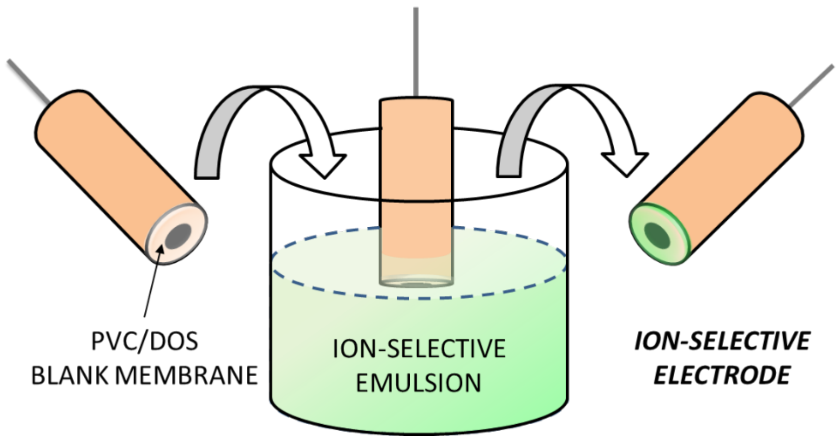
Supporting information for:

Emulsion Doping of Ionophores and Ion-Exchangers into Ion-Selective Electrode Membranes

Yoshiki Soda[a], Wenyue Gao[a], Jérôme Bosset[b] and Eric Bakker[a*]

[a] Department of Inorganic and Analytical Chemistry, University of Geneva, Quai Ernest-Ansermet 30, CH-1211 Geneva, Switzerland.

[b] BioImaging Center, Department of Biochemistry, University of Geneva, Quai Ernest-Ansermet 30, CH-1211 Geneva, Switzerland.



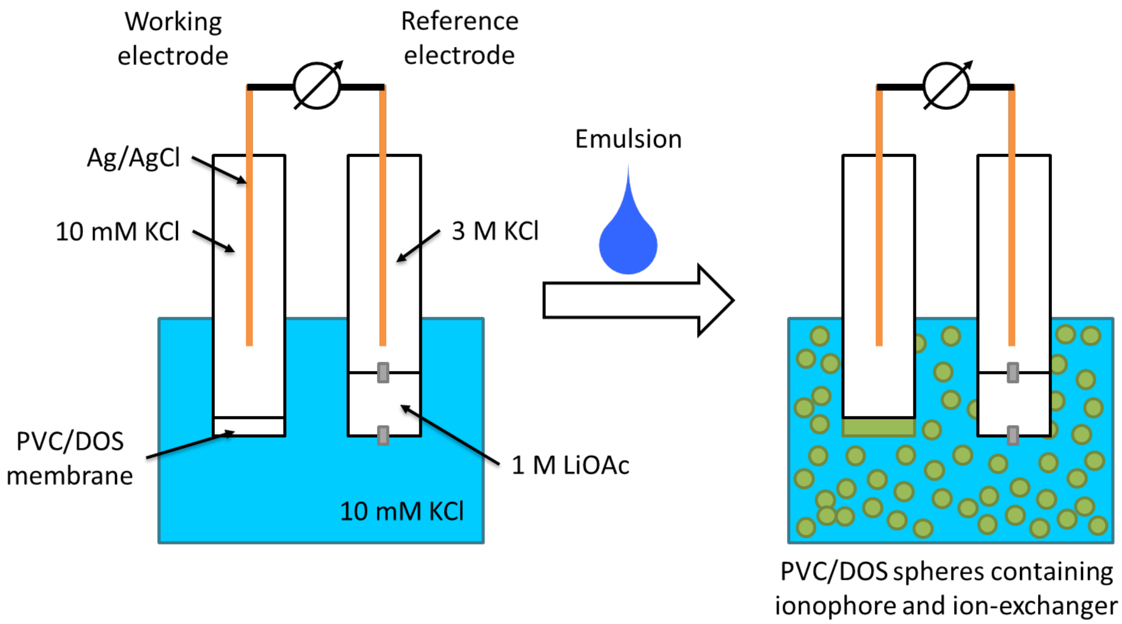


Figure S1. Schematic illustration of the experimental mass transfer of ionophore and ion-exchanger from emulsified plasticized PVC to an originally pristine membrane free of sensing components to endow it with K^+ selectivity.

