Electronic Supplementary Material (ESI) for Analytical Methods.

Supporting information for

Antifouling membrane integrated on a renewable gold deposited microelectrode for *in situ* detection of As(III)

Romain Touilloux, Mary-Lou Tercier-Waeber*, Eric Bakker*

Department of Inorganic and Analytical Chemistry, University of Geneva, Quai Ernest-Ansermet 30, 1211 Geneva 4, Switzerland

Table

Table S1. Reproducibility of Au layer deposition on an Au-GIME for a fixed time of 86 s using the following conditions: E_{dep} = -300 mV ; Solution: 1 mM Au(III), 0.1 M $NaNO_3$, HNO_3 pH 2.

Au layer n°	Q_{red} / µC	Thickness / µm
1	0.380	0.947
2	0.382	0.952
3	0.427	1.07
4	0.357	0.890
5	0.383	0.955
6	0.385	0.960
7	0.405	1.01
8	0.349	0.870
9	0.338	0.843
Average	0.378 ± 0.028	0.943 ± 0.069

Figure Captions

Fig. S1. Results of arsenic speciation analysis of spiked freshwater samples by proposed separation method using Lewatit MonoPlus M500 and analysed by ICP-MS (n=3) at different ratios of As(III):As(V) (0:100, 10:90, 90:10, 100:0 and 50:50 %). Comparison is made between expected (left column) and experimental values (right column).

Fig. S2. As(III) calibration curves (n = 3) obtained (●) from the Au-GIME and (■) from the Au-IrM (without gel) SWASV measurements. The current are presented (a) before and (b) after the normalization by $D_{gel}/D_{free\ sol} = 0.69$. Sample and SWASV conditions as in Fig. 4.

Fig. S3. Corresponding calibration curves of Fig. 4

Fig. S4. Corresponding calibration curves of Fig. 4

Fig. S5. Corresponding calibration curves of Fig. 5

Fig. S6. Corresponding calibration curves of Fig. 6

Fig. S7. (a) As(III) concentration profiles in Lake Greifen (22th August 2015) determined from Au-GIME SWASV measurements and ICP-MS after separation on LM500 resin. Also shown are profiles of total dissolved As measured in pH 1 acidified samples by ICP-MS, (b) dissolved oxygen and *chlorophyll a* measured in situ using an Idronaut OS316-multiparameter probe.

