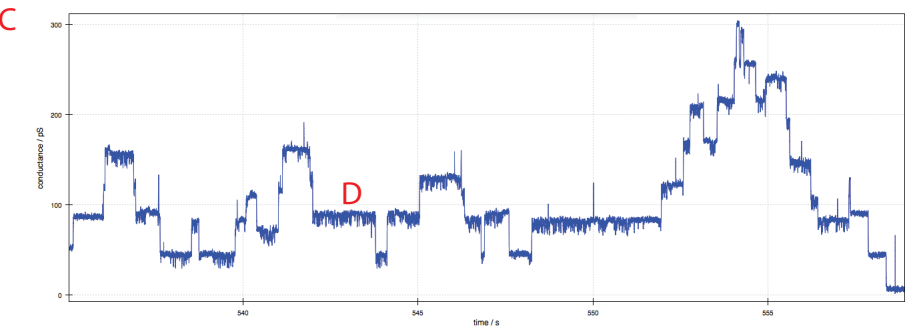
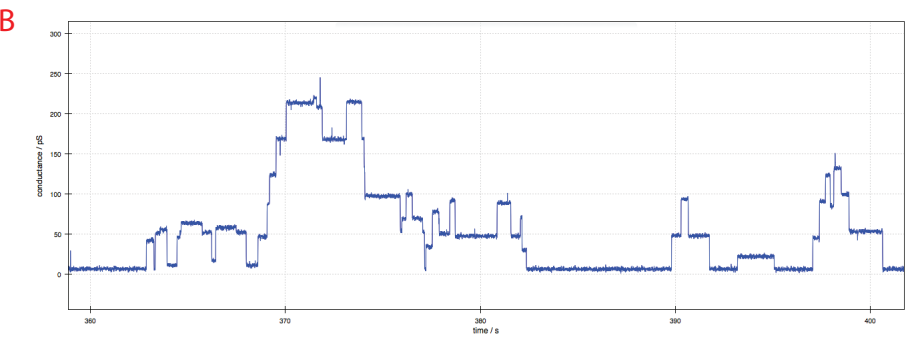
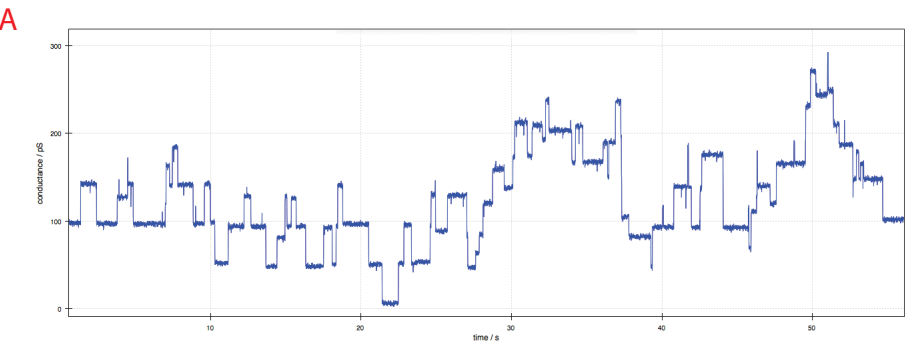
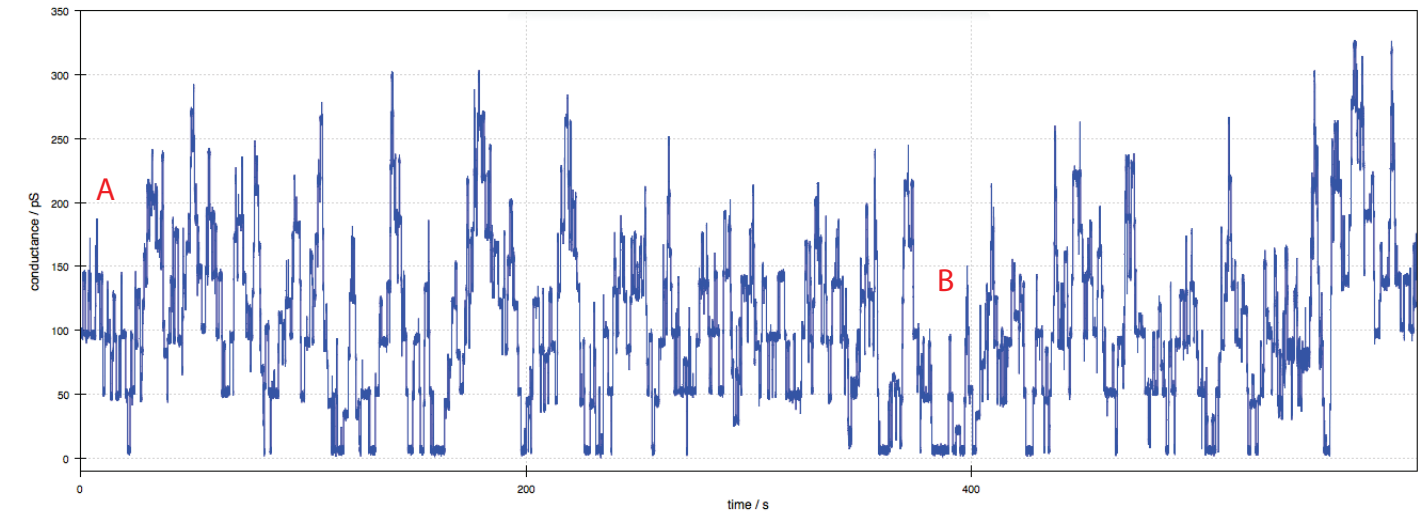


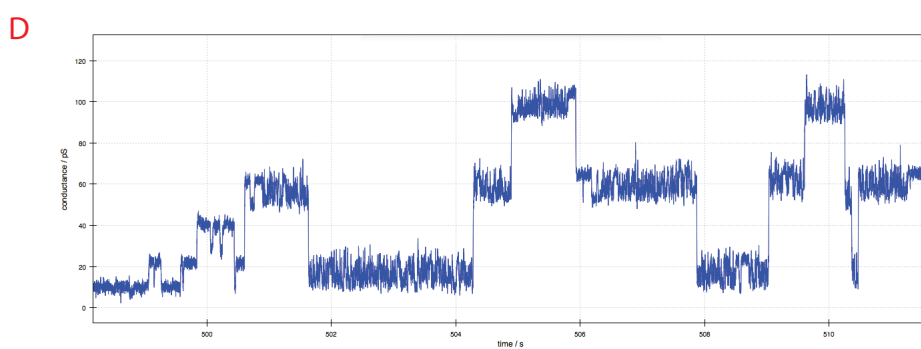
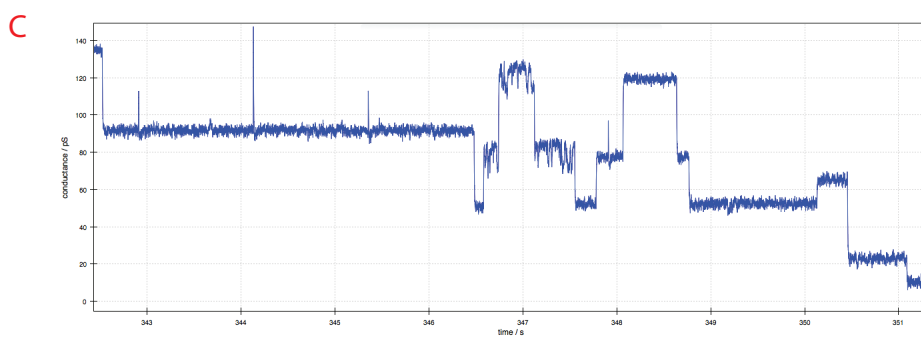
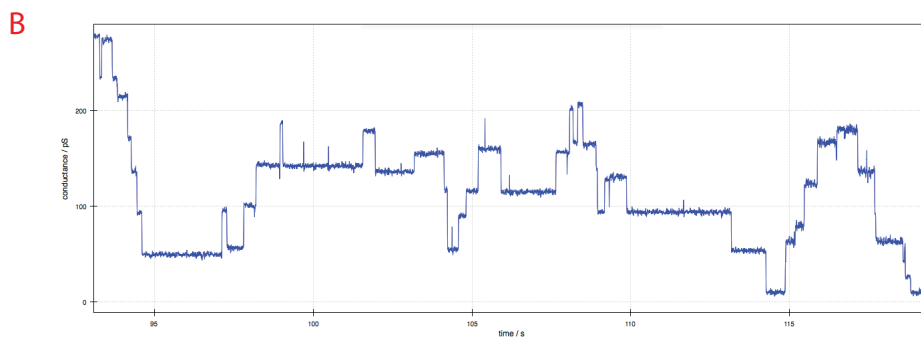
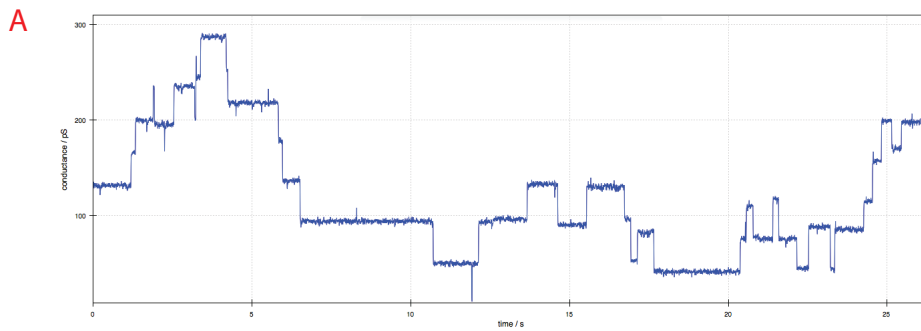
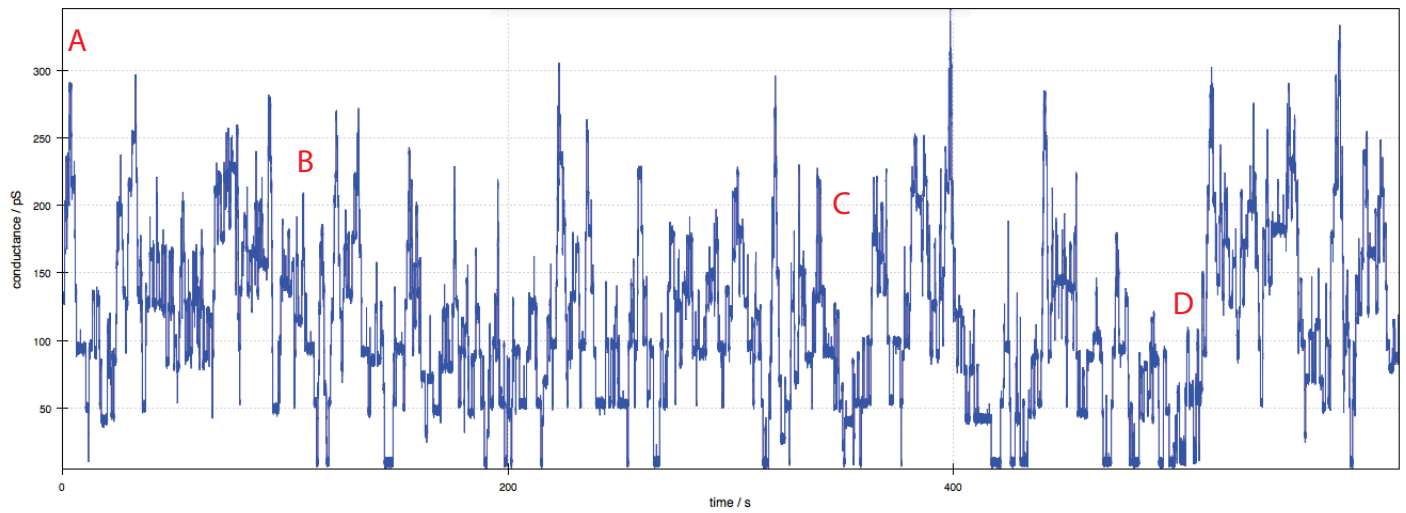


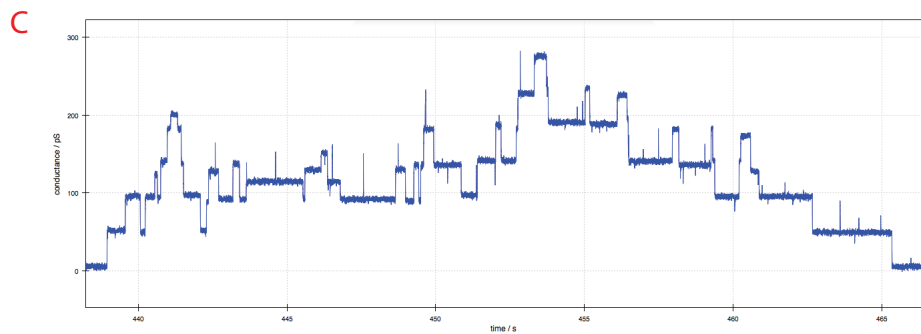
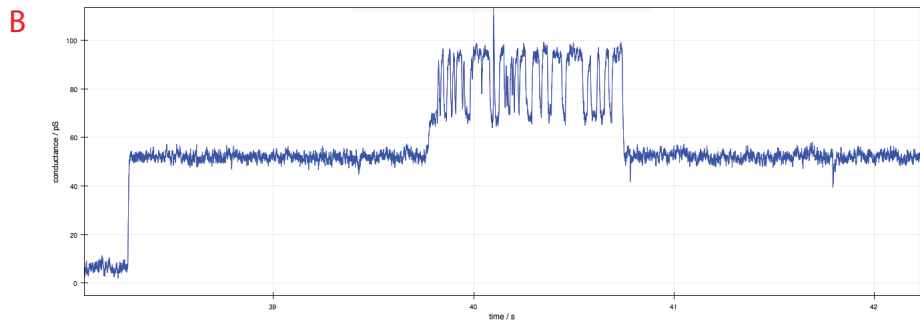
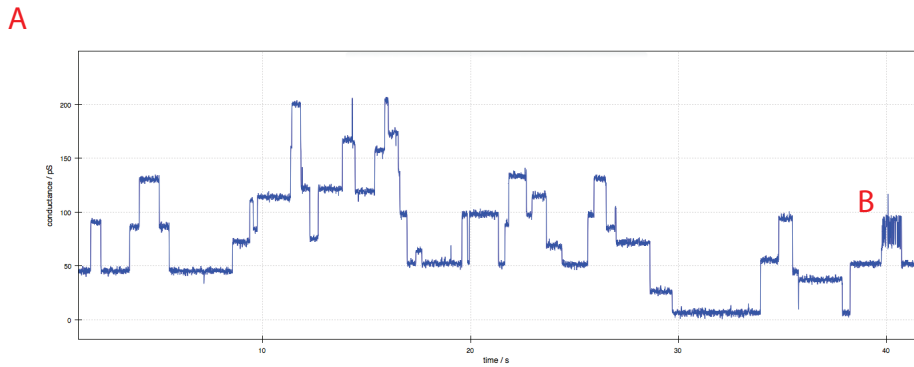
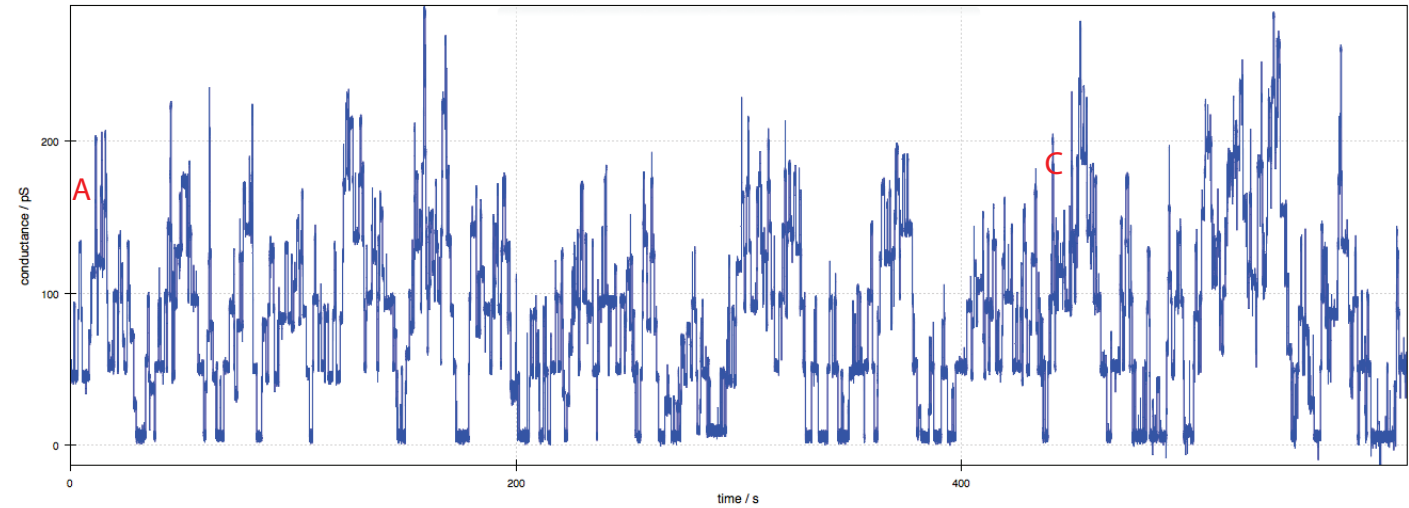