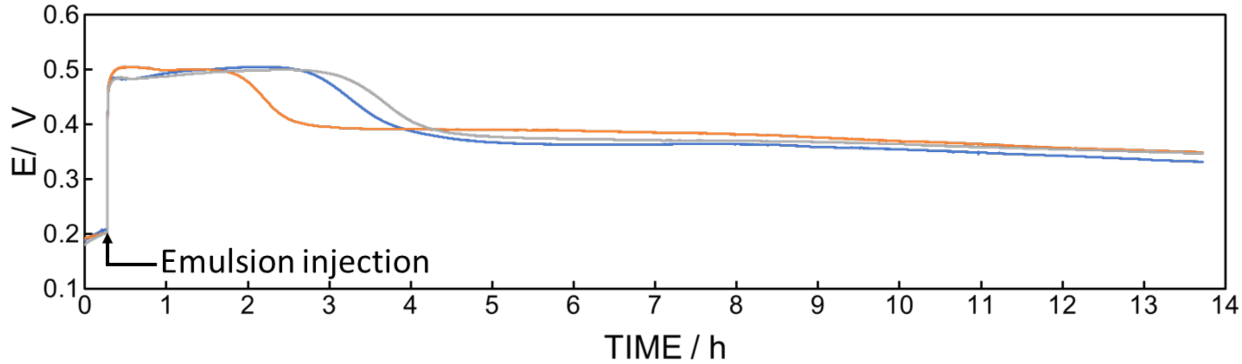
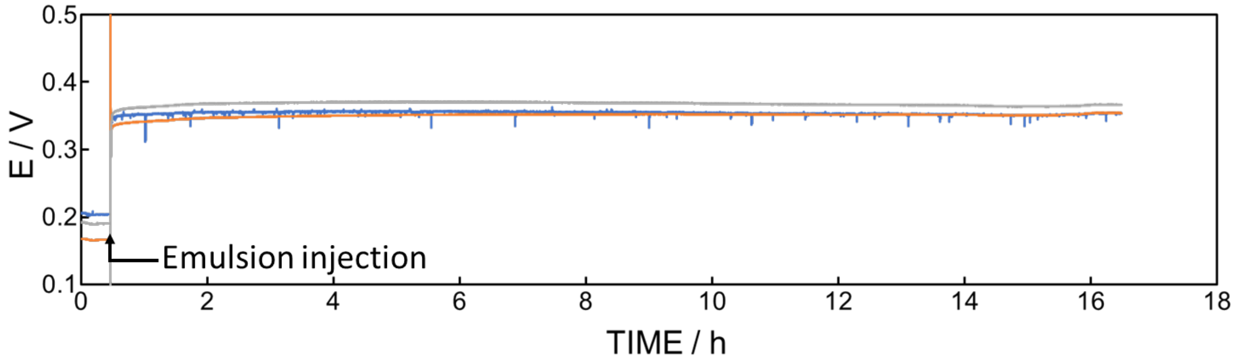


Figure S2. Recorded potential-time trace during emulsion doping with valinomycin and KTFPB for three all-solid-state electrodes with blank plasticized PVC (PVC:DOS = 1:2) and a conductive POT transducing layer. The abrupt potential increase marks the time when the polymeric emulsion composed of PVC/DOS (1:2), valinomycin and KTFPB is added to the KCl solution, resulting in extraction of sensing components into the membrane. The partial potential reversal after 2 to 4 h suggests that the inner membrane potential is influenced by the diffusing sensing components.