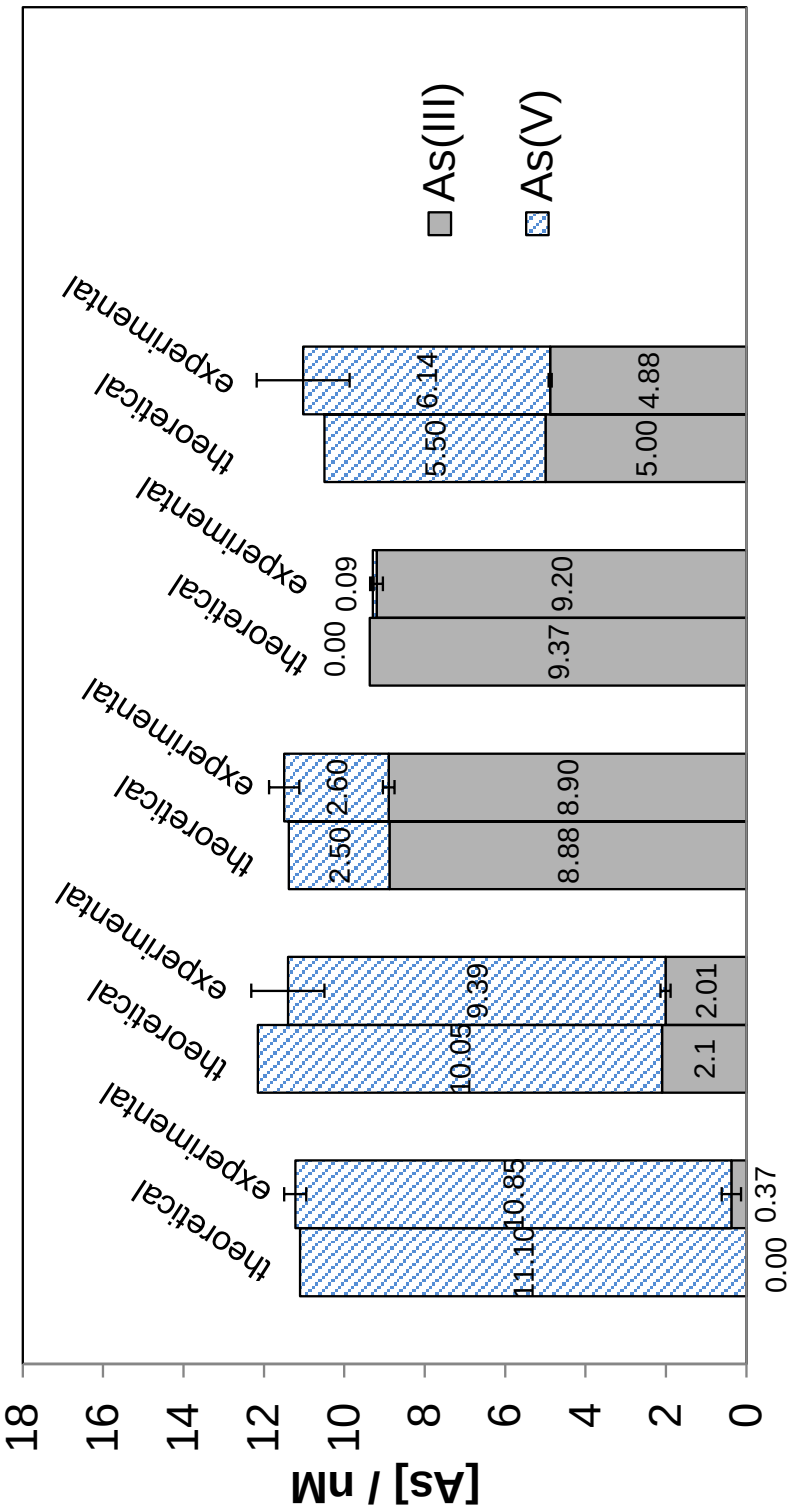
As(III)
As(V)
[As] / nM
0
2
4
6
8
10
12
14
16
18
theoretical
experimental
11.10
10.85
0.00
0.37
10.05
9.39
2.1
2.01
8.88
2.50
2.60
8.90
0.00
0.09