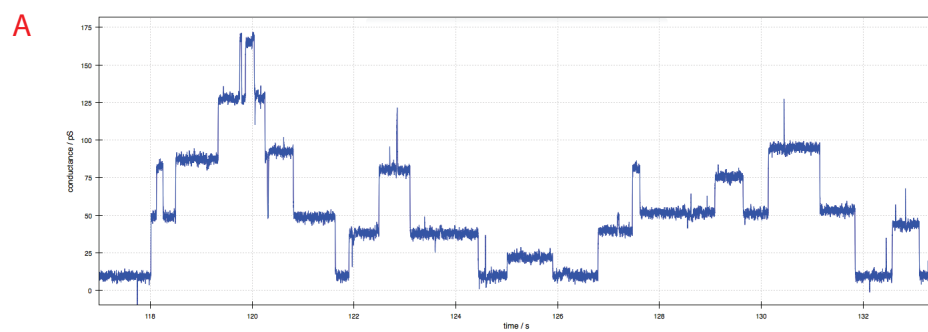
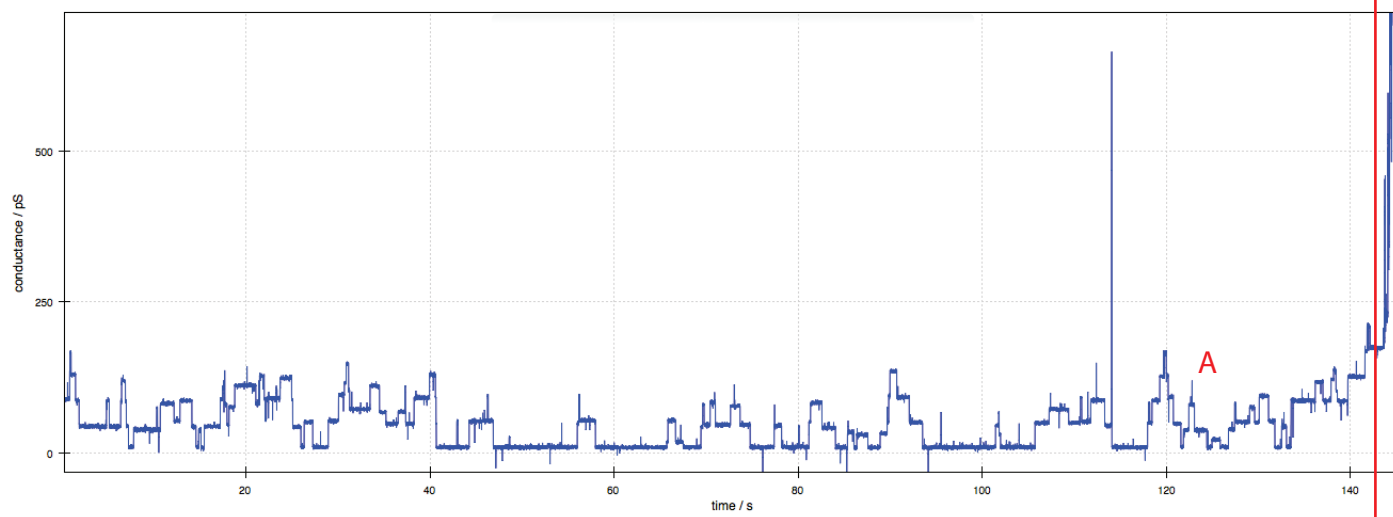


multiple populations of (small) openings

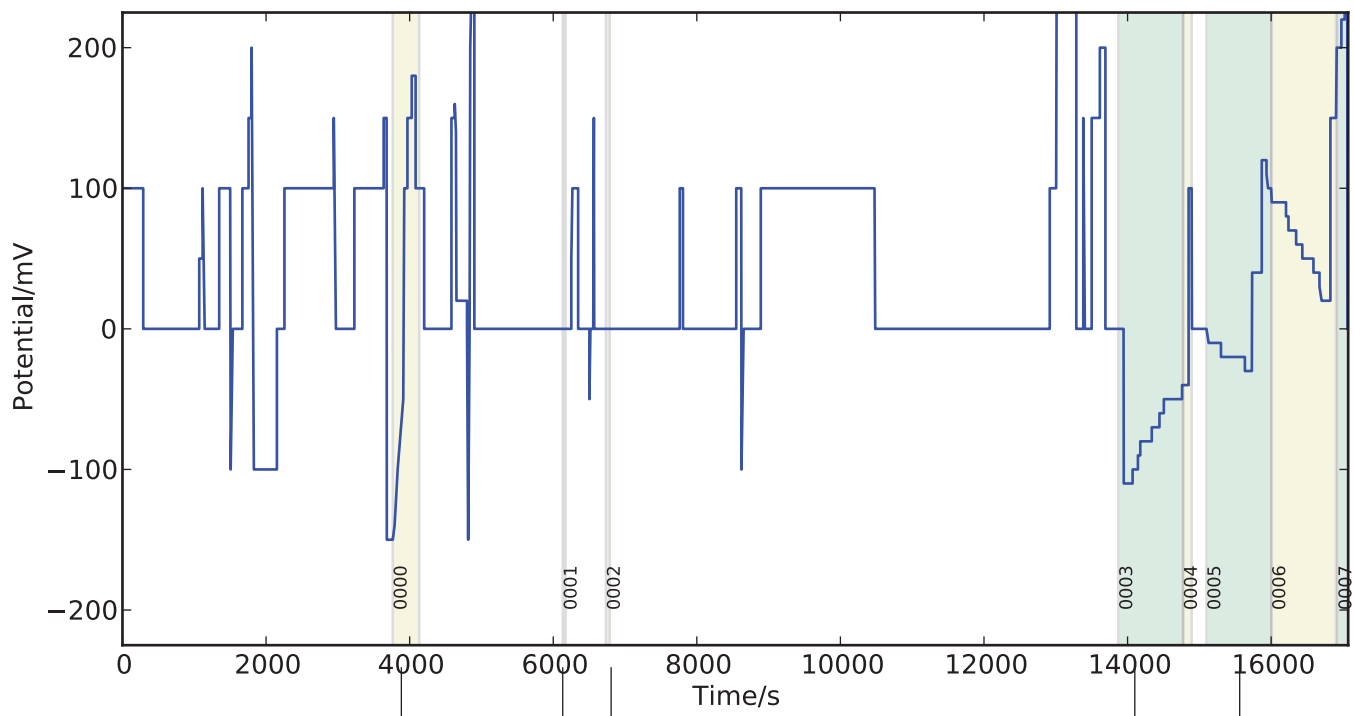




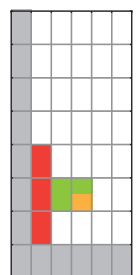
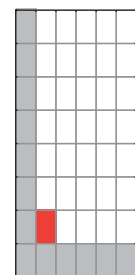
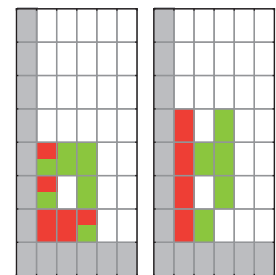
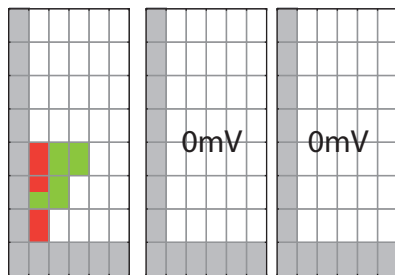




[JC-106] 8-12-8-G 1M 200mM CsCl homoAdd

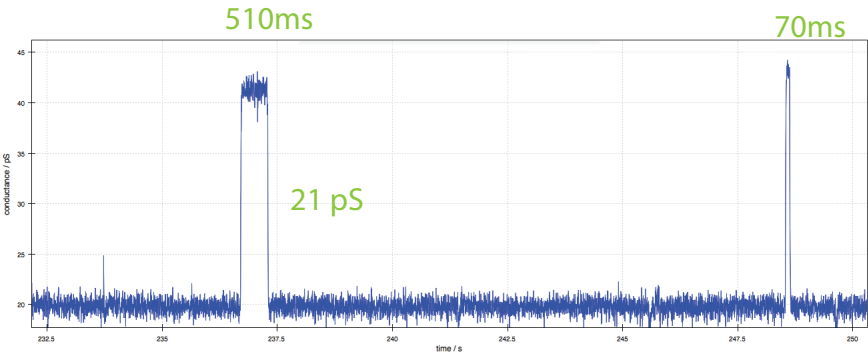
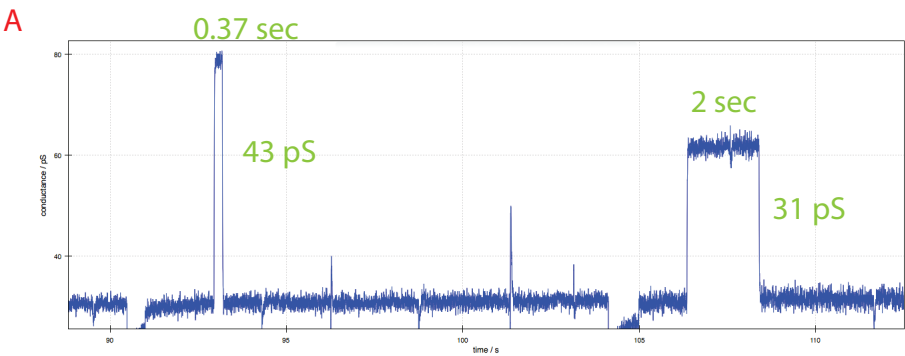
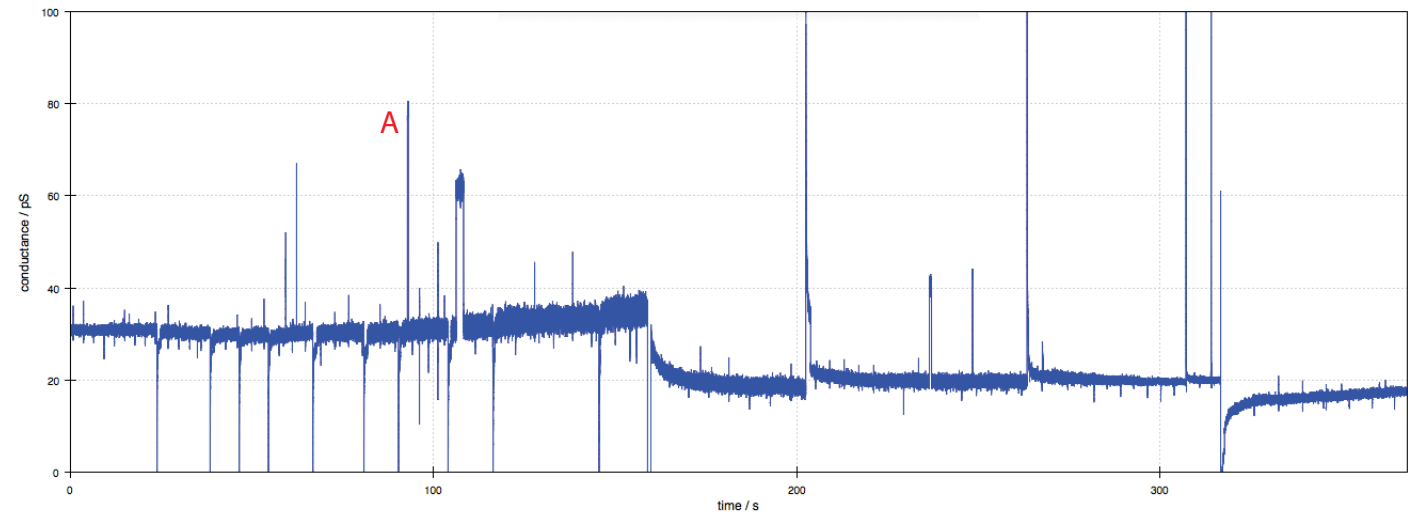


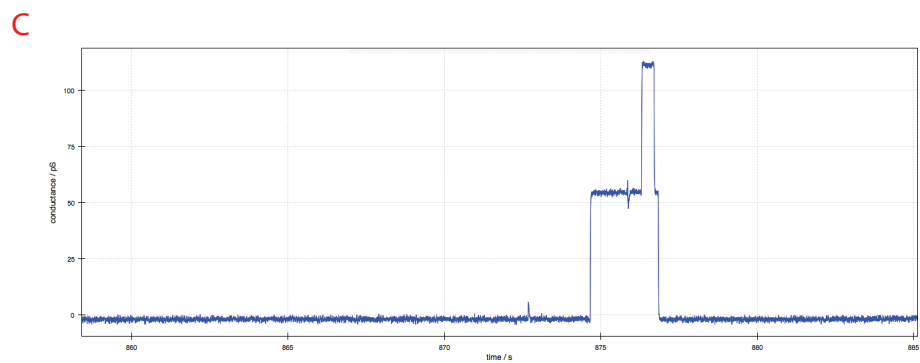
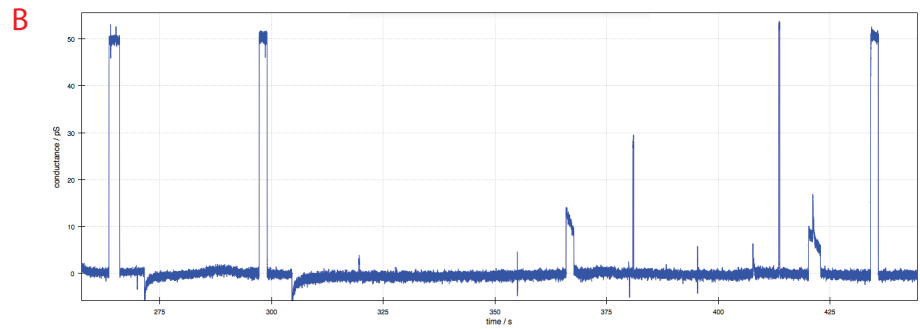
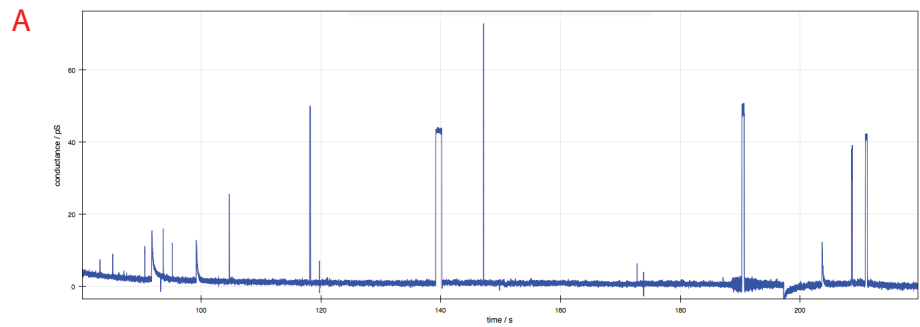
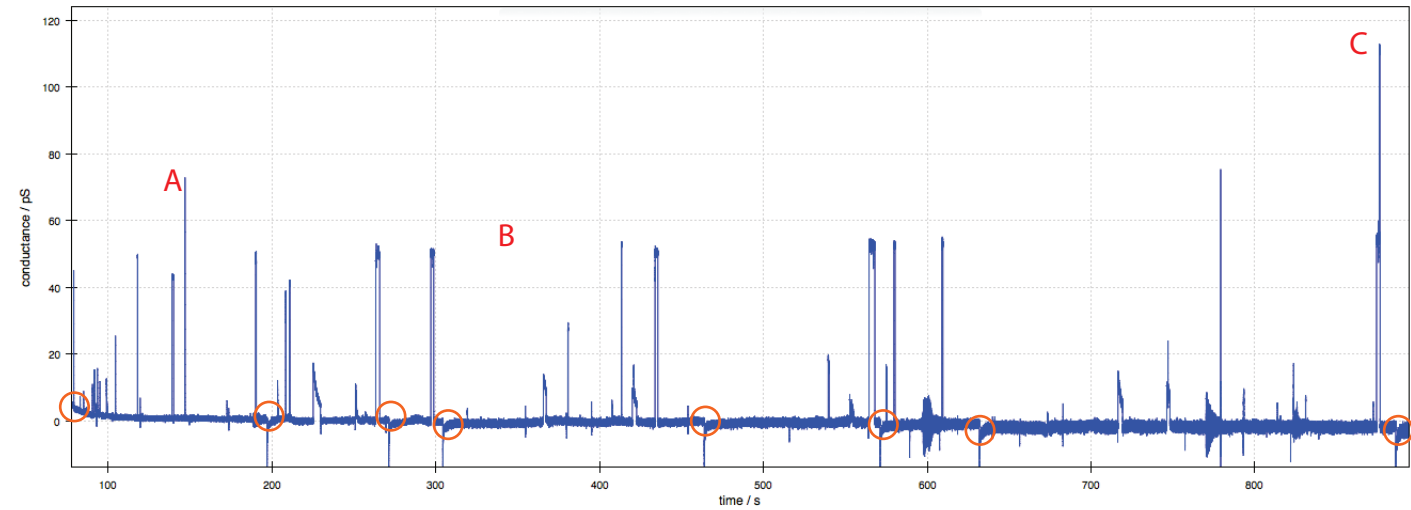
lipid
electrolyte 12.5/7.7uM
contact injection
brush transfer