(a)



(b)

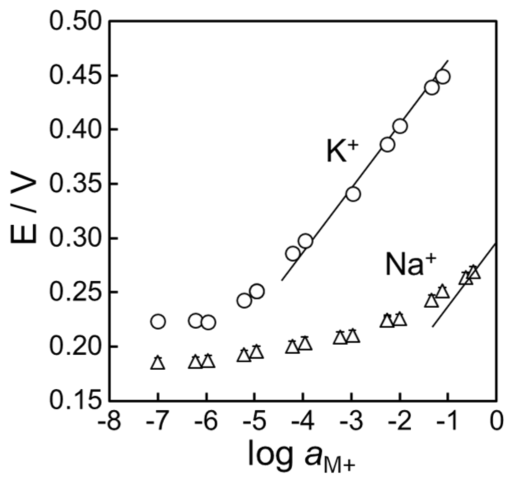


Figure S3. (a) Potential-time trace during emulsion doping for three all-solid-state electrodes as in Figure S1, but fabricated with less diffusive PVC membranes (PVC:DOS = 3:1). (b) Corresponding potentiometric response to K^+ and Na^+ after doping is complete. The solid lines with Nernstian slopes. See Table 1 for the experimental slope values.

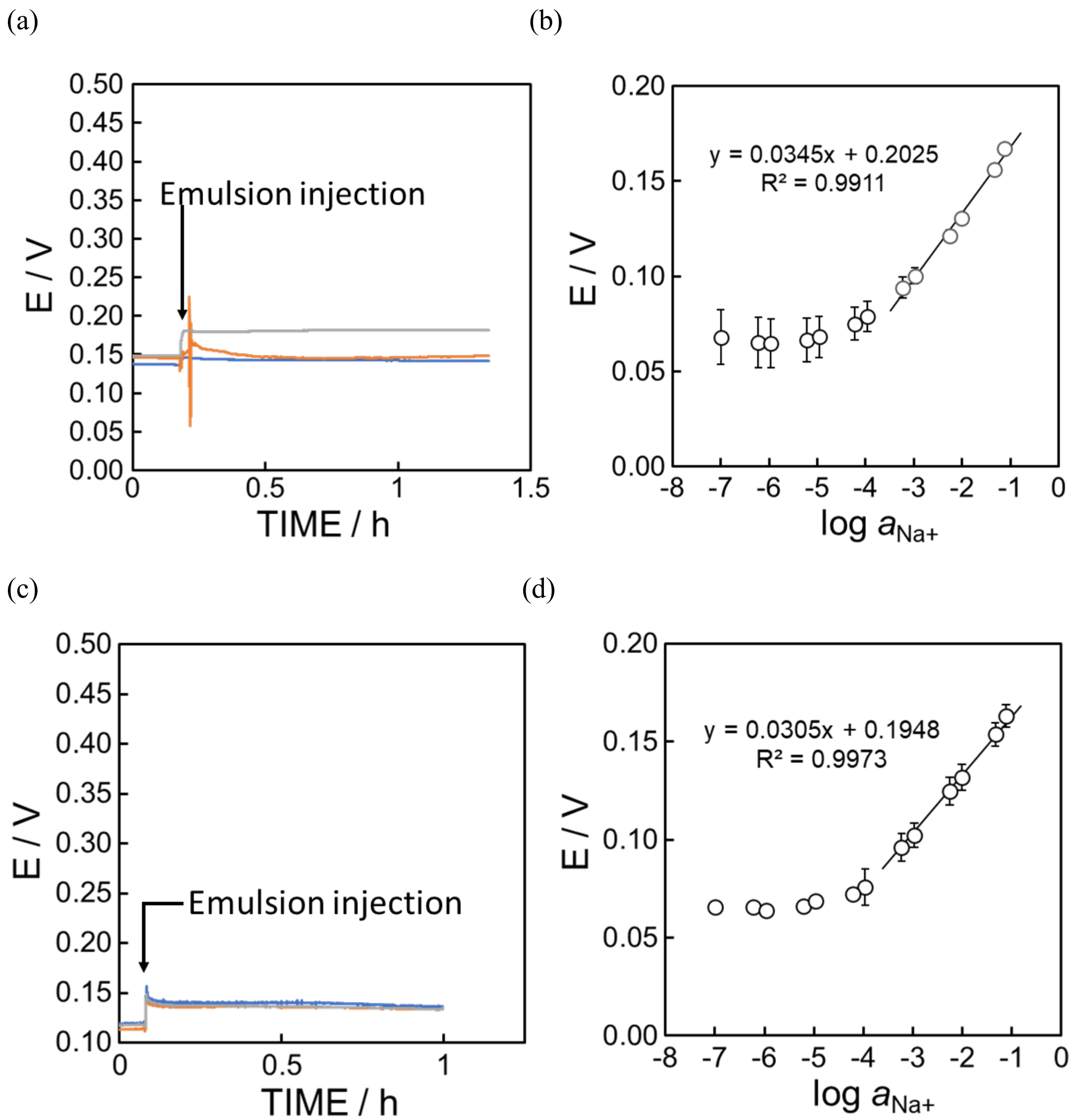


Figure S4. (a) Observed potential-time traces during the attempted doping of Na-X and NaTFPB from PVC/DOS (1:2) emulsion into three polymeric membranes (PVC:DOS = 1:2). (b) Subsequent lack of Nernstian response to Na^+. (c) Doping as in a) but from Pluronic® F-127 with (d) the corresponding potentiometric response to Na^+. See also Table 1 for the slope values.