9.37
9.20
5.50
6.14
5.00
4.88

Figure S 1

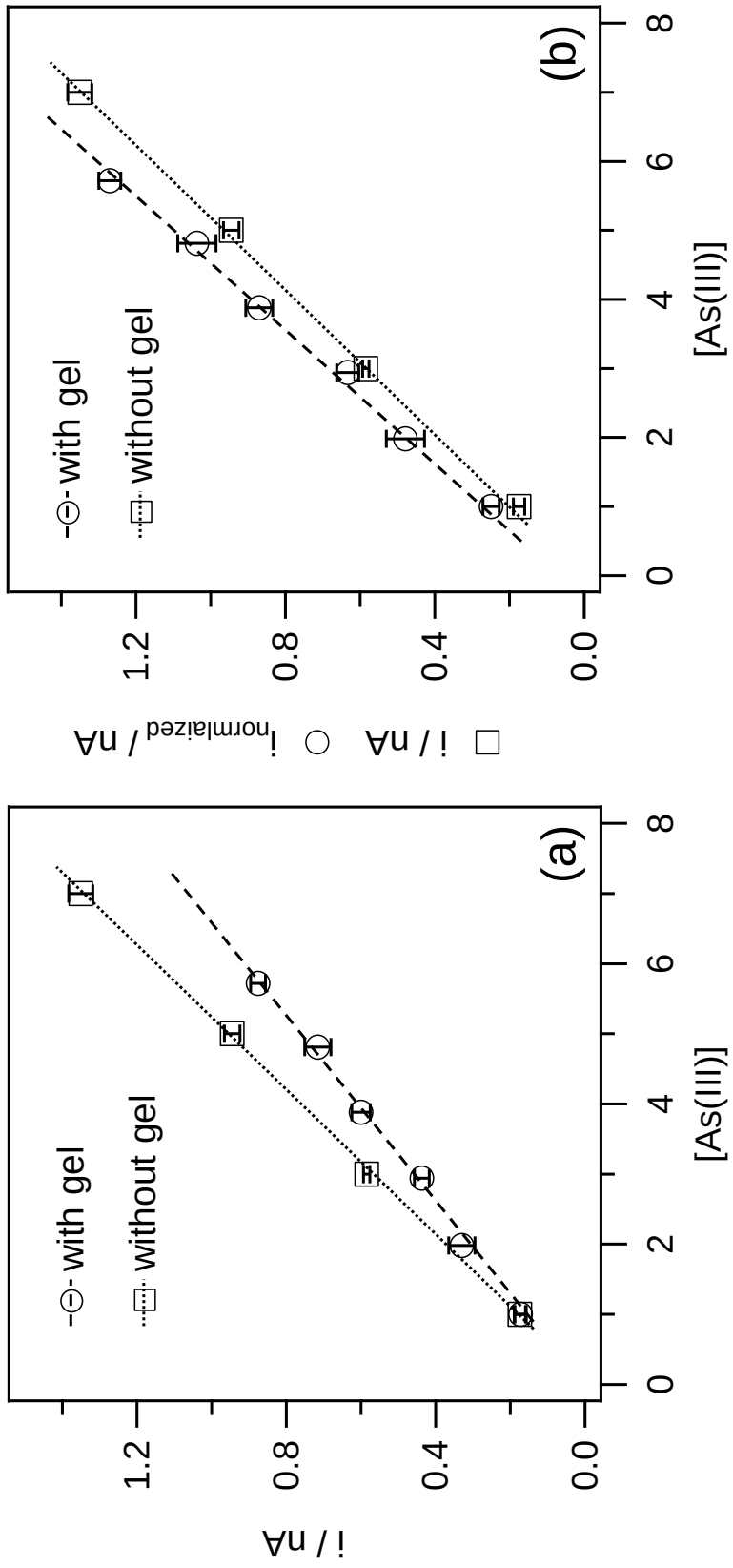
(a)
(b)
i / nA
[As(III)]
with gel
without gel
□ i / nA ○ i normalized / nA
0.0
0.4
0.8
1.2
0
2
4
6
8