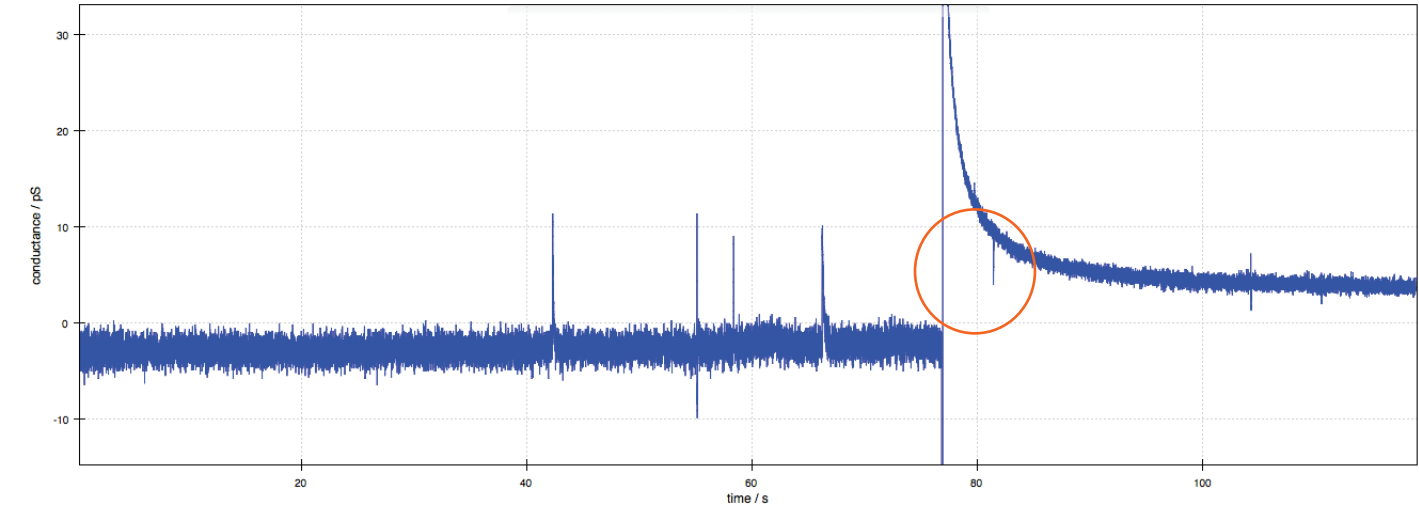


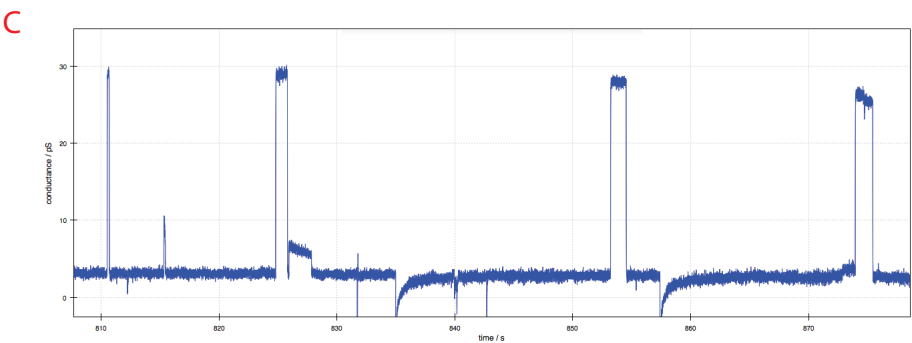
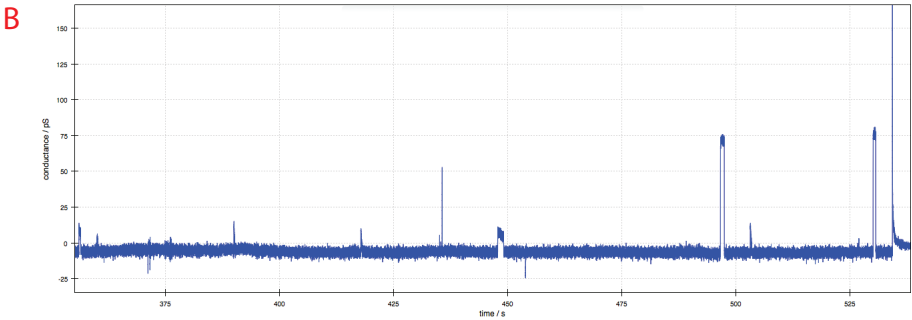
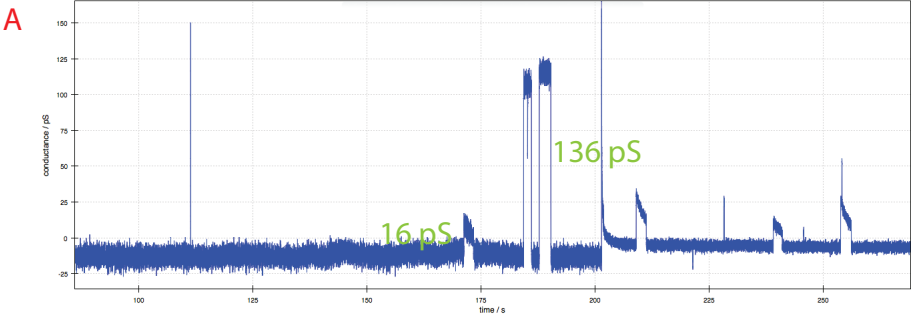
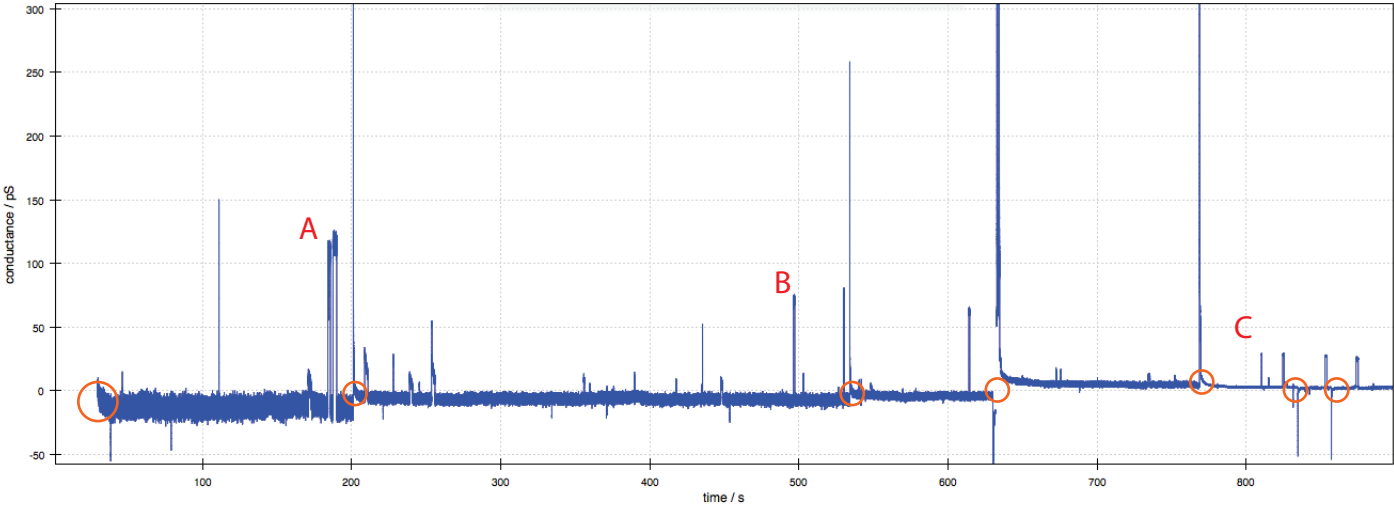
0004

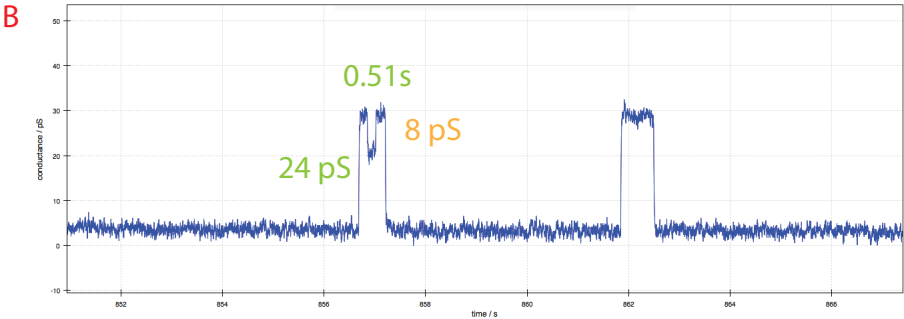
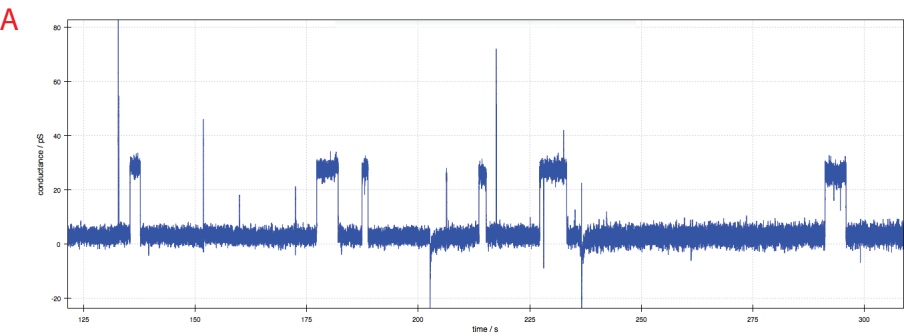
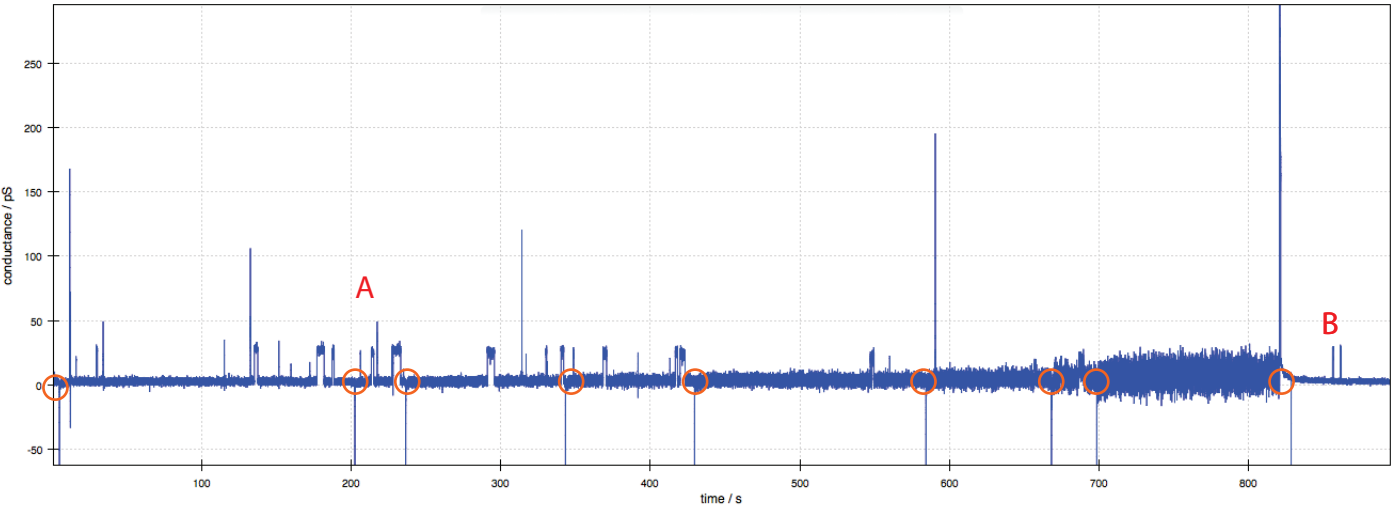
0006

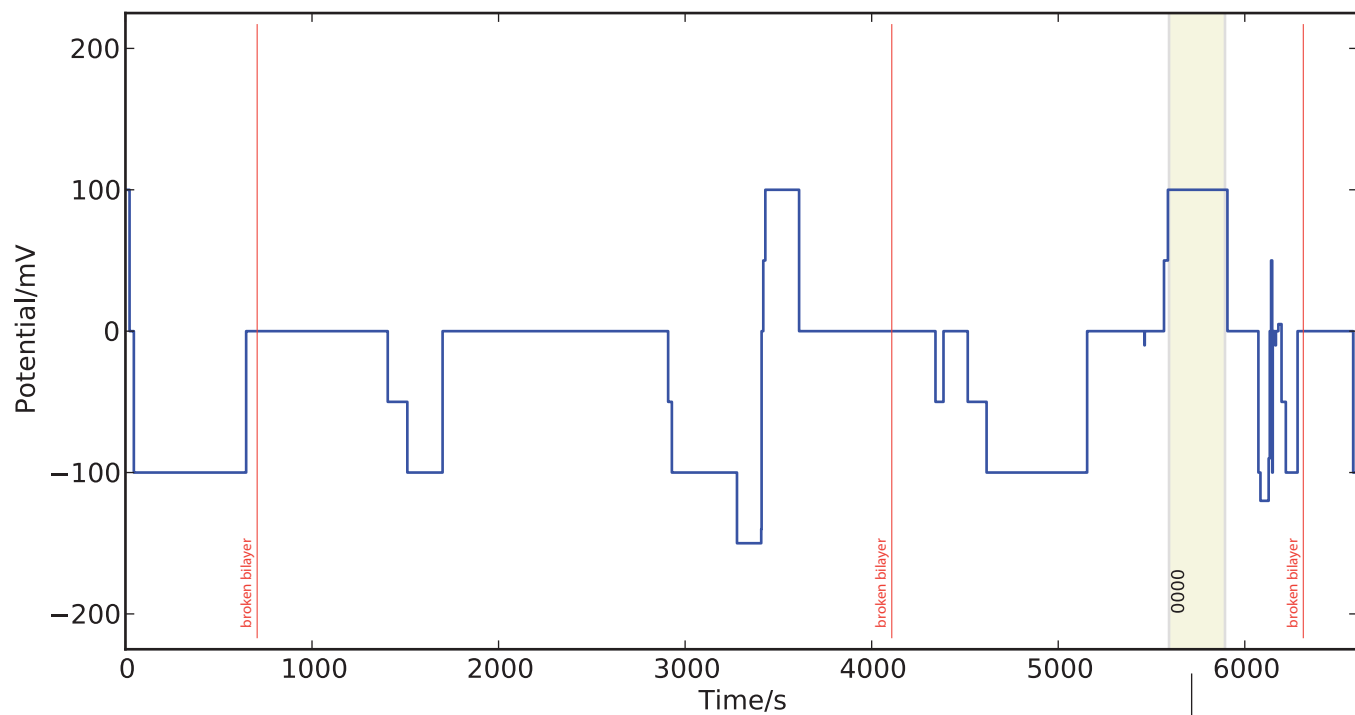




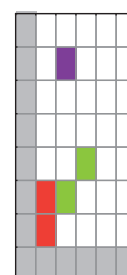


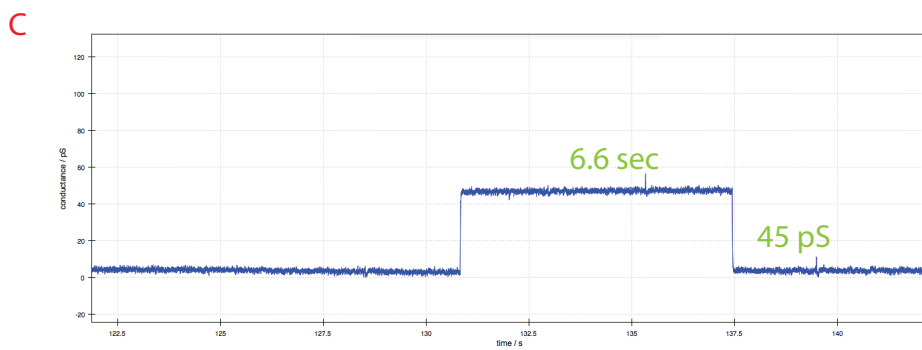
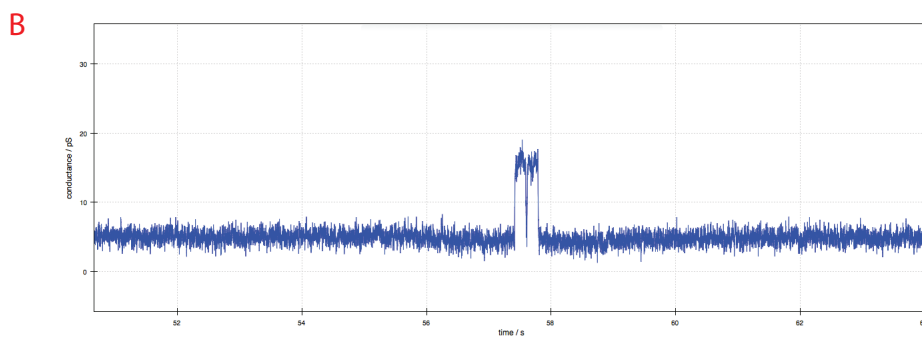
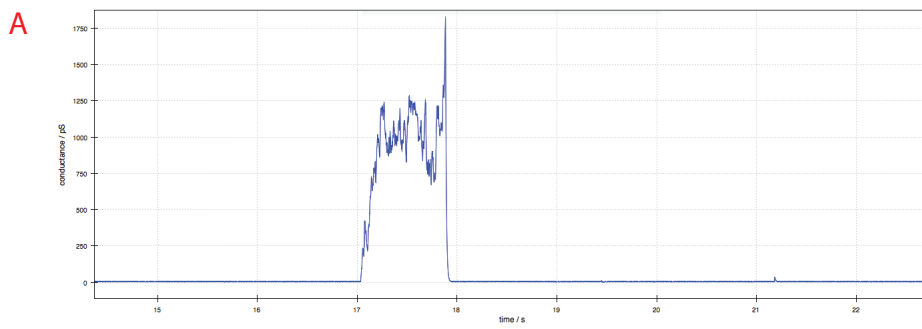
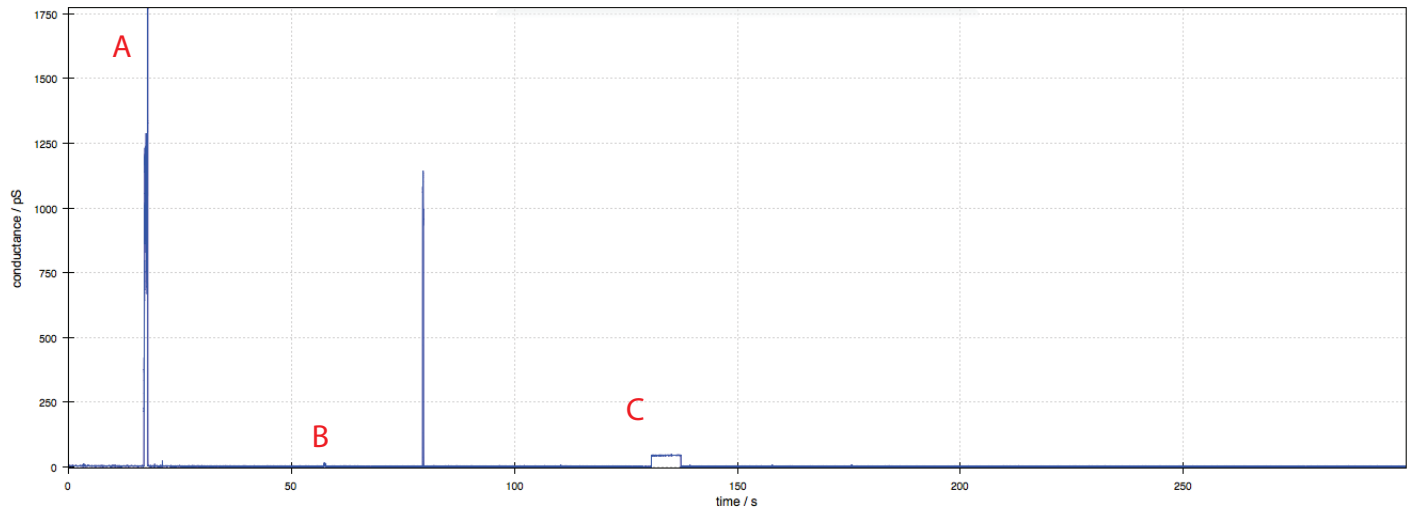