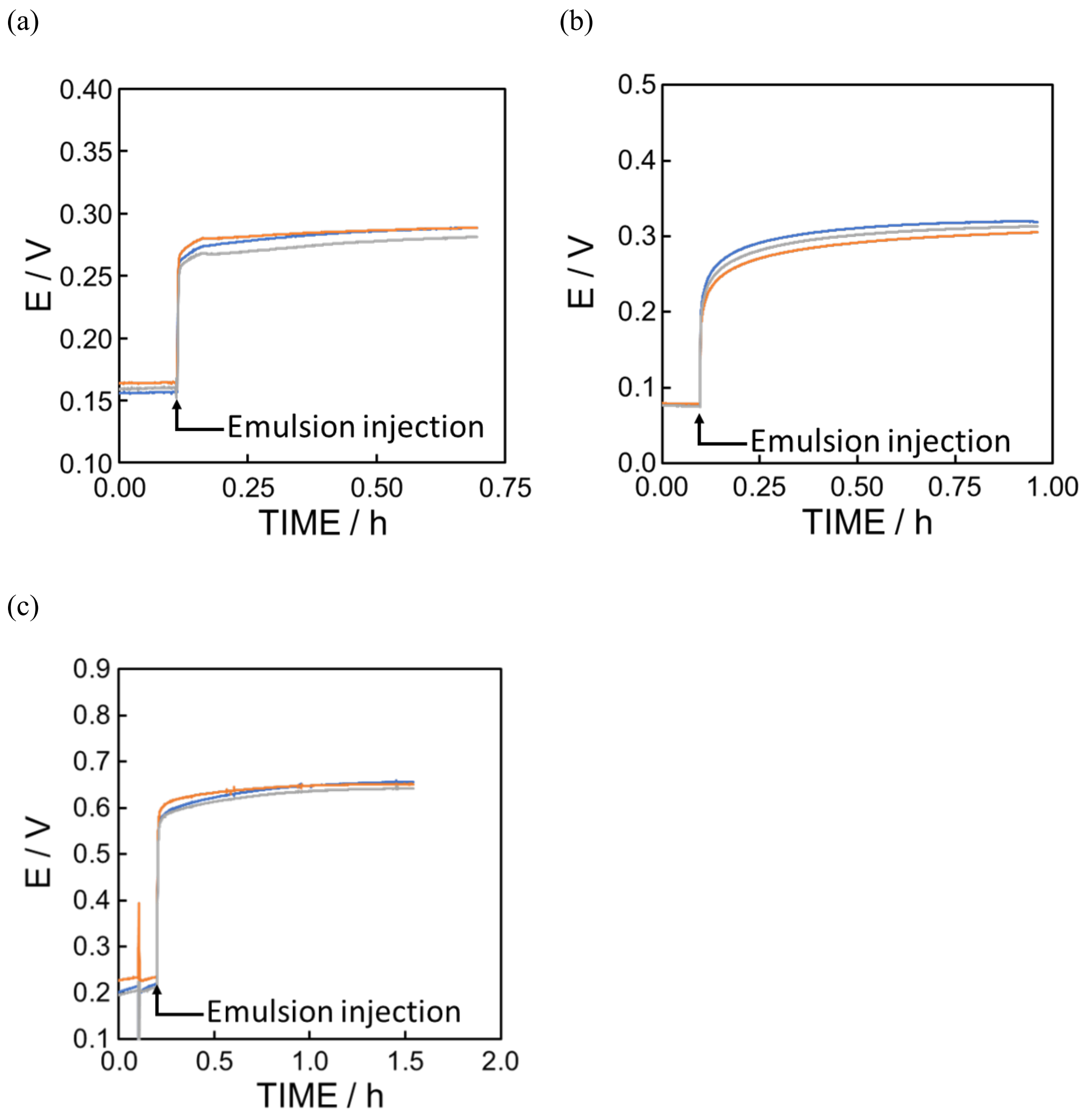


Figure S5. Potential transients of solid state electrodes with PVC/DOS containing a POT transducing layer upon addition of a DMF-based matrix-free emulsion containing (a) Na-X and NaTFPB for sodium (b) Ca-II/KTFPB for calcium and (c) $TDMANO_3$ for nitrate into solutions containing the appropriate analyte ion salt (see main text).