Figure S 2

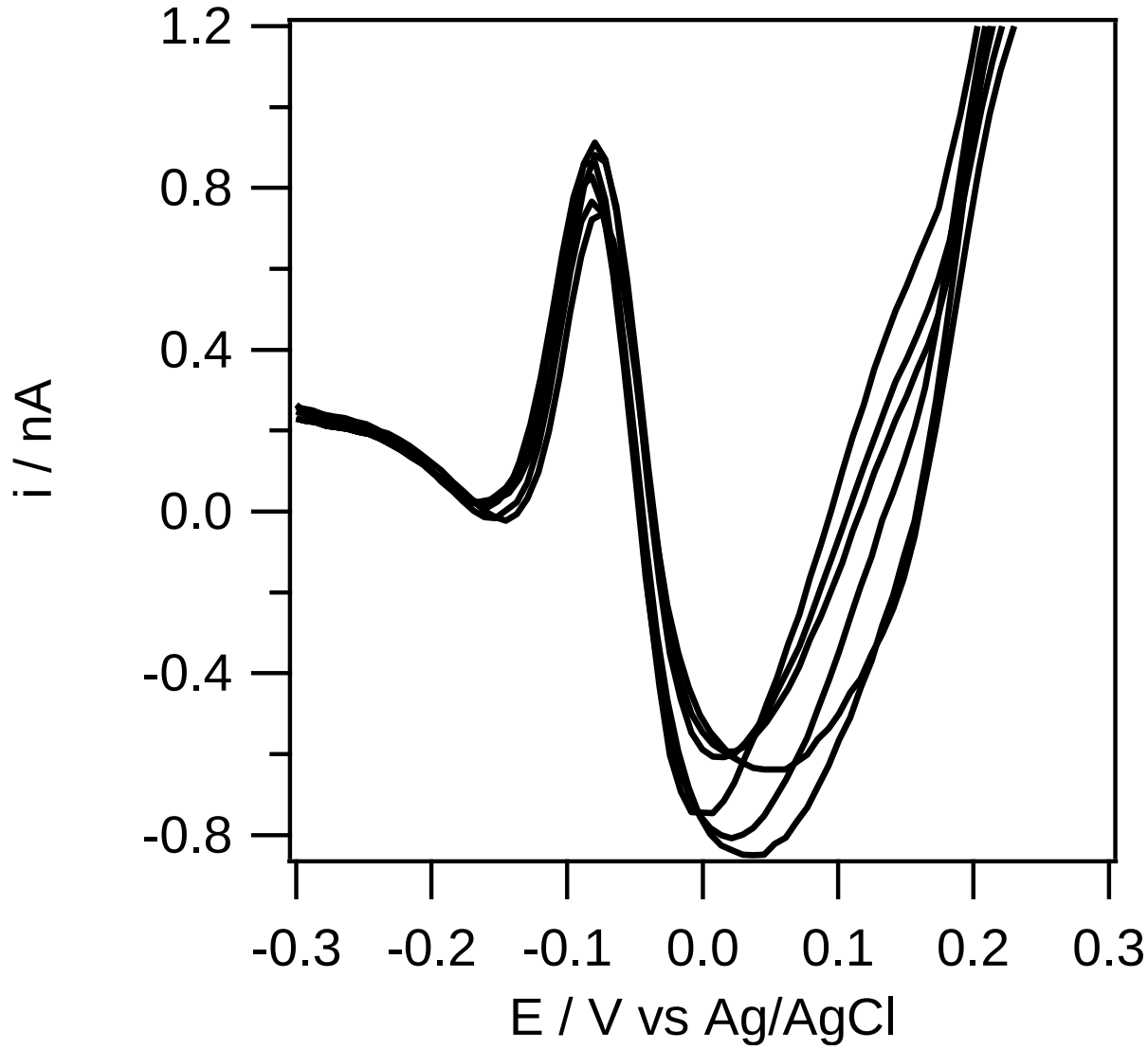

Figure S 3

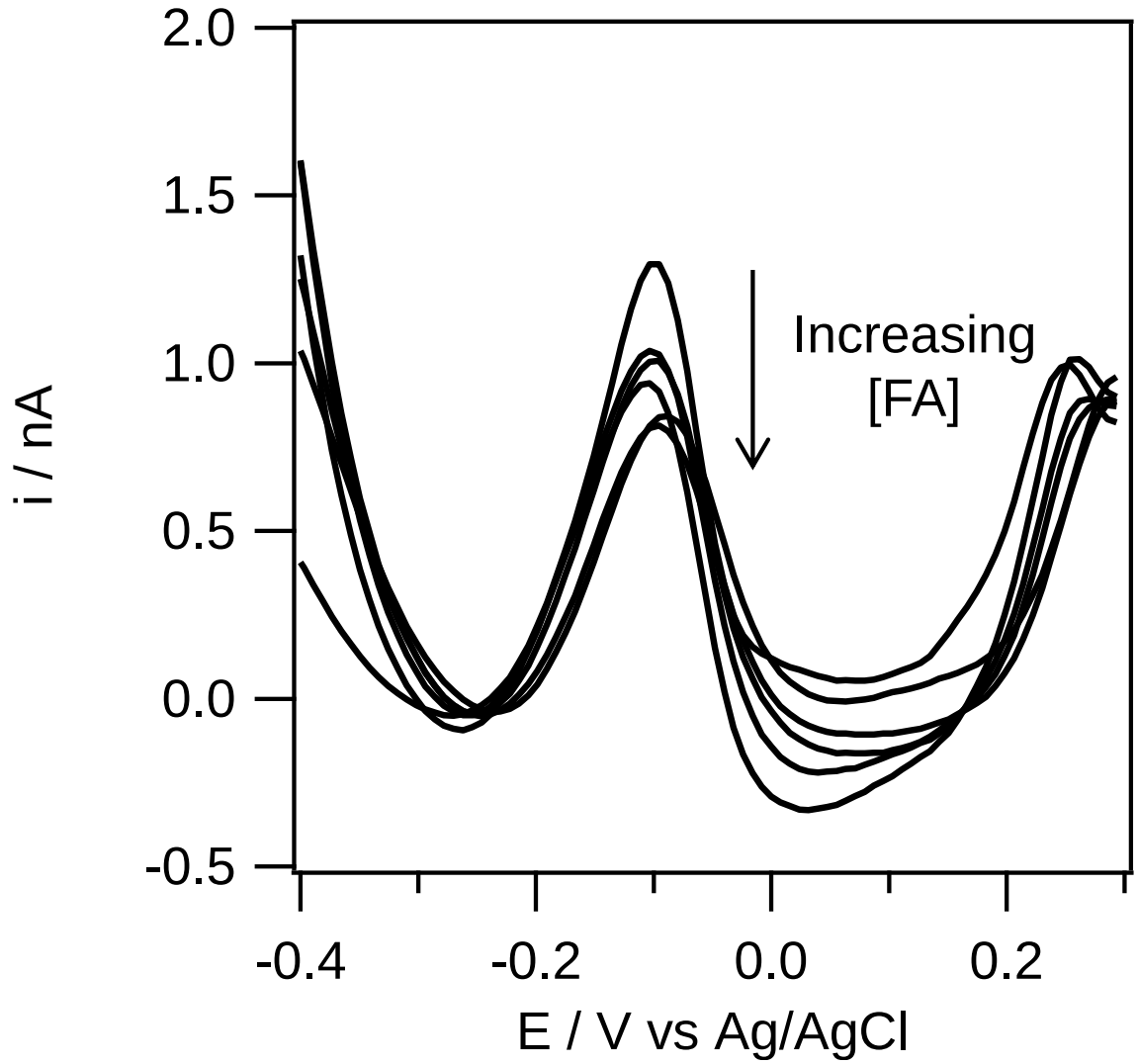

Figure S 4

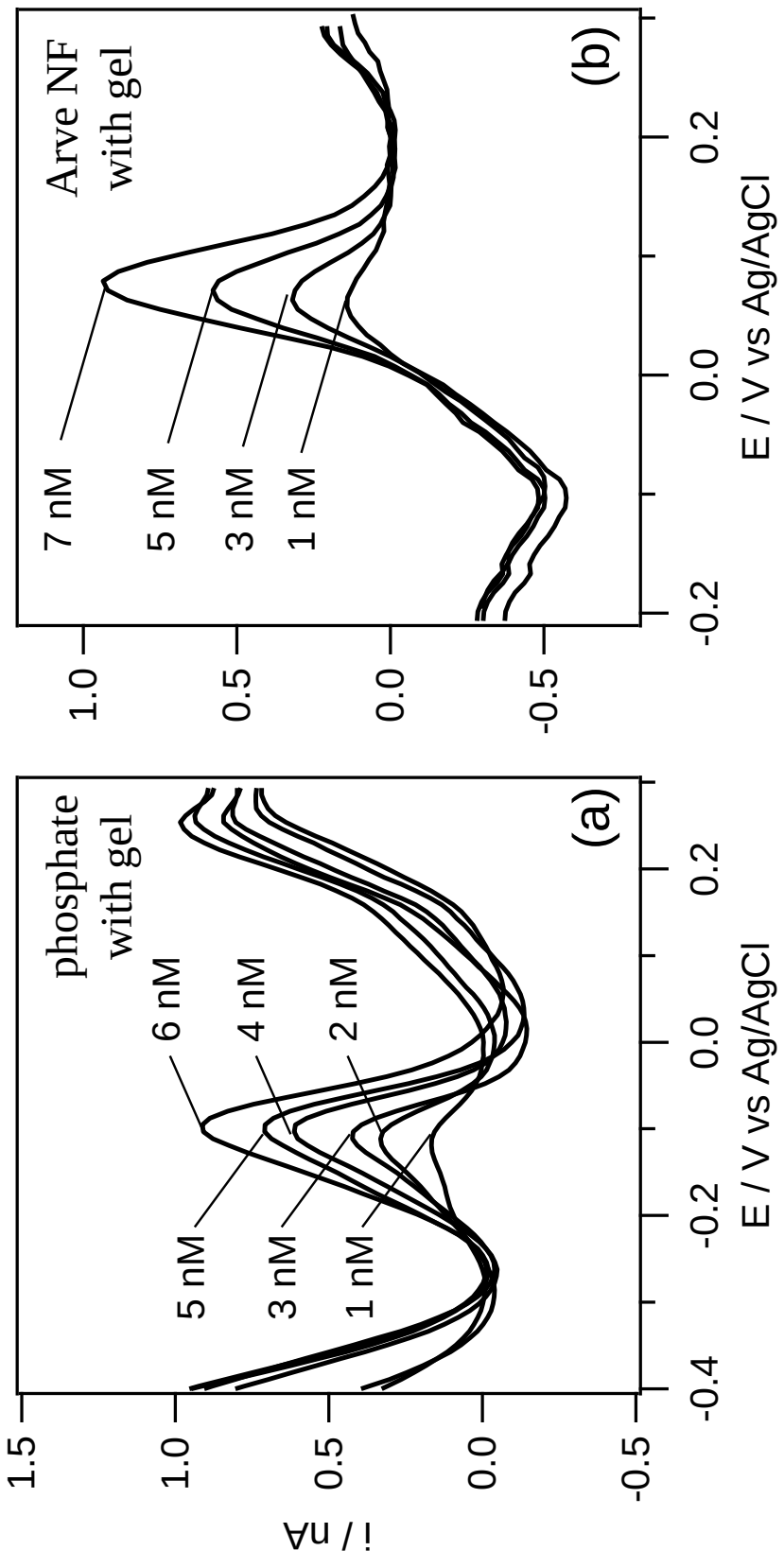
phosphate
with gel
(a)
6 nM
5 nM
4 nM
3 nM
2 nM
1 nM
i / nA
E / V vs Ag/AgCl
Arve NF
with gel
(b)
7 nM
5 nM
3 nM
1 nM
E / V vs Ag/AgCl