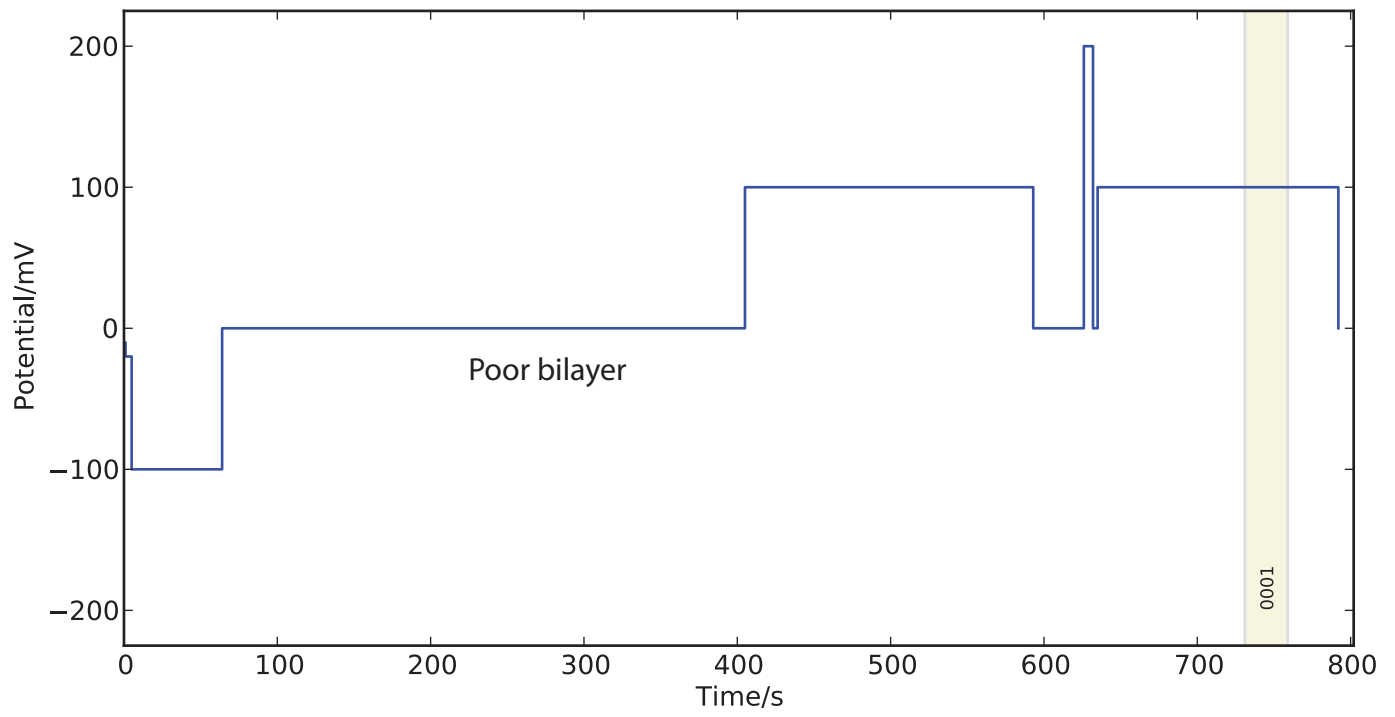


lipid
electrolyte 24/16uM
contact injection 12/9uM
brush transfer



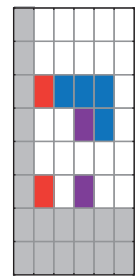
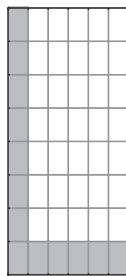
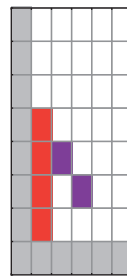
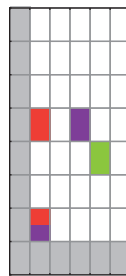
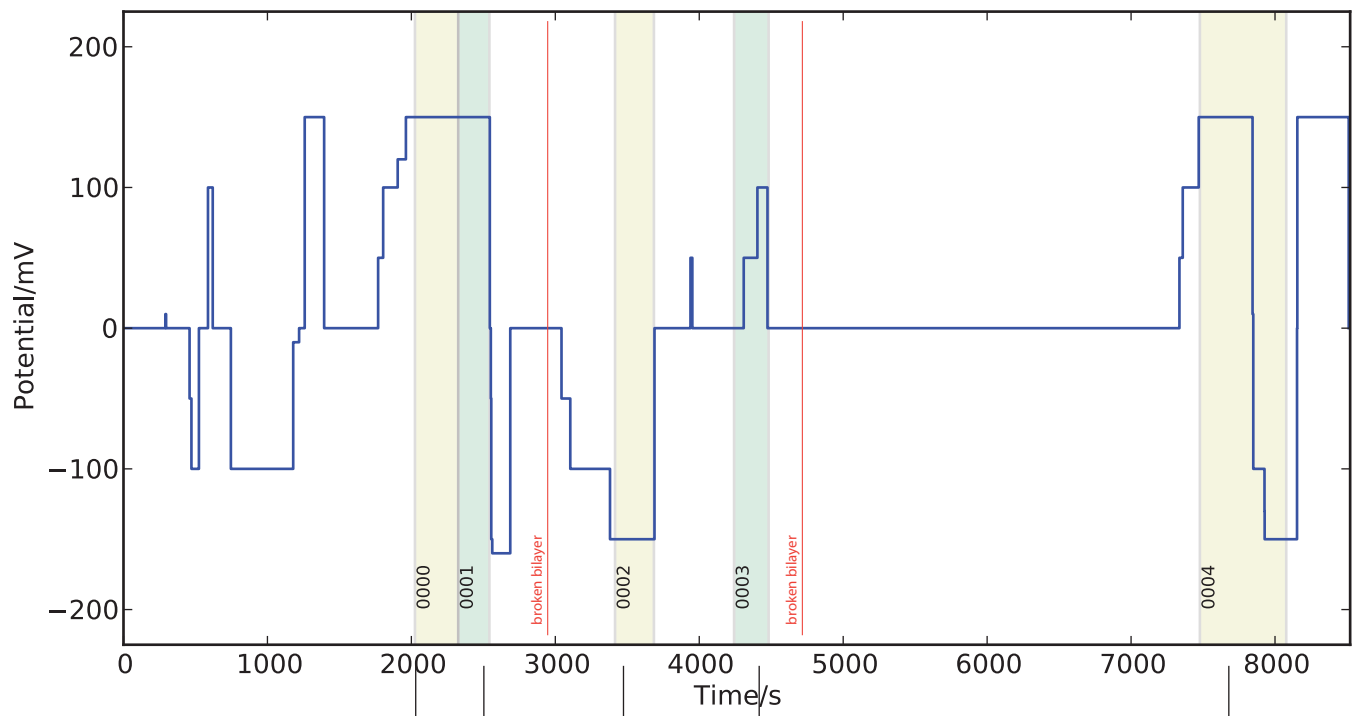


[JC-111] 8-12-8-ole 1M CsCl pH 7 homoAdd

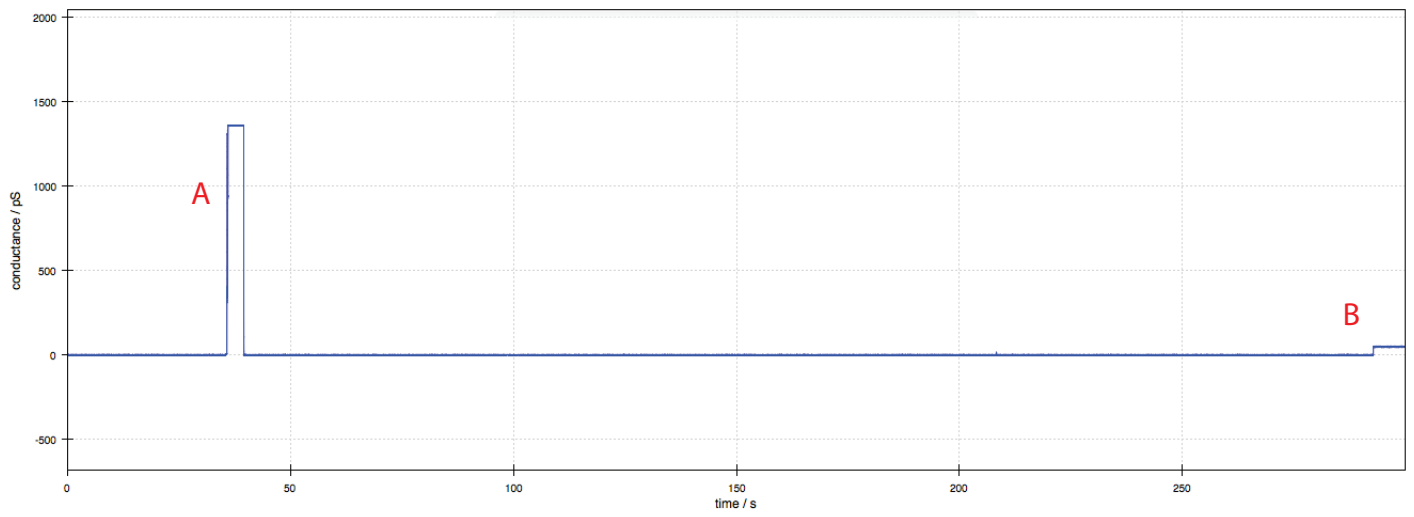


lipid
electrolyte
contact injection
brush transfer

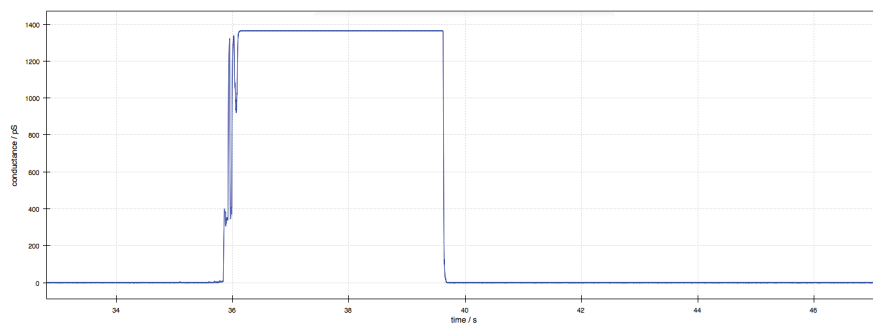
[JC-112] 8-12-8-ole 1M CsCl pH 7 homoAdd



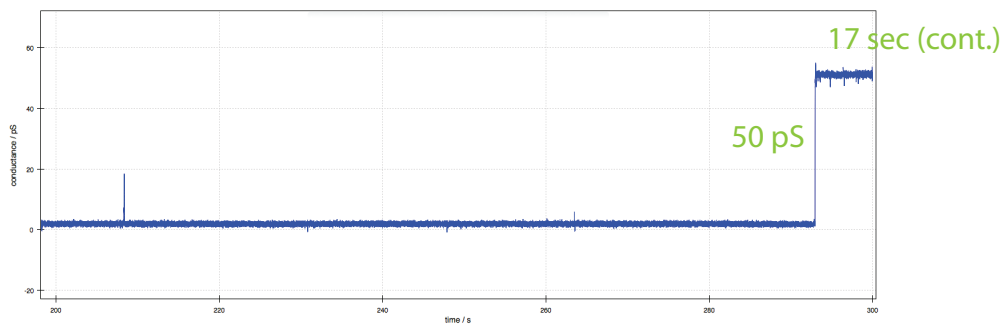
no activity

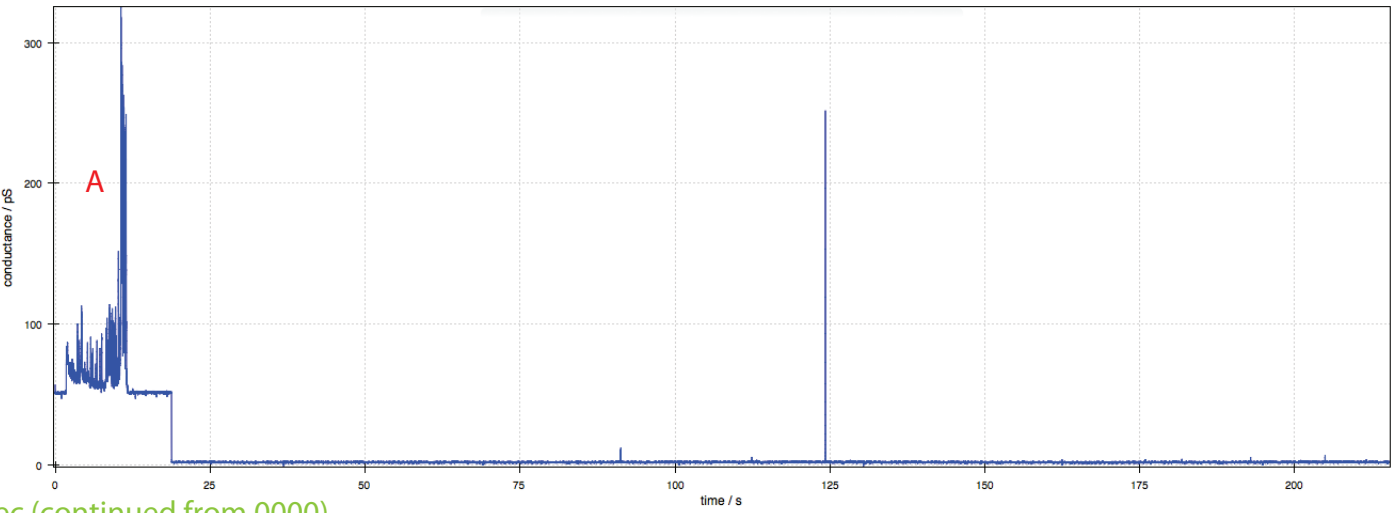


A

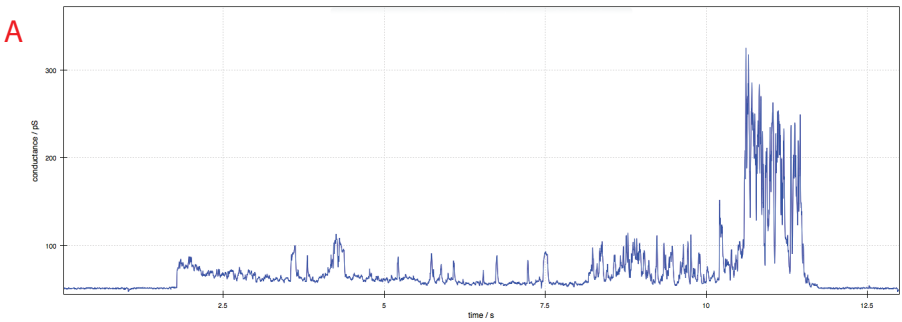


B

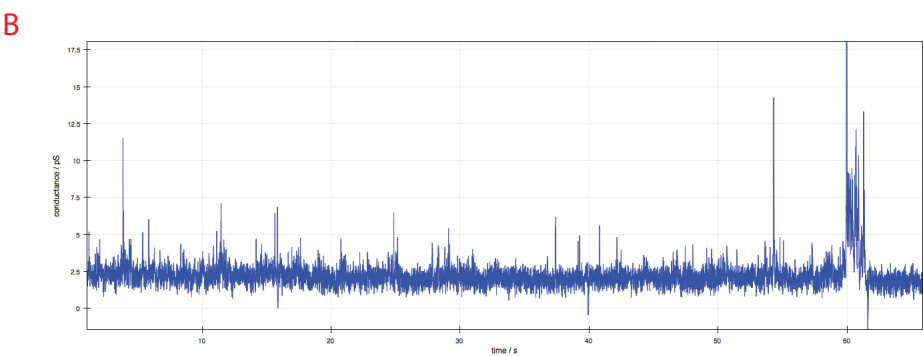
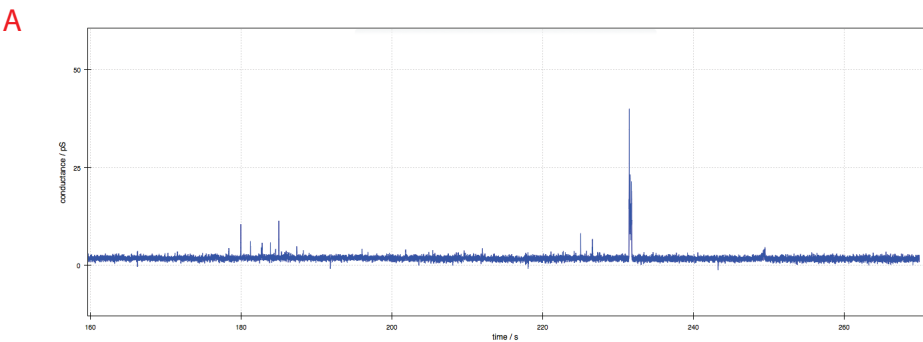
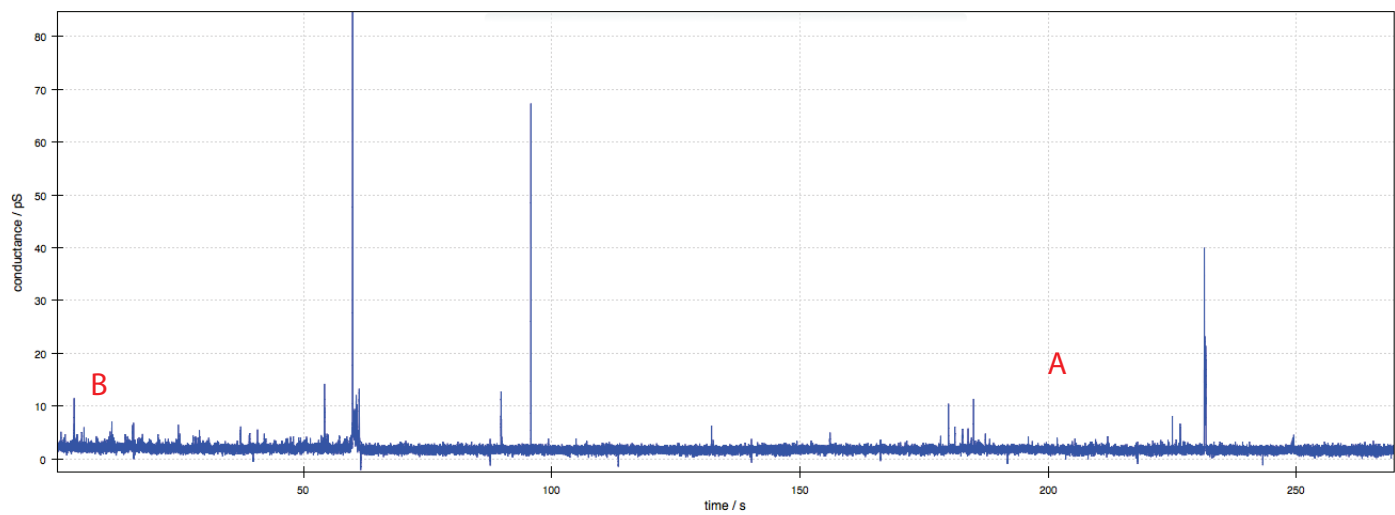