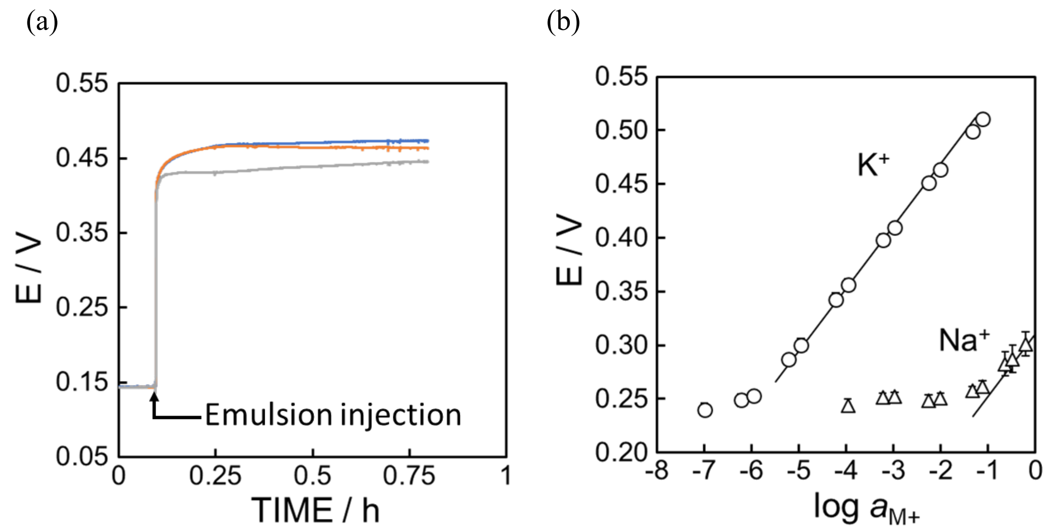


Figure S6. (a) Potential transients for three all-solid-state electrodes containing a blank plasticized PVC membrane (PVC:DOS = 1:2) doping with DMF-based matrix-free emulsions system containing valinomycin and KTFPB. (b) Corresponding potentiometric responses to K^+ and Na^+. Solid lines are Nernstian (see Table 1 for experimental slopes).