Figure S 5

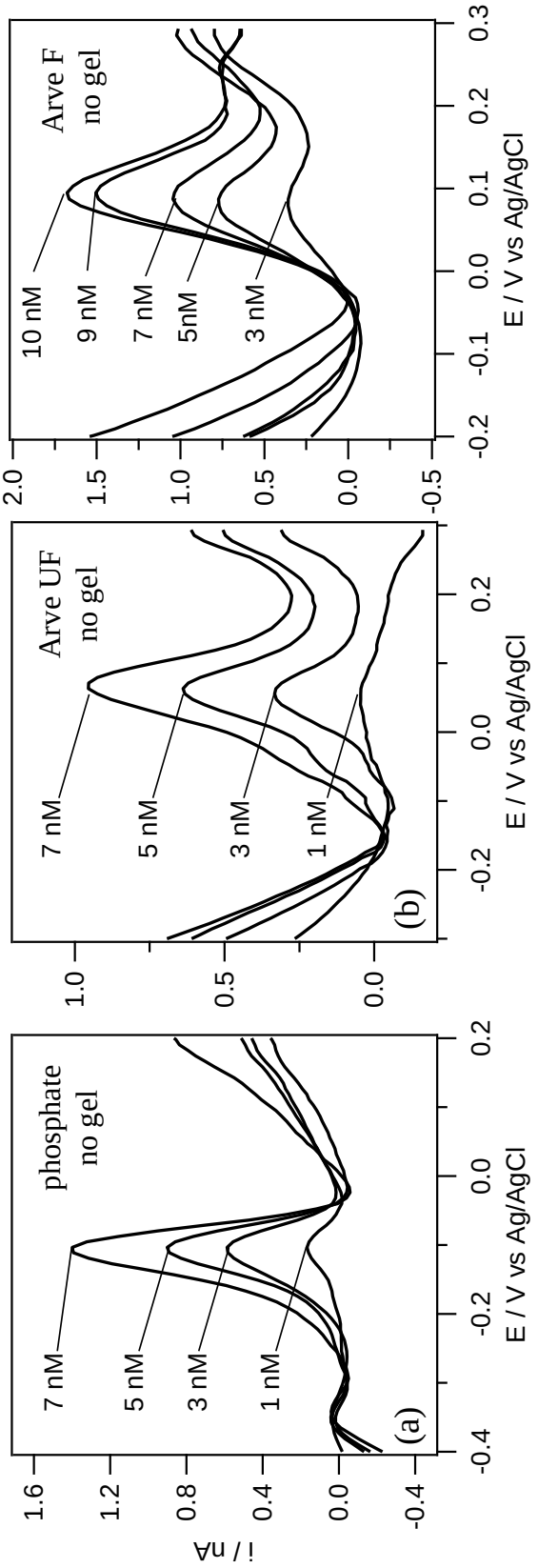
phosphate
no gel
7 nM
5 nM
3 nM
1 nM
(a)
Arve UF
no gel
7 nM
5 nM
3 nM
1 nM
(b)
Arve F
no gel
10 nM
9 nM
7 nM
5nM
3 nM
i / nA
E / V vs Ag/AgCl
E / V vs Ag/AgCl
E / V vs Ag/AgCl