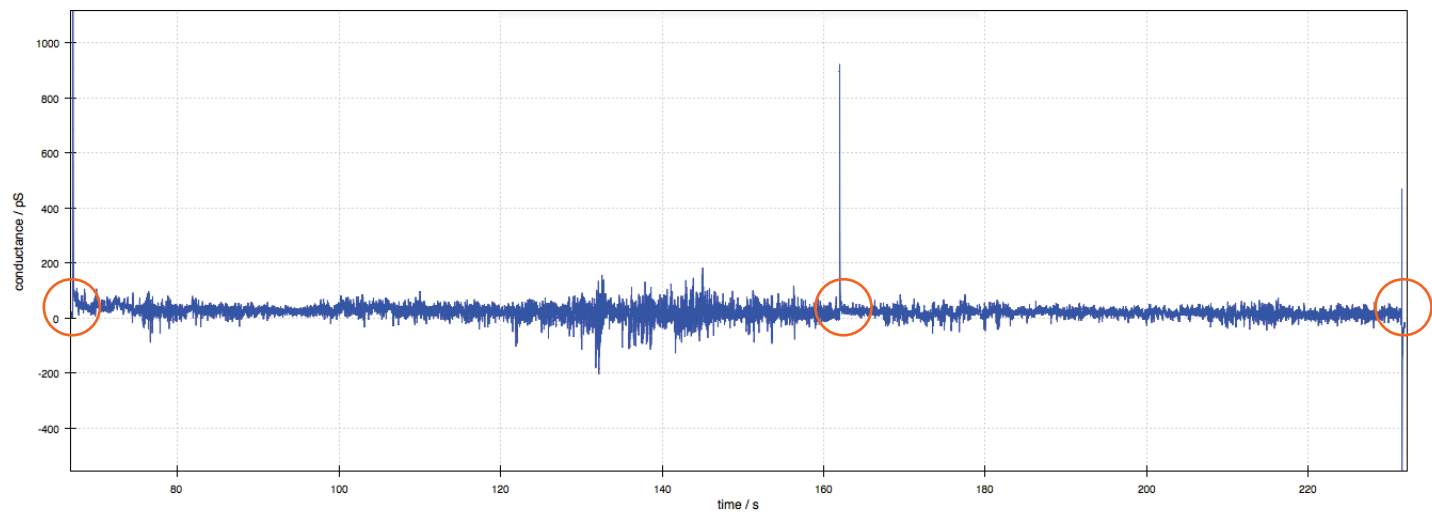
17 sec (continued from 0000)

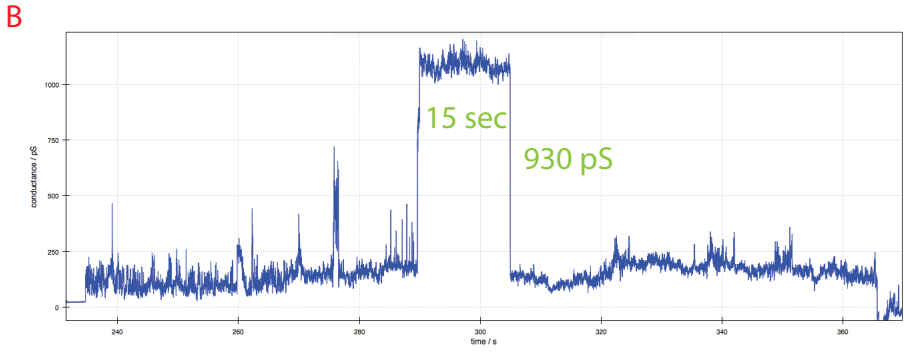
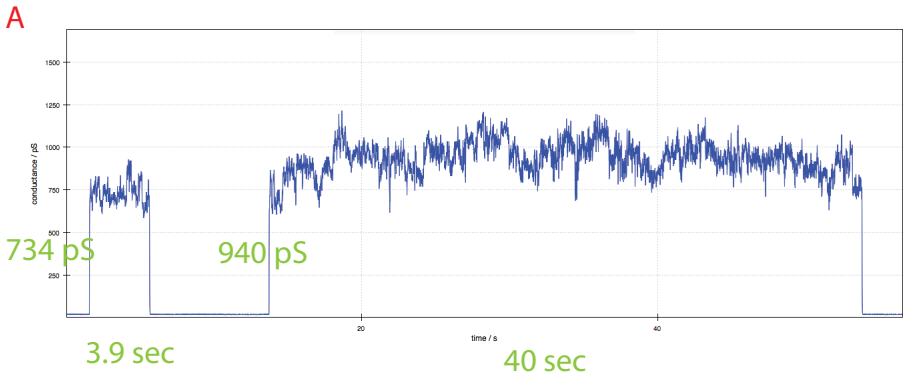
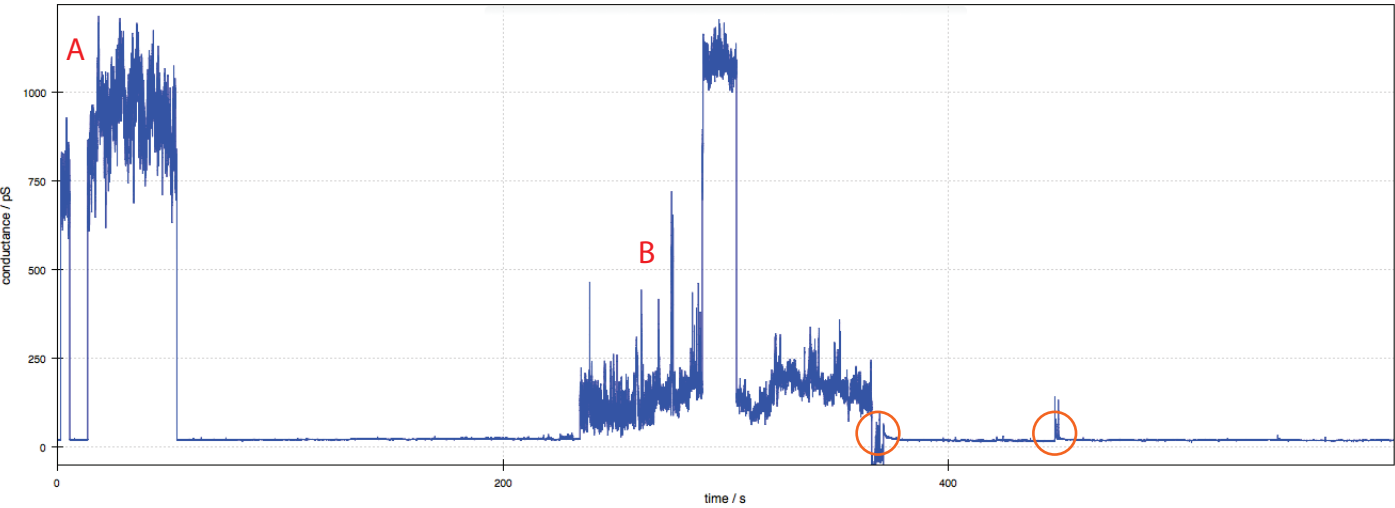


112-0003

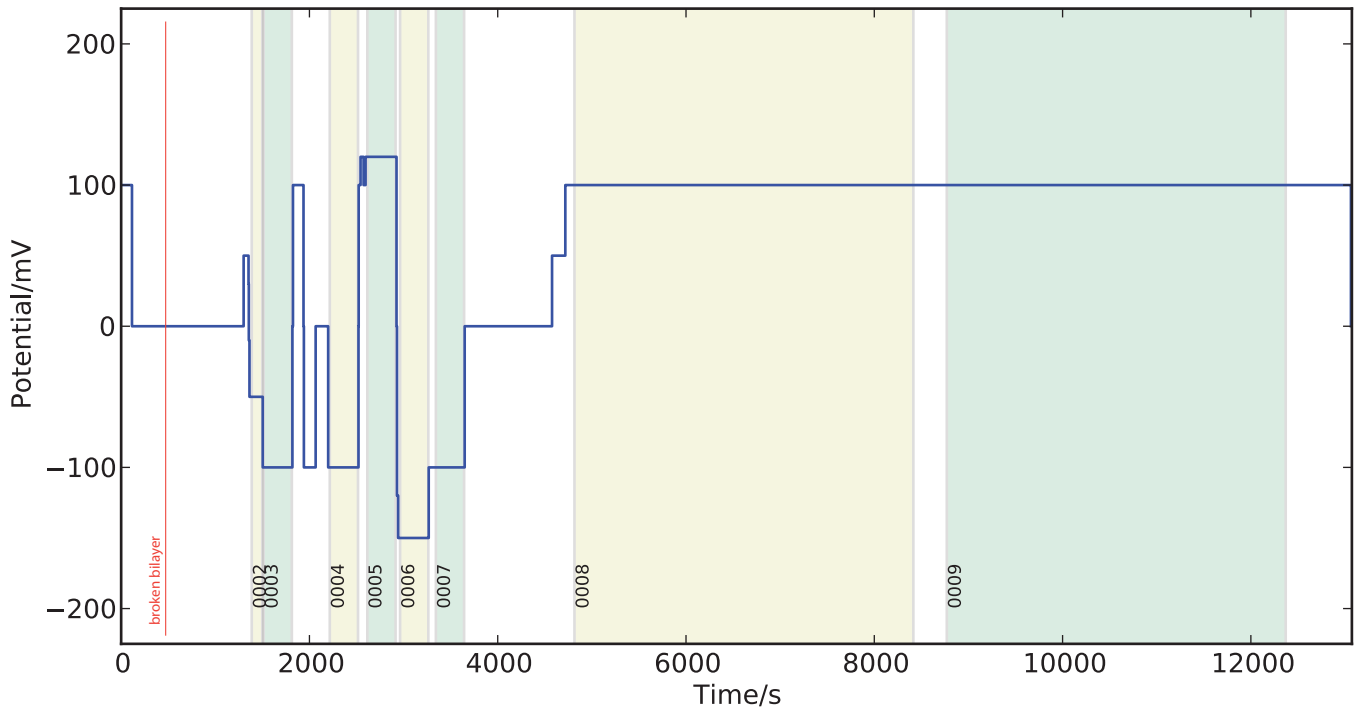


112-0003

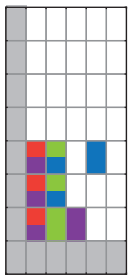




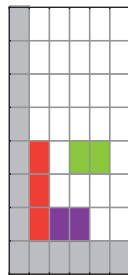
[JC-99] G-8-12-8 1M CsCl pH 7 homoAdd



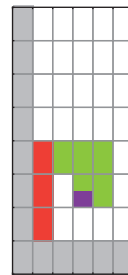
0002



0007



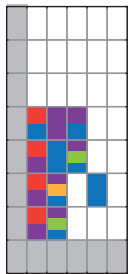
0008



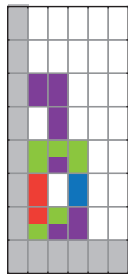
0009



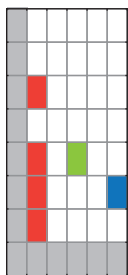
0003



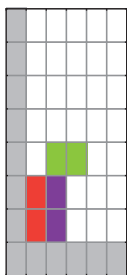
0006



0004

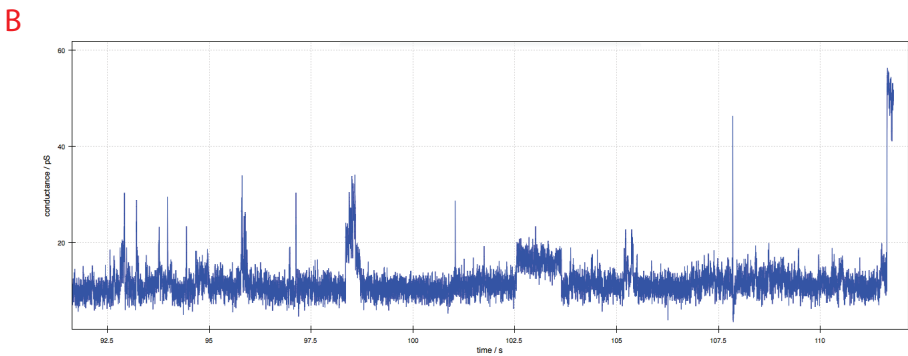
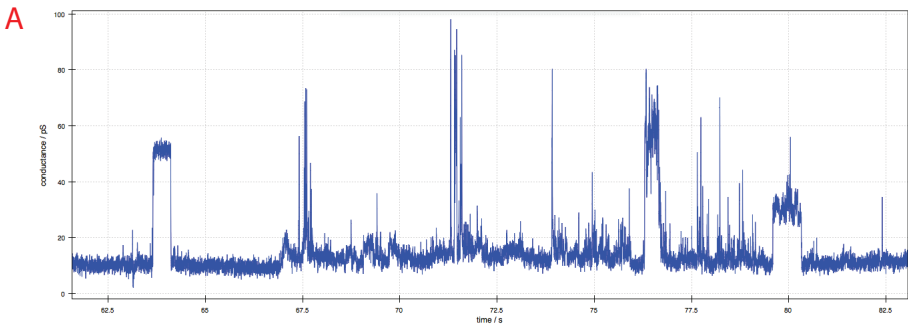
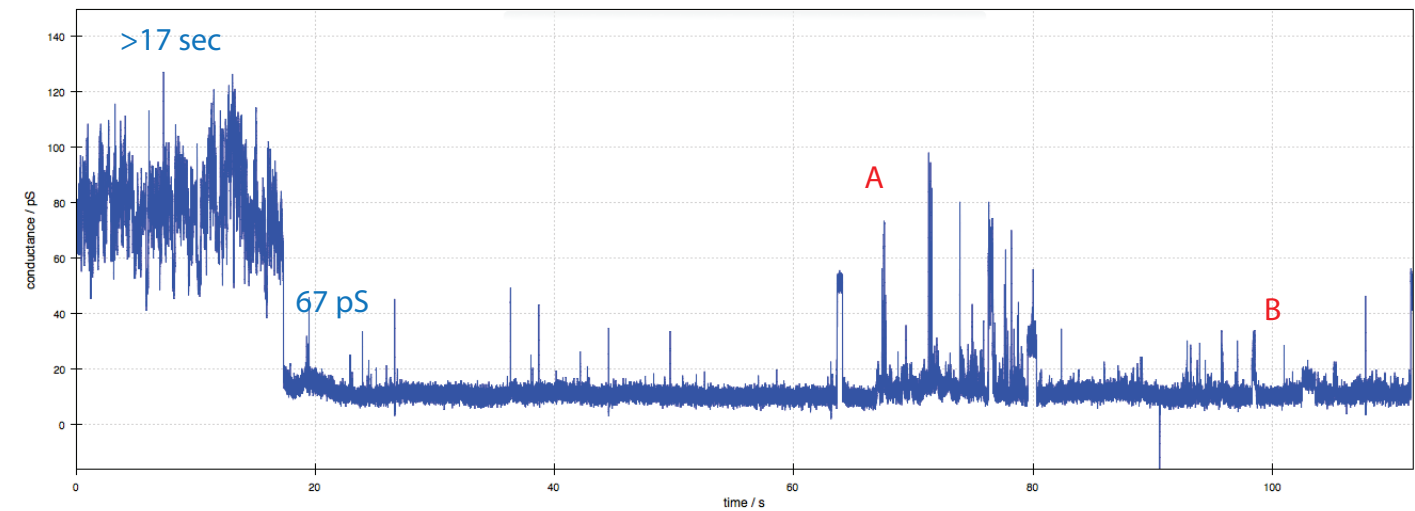