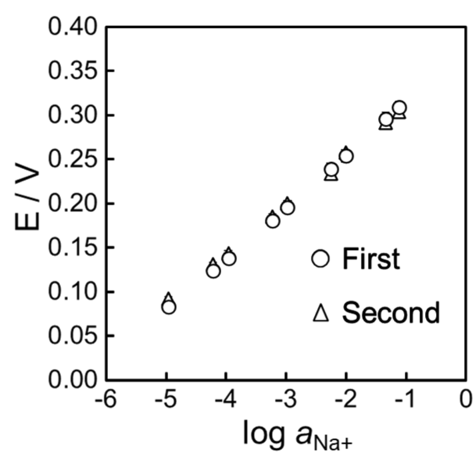


Figure S7. Repeated potentiometric calibration curves to Na^+ by electrodes prepared by doping with a Na-X/NaTFPB-based DMF emulsion.

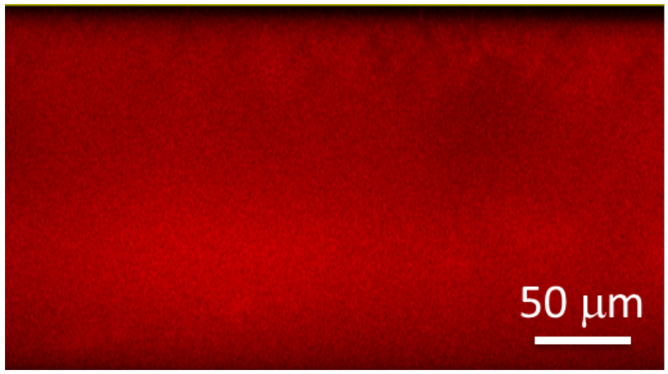


Figure S8. Picture of chromoionophore I fluorescence signal in the PVC/DOS membrane (1:2 mass ratio) observed by confocal microscopy. Conditions otherwise as for Figure 1b.

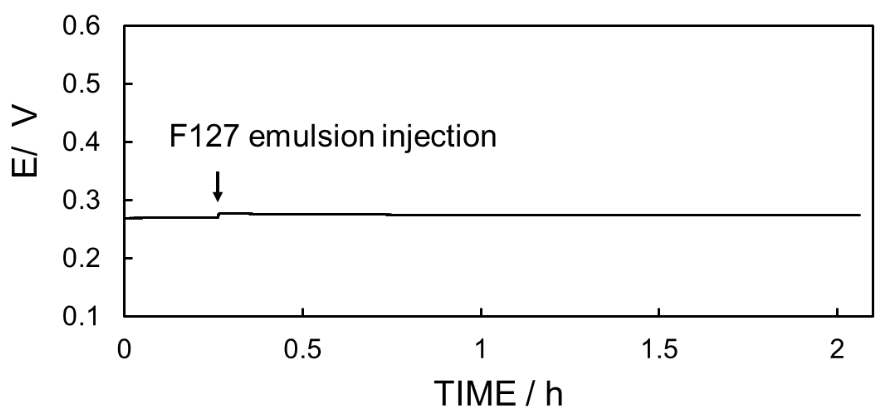


Figure S9. Prolonged exposure of a membrane containing 10 mmol kg^{-1} of valinomycin and 3.3 mmol kg^{-1} of KTFPB to an F-127/DOS emulsion, showing negligible potential drift.