Figure S 6

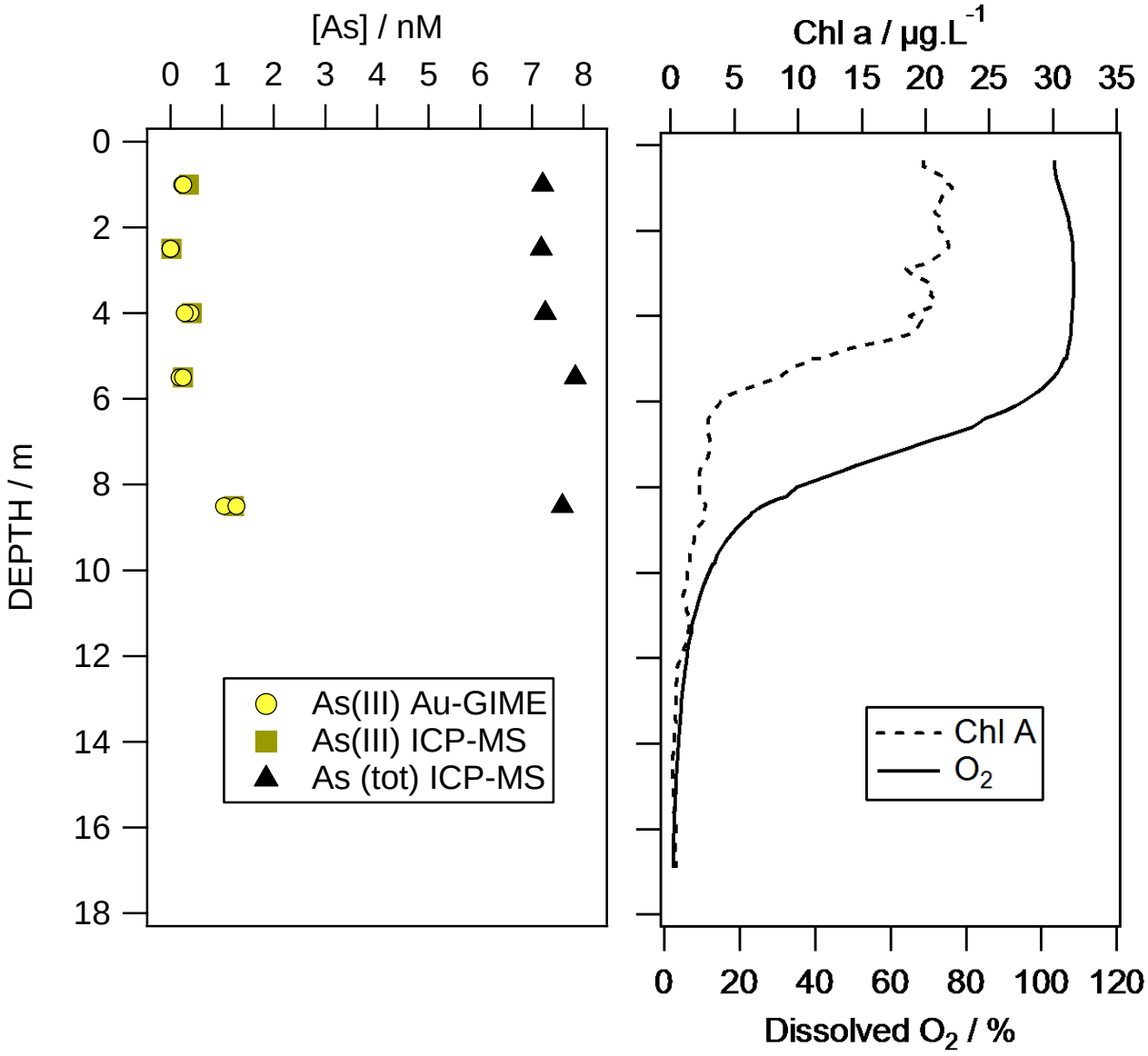
[As] / nM
0 1 2 3 4 5 6 7 8
DEPTH / m
0 2 4 6 8 10 12 14 16 18
As(III) Au-GIME
As(III) ICP-MS
As (tot) ICP-MS
Chl a / µg.L-1
0 5 10 15 20 25 30 35
Chl A
O2
0 20 40 60 80 100 120
Dissolved O2 / %

Figure S7