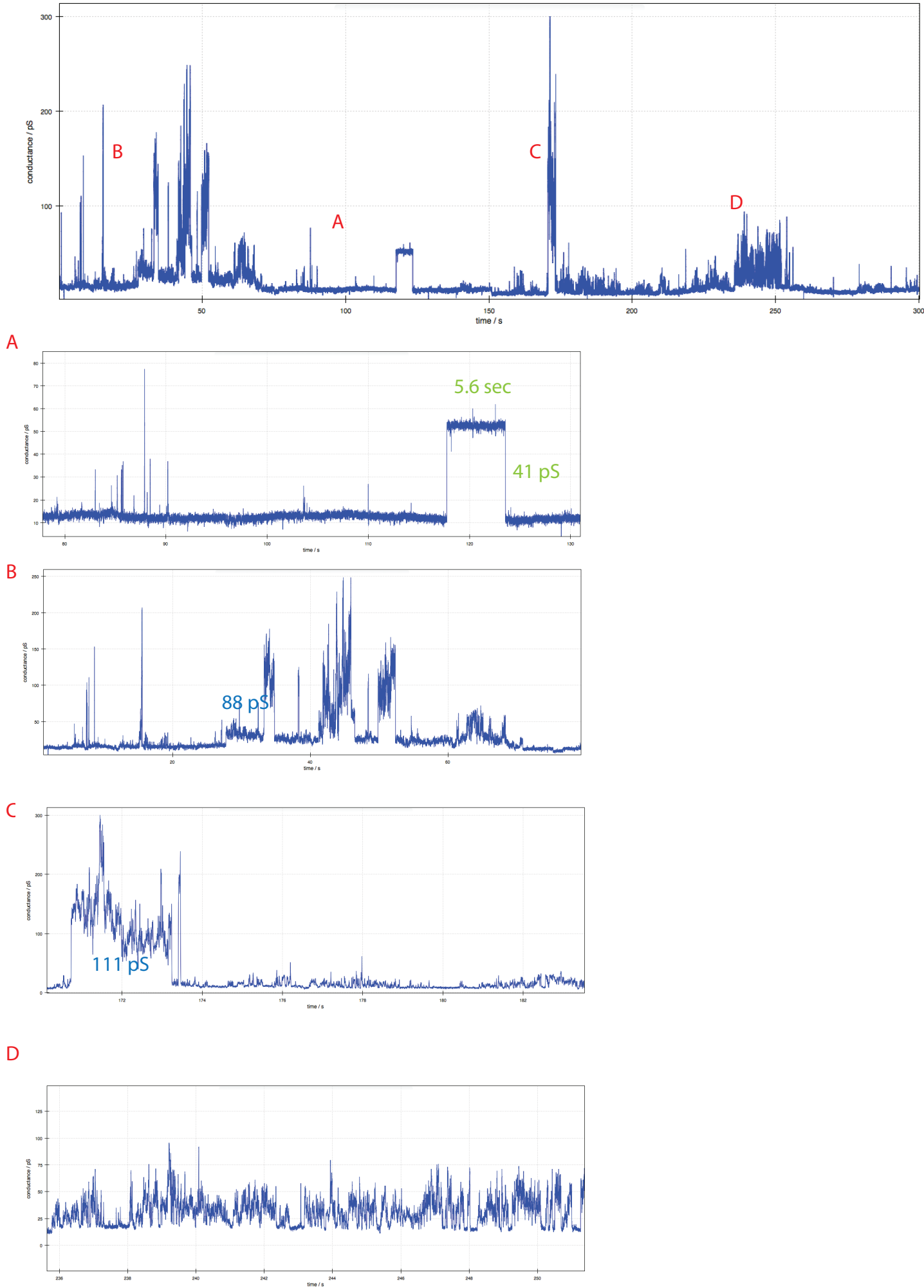
0005

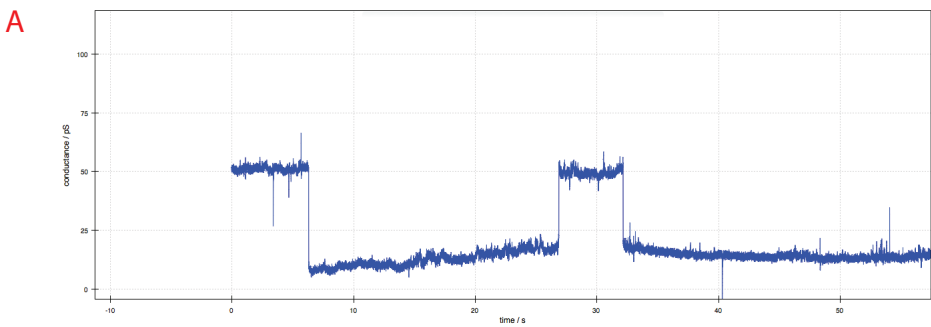
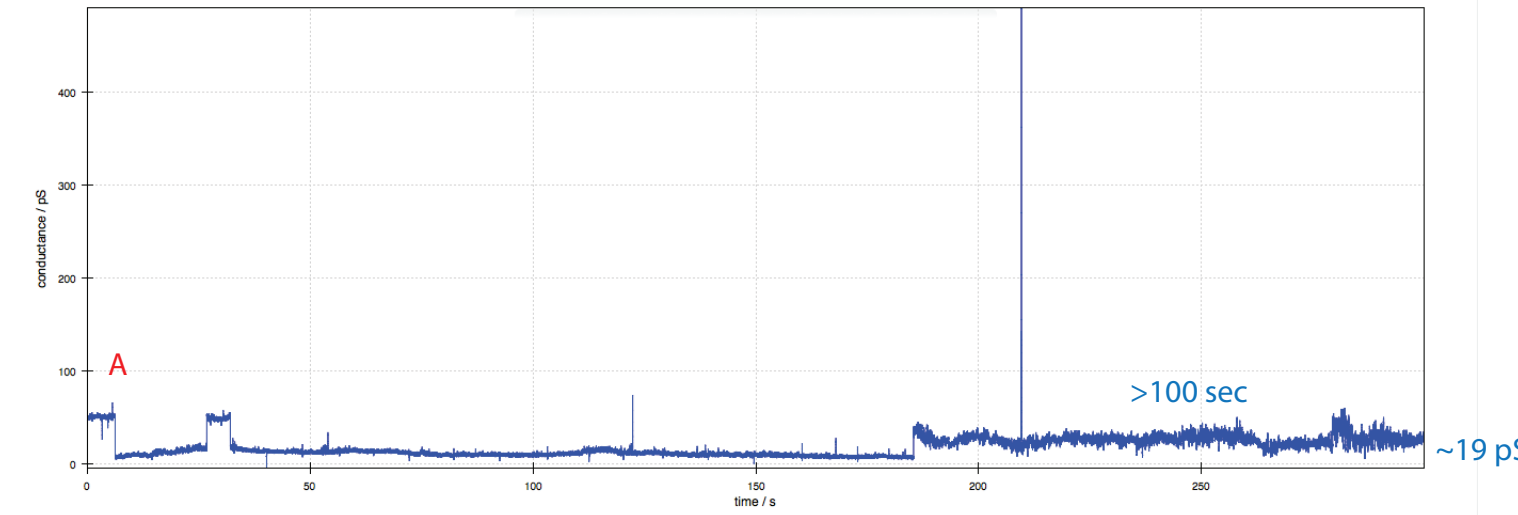


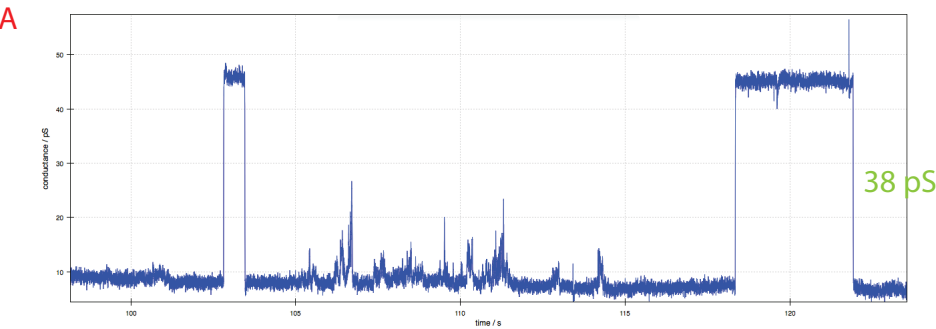
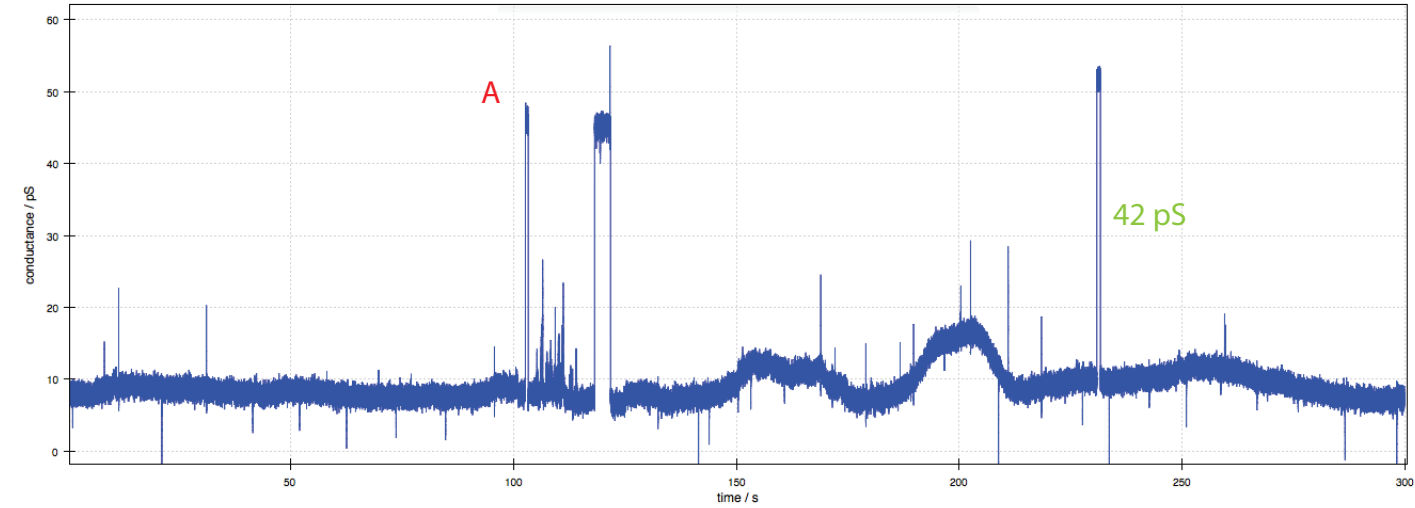
I think it is fair to conclude that:

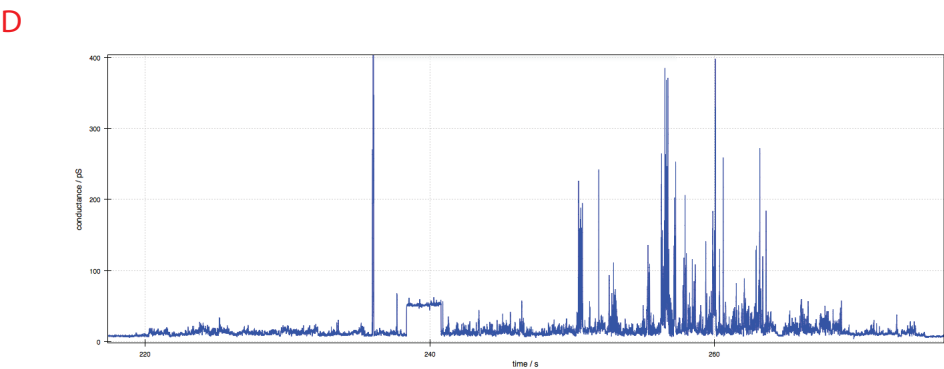
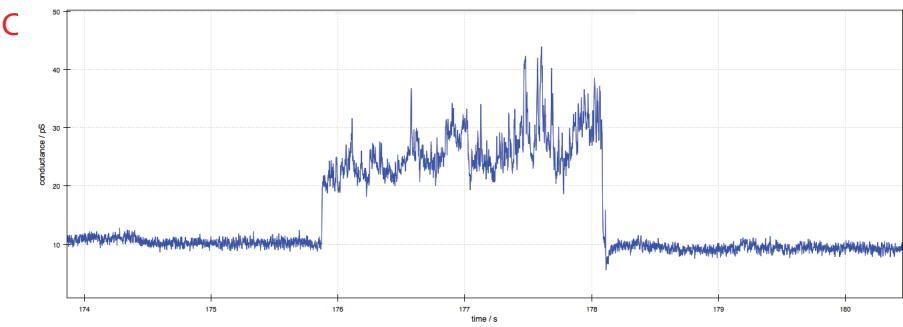
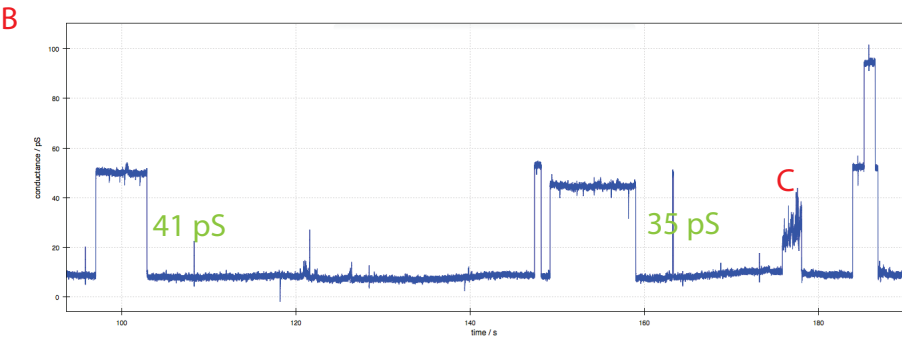
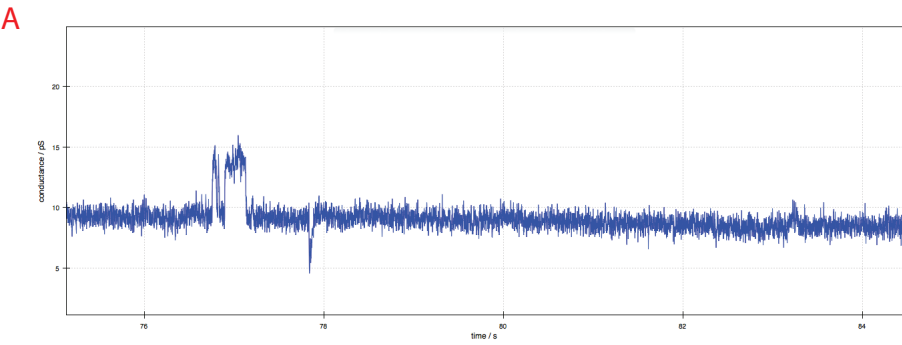
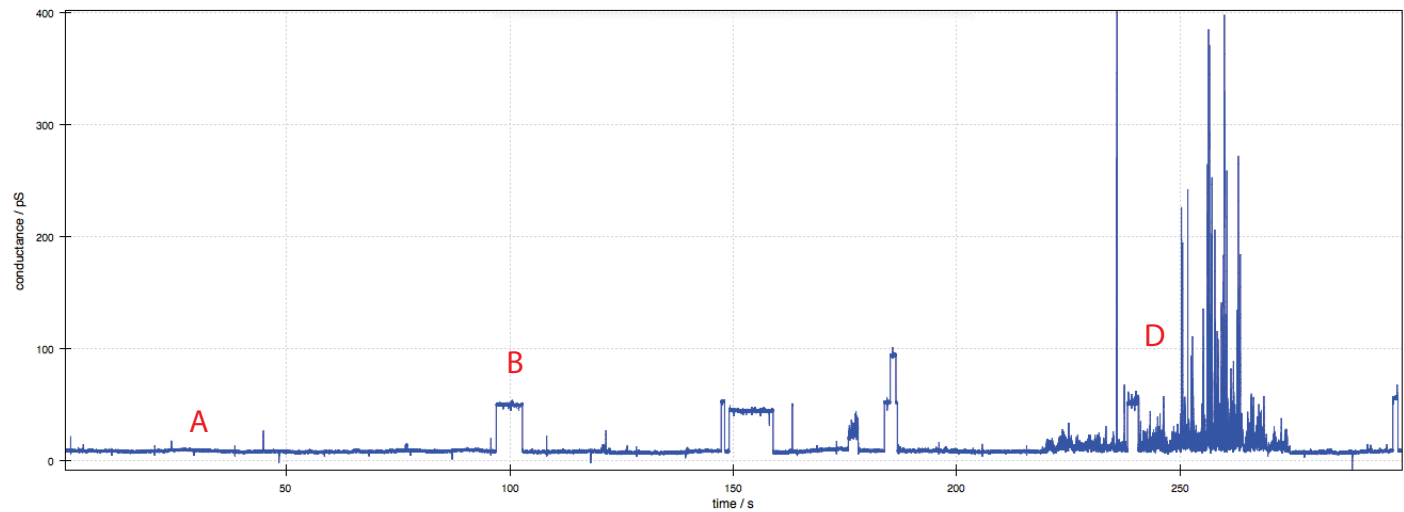
- both 8-12-8-G(12) and G(12)-8-12-8 can form similar discrete channels,
- G(12)-8-12-8 has a variety of other membrane-active modes,
- and with weak evidence we'll say that G(12)-8-12-8 forms these discrete channels more readily.

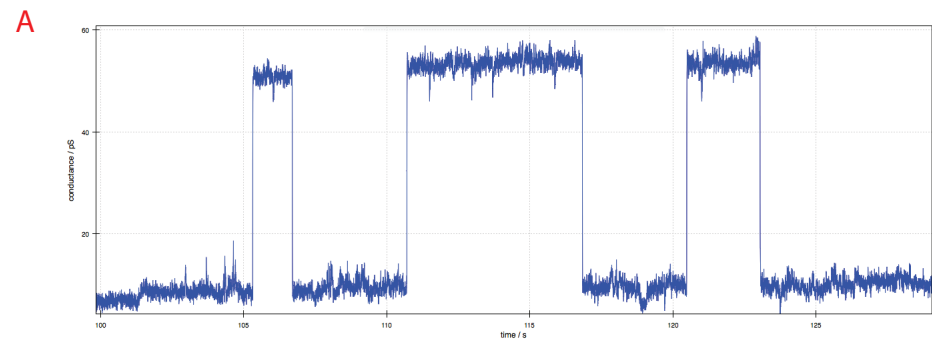
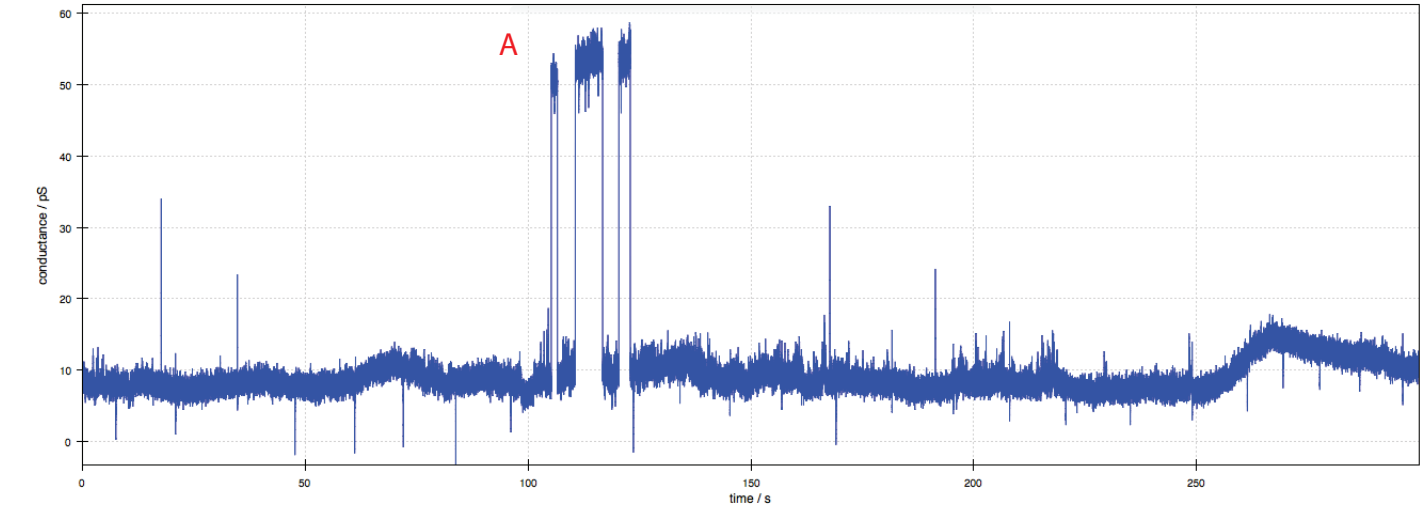


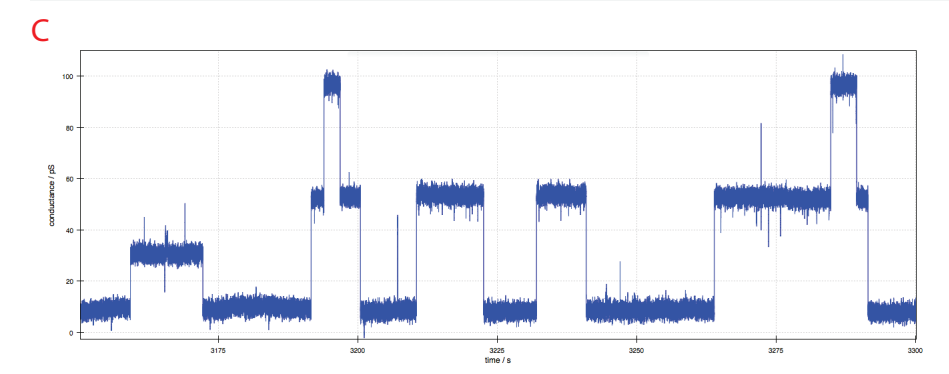
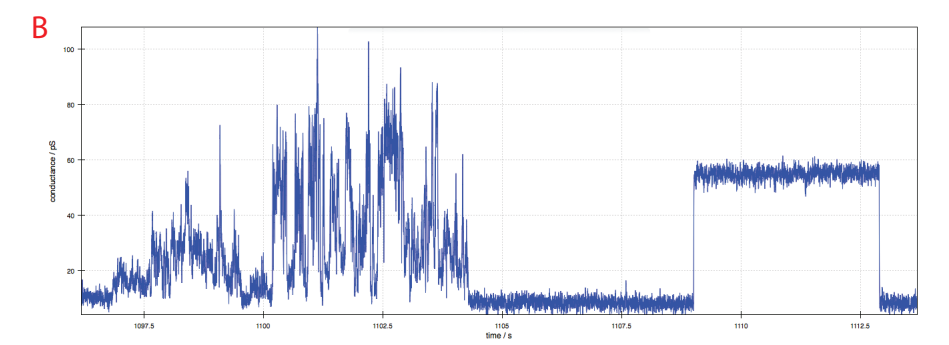
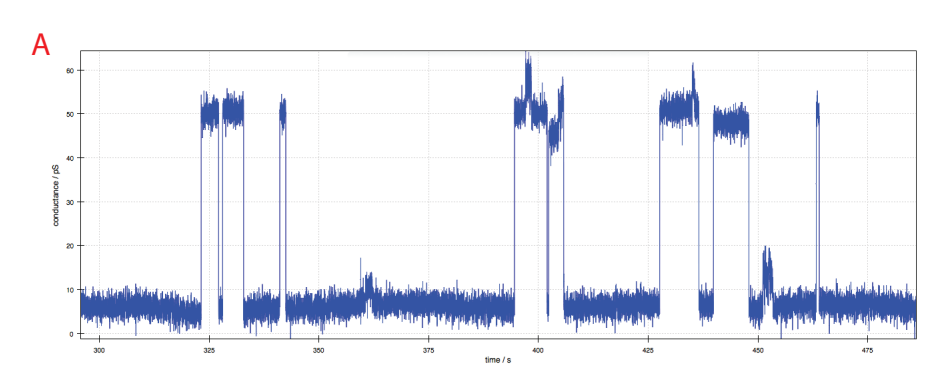
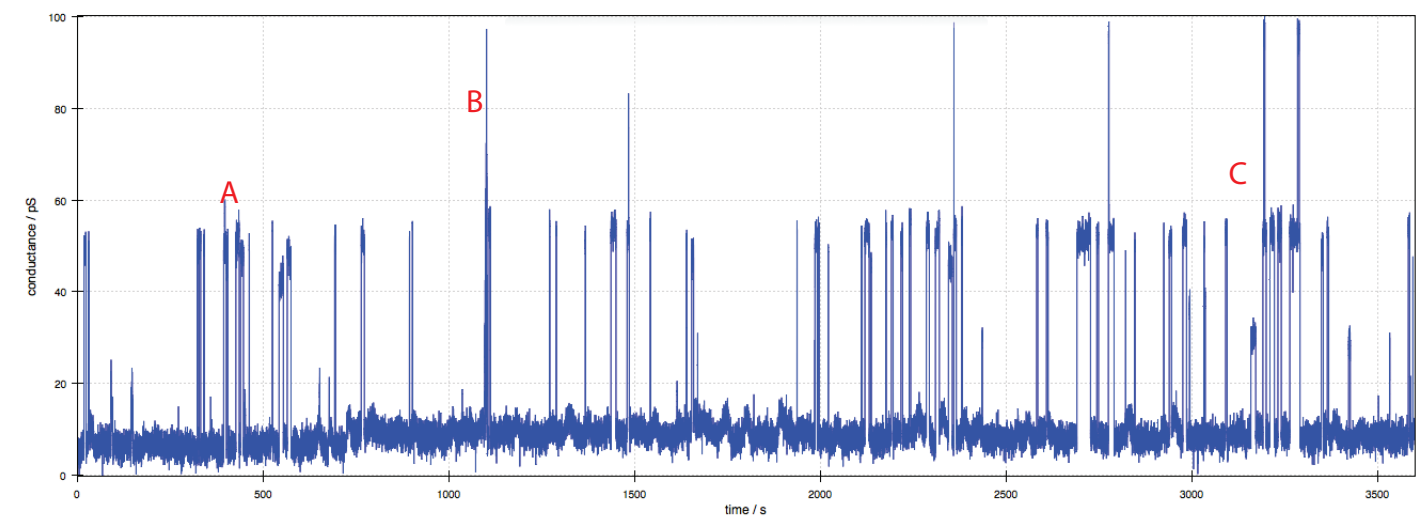


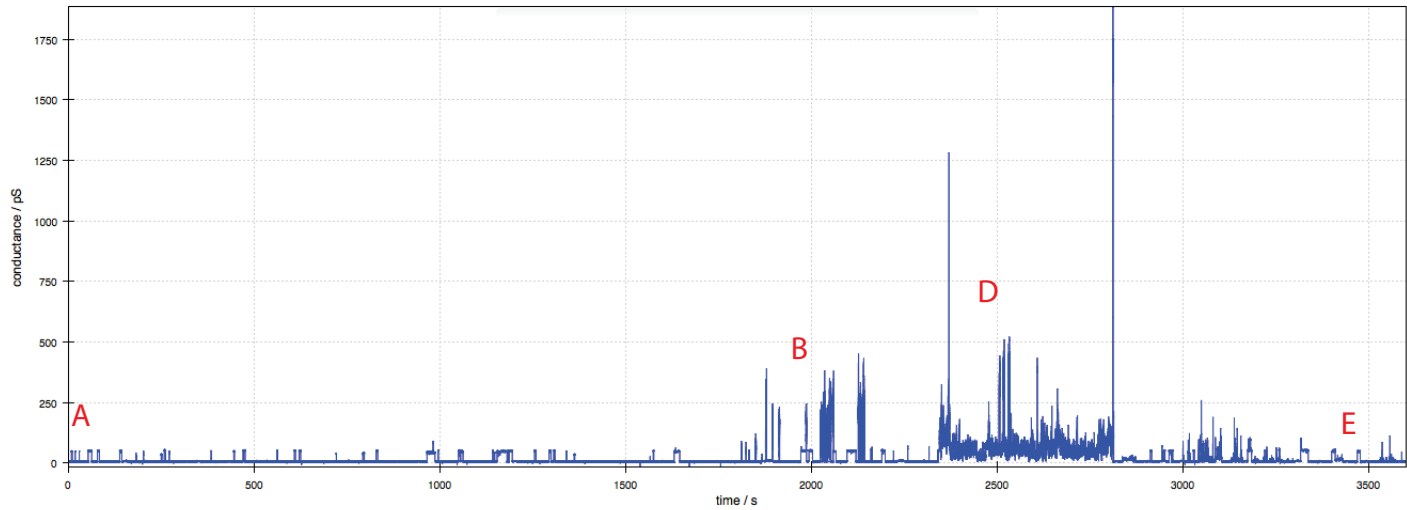




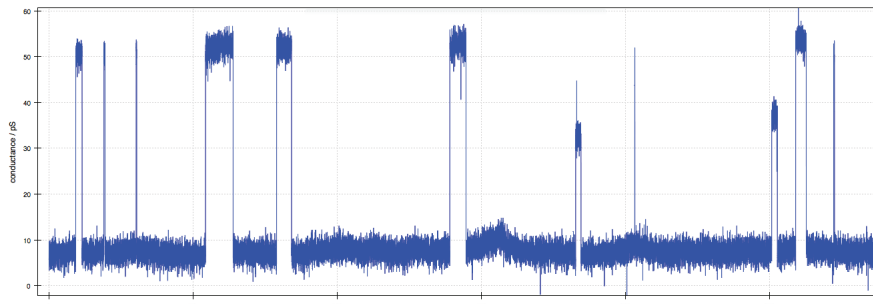




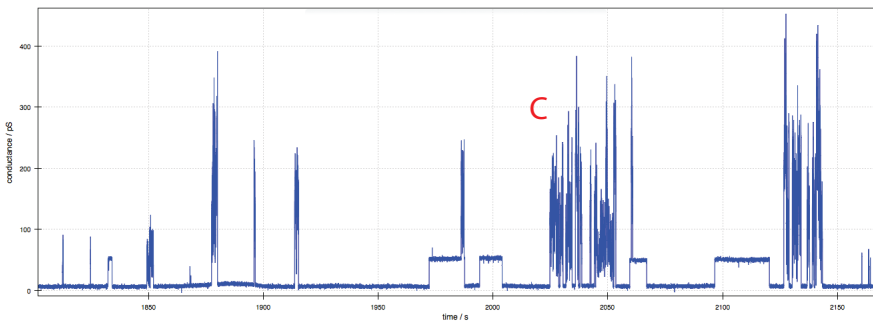




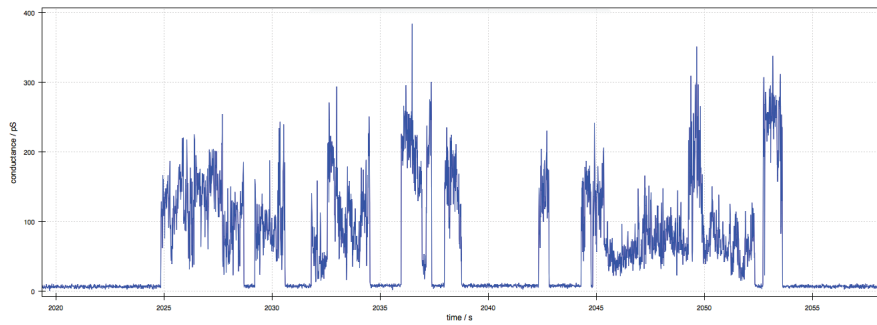
A

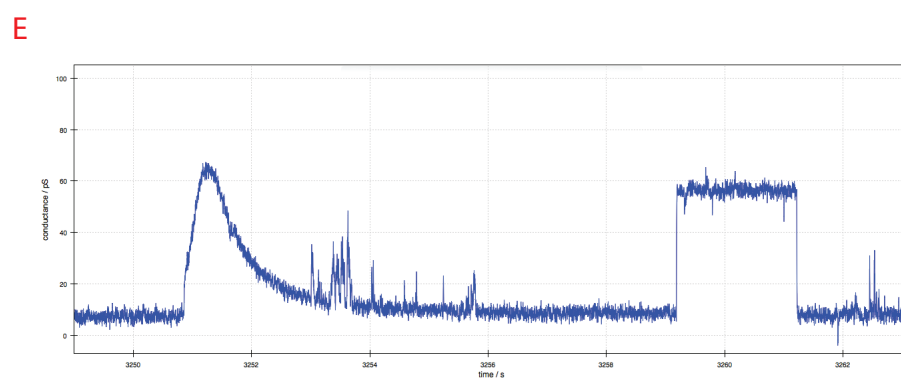
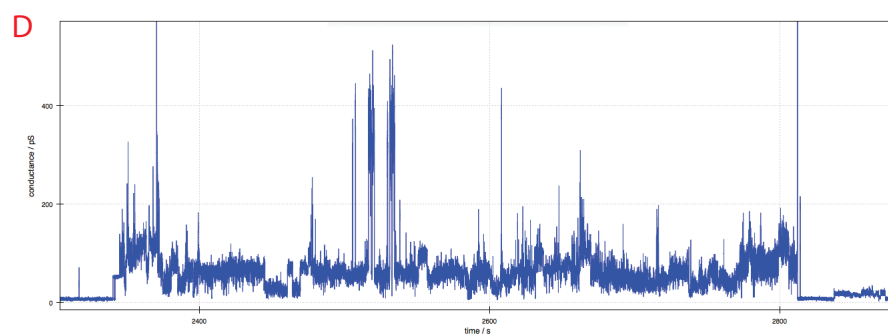


B

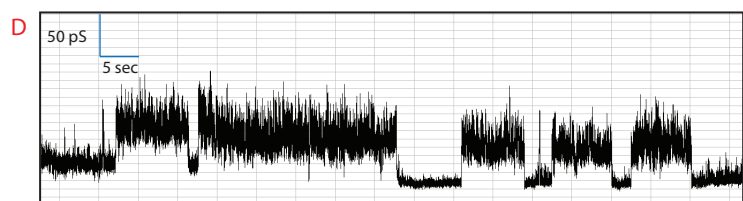
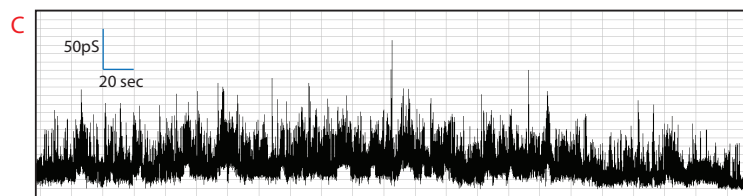
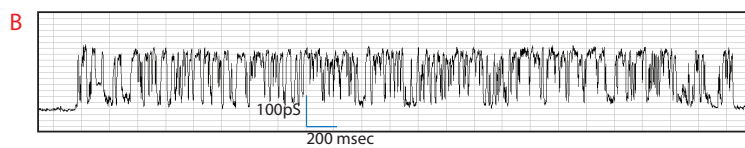
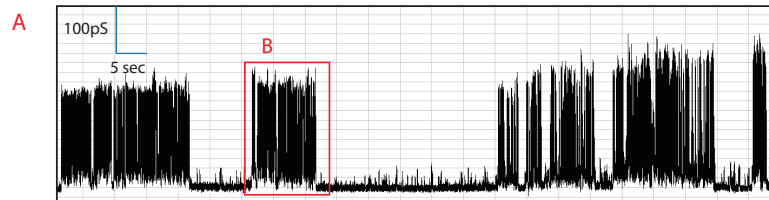
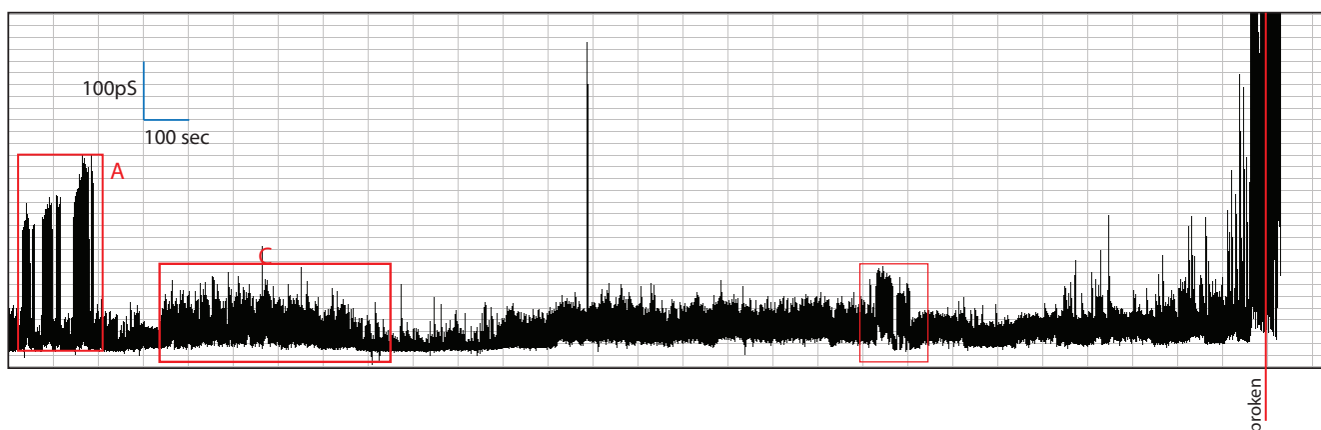


C

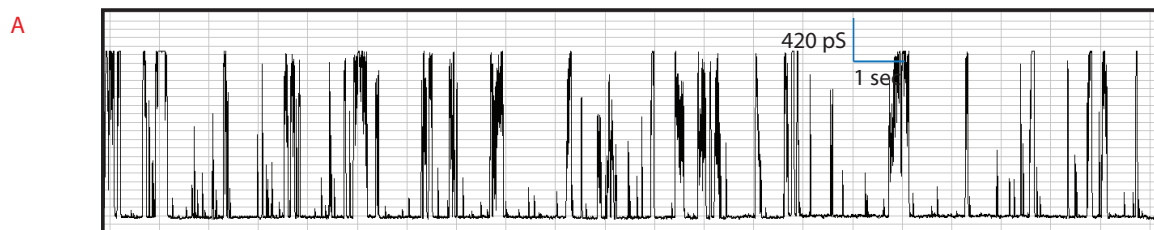
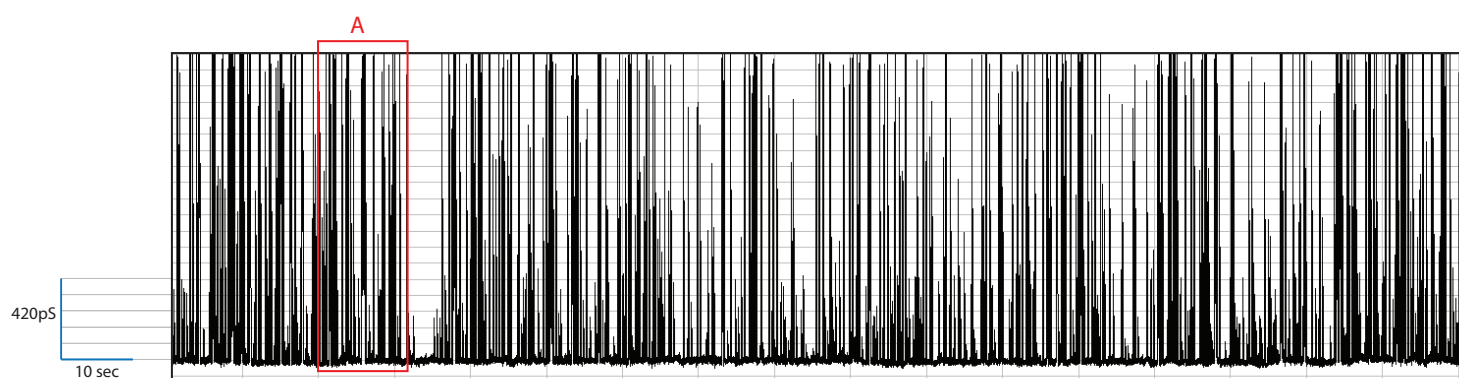




2 40-0001 1M CsCl inj., +100mV

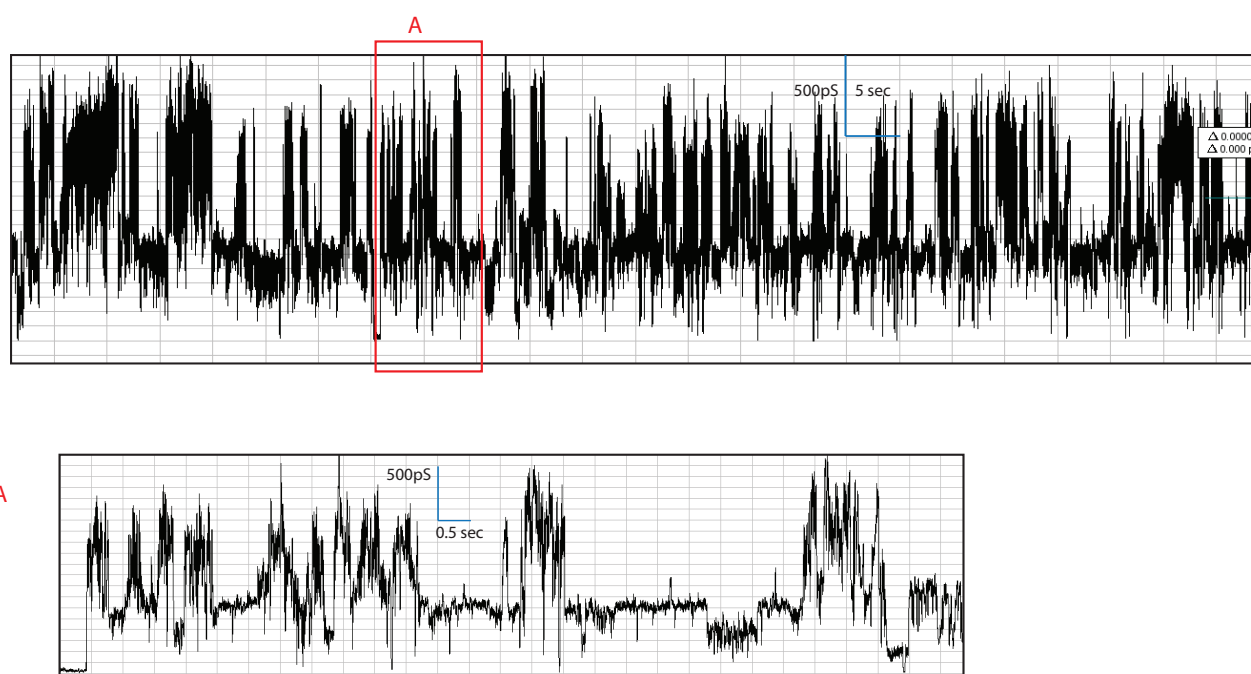


2 40-0002 1M CsCl inj., +120mV

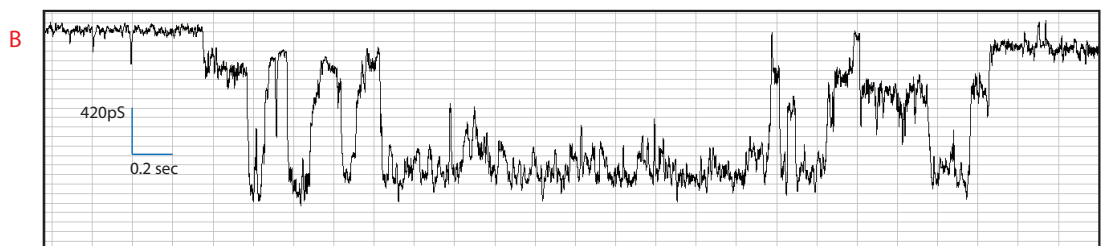
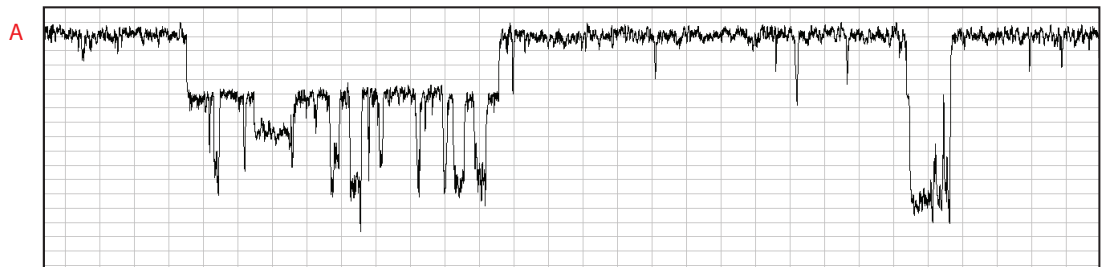
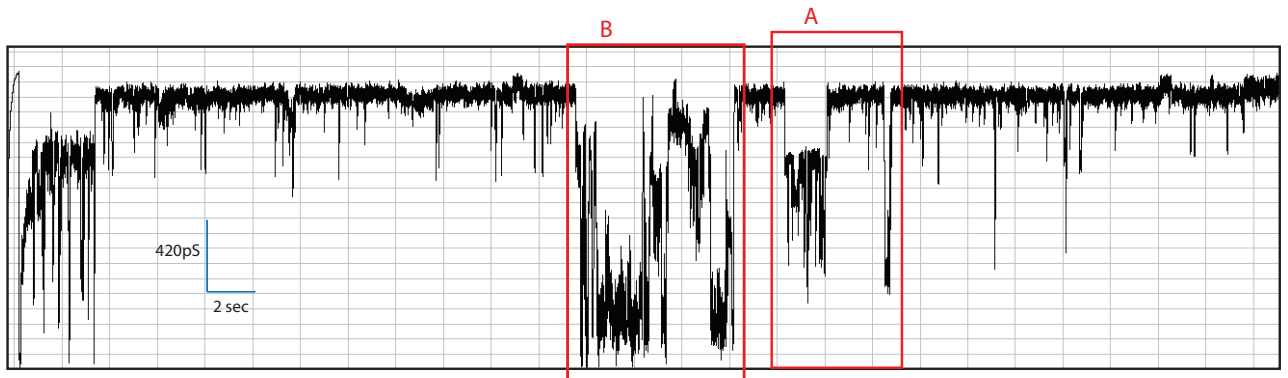


2

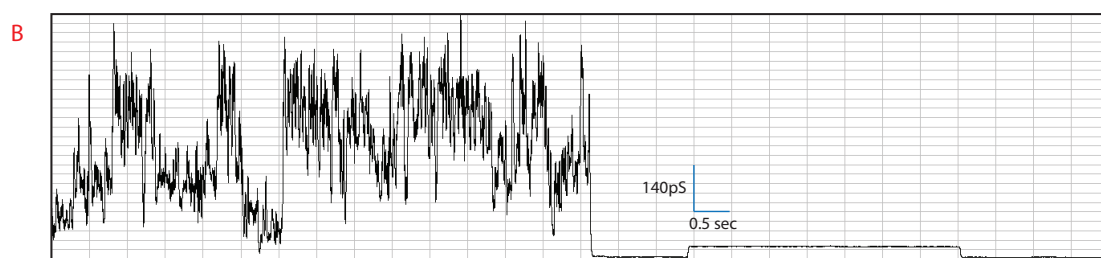
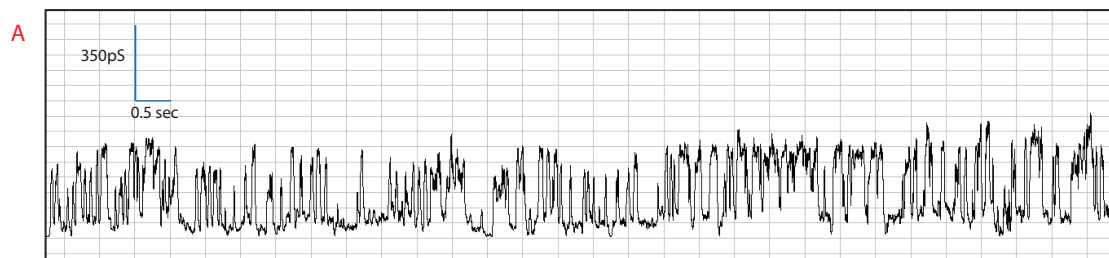
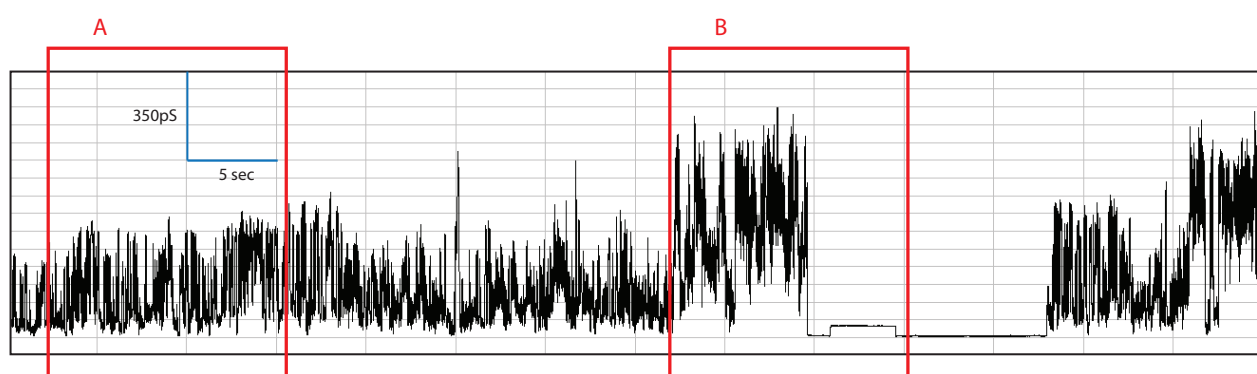
41-0007 1M CsCl 2uM in cmpd, +100mV



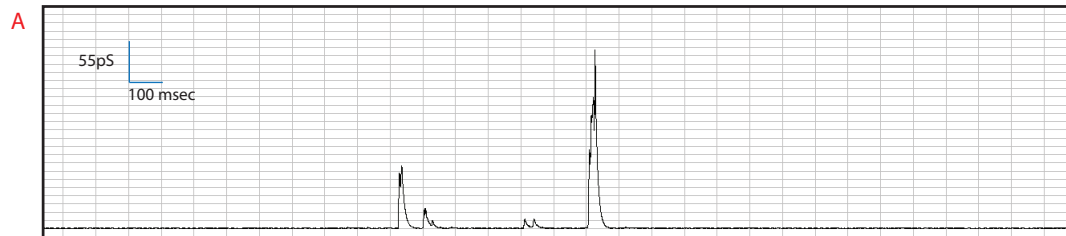
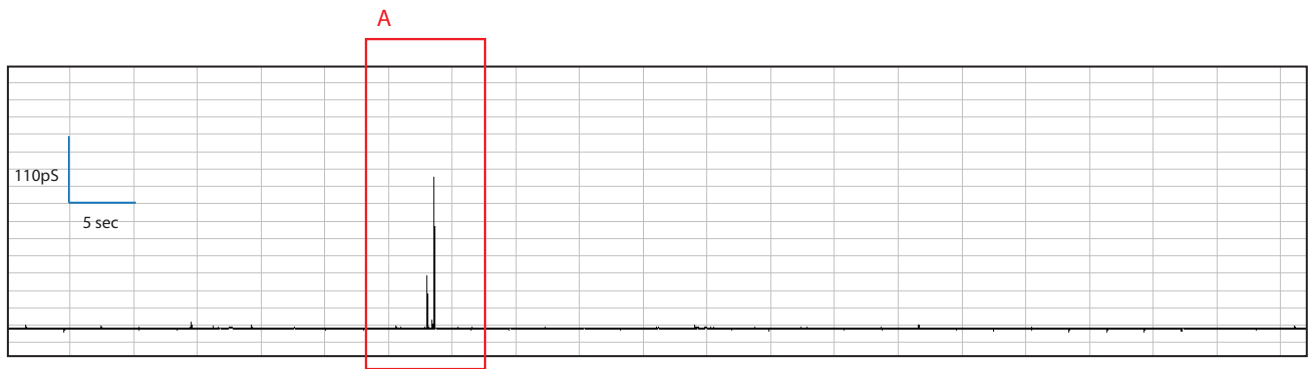
2 41-0011 1M CsCl 2uM in cmpd, -120mV



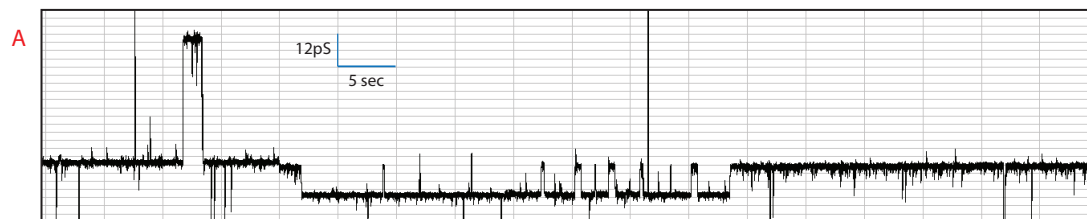
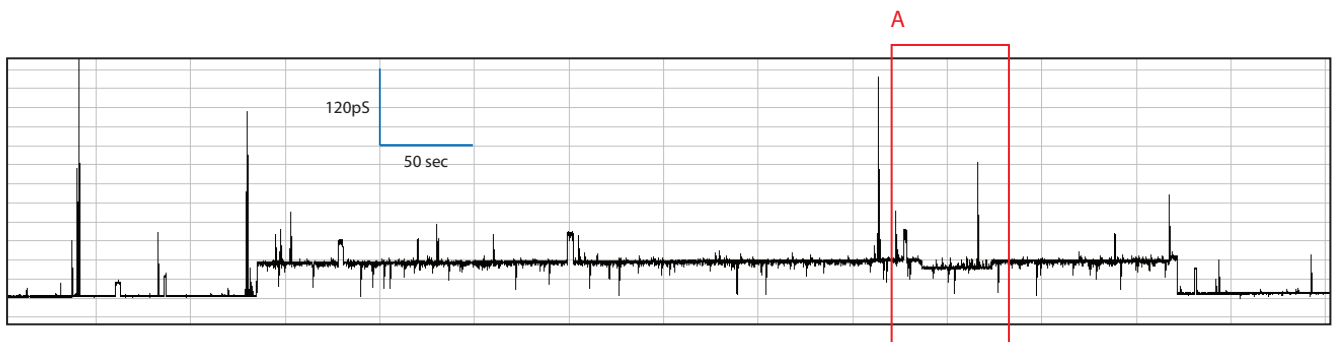
2 43-0008 1M CsCl pH7 2uM in cmpd, +120mV



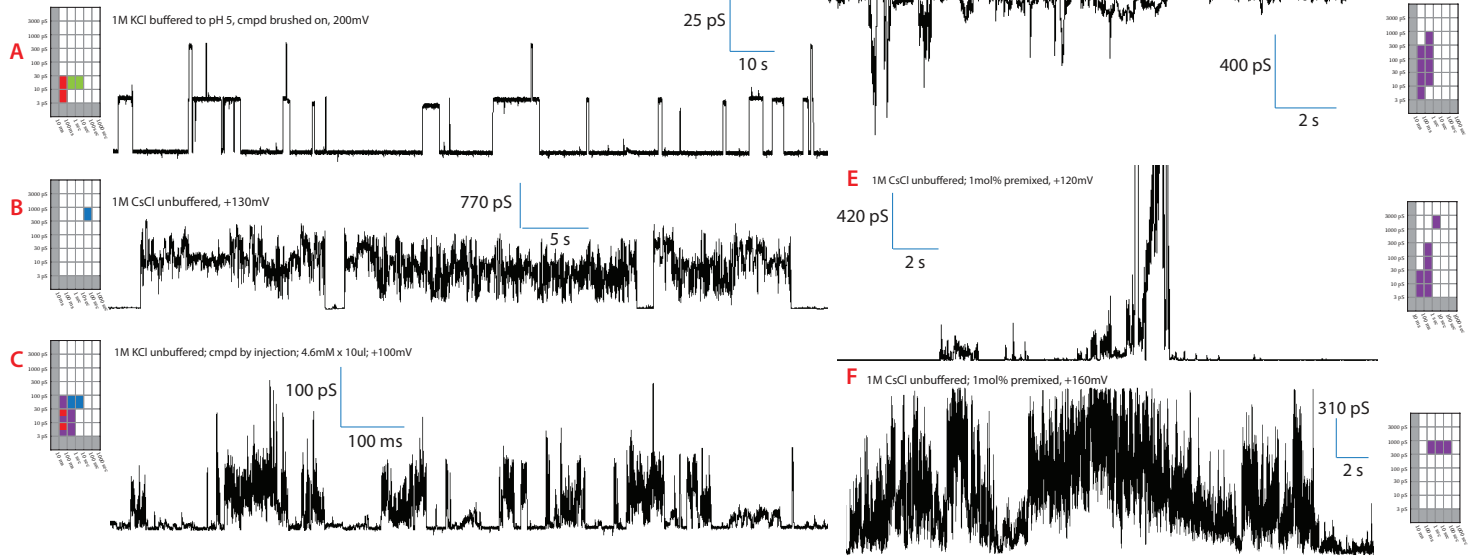
2 50-0003 1M CsCl pH 7 4uM in compd, +180mV



2 53-0001 1M CsCl pH 7 7.5uM in cmpd, +170mV



1



3

