

Figure S1. Equivalent circuits used to analyse EIS spectra: **(A)** – “simple” circuit for analysis at LIG355, **(B)** – Randles circuit for LIG532, **(C)** – circuit for some modified LIG532 electrodes.

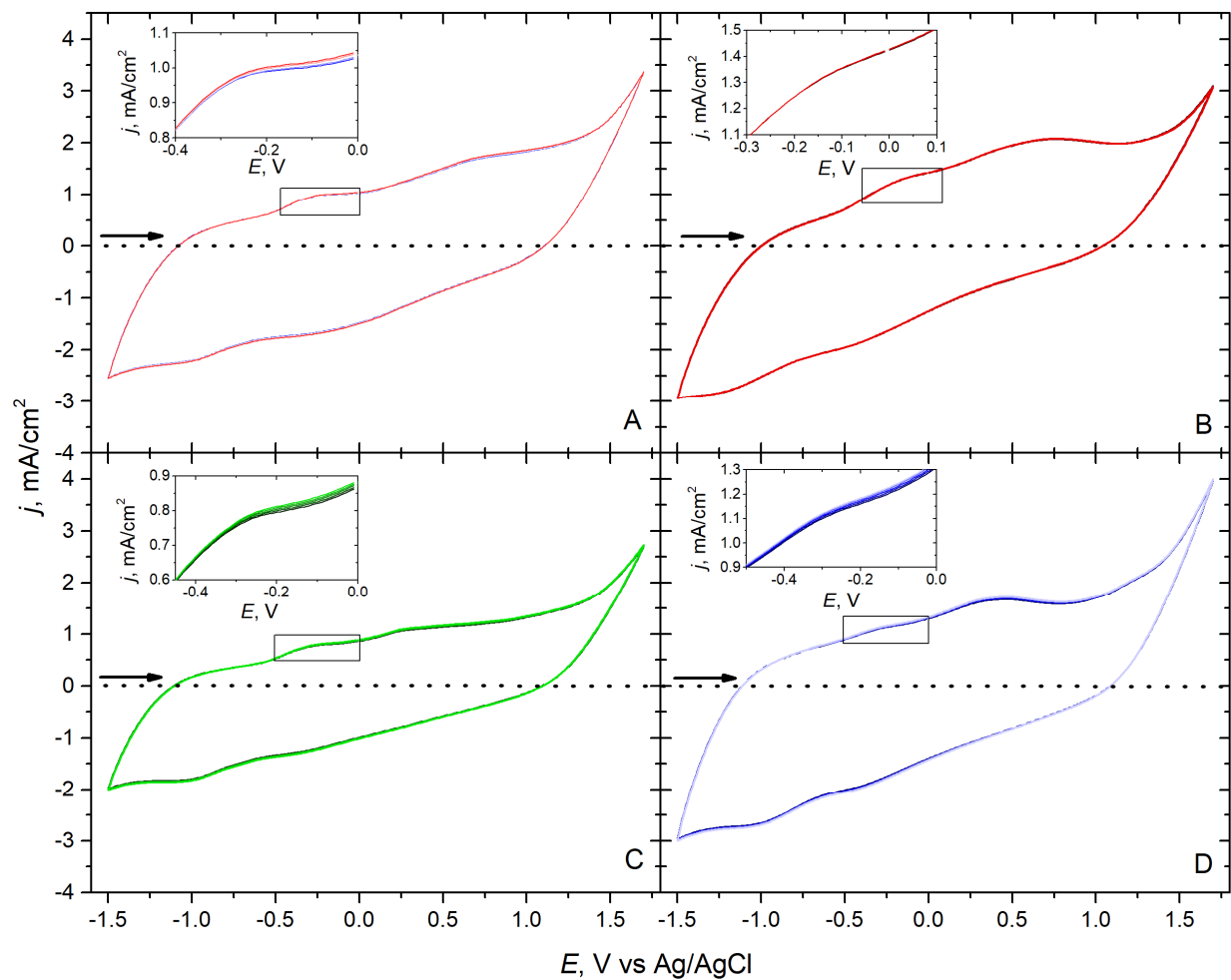


Figure S2. Last 5 cycles of FA electropolymerisation presented in Figure 6 at LIG355 (A), Chit/LIG355 (B), LIG532 (C) and Chit/LIG532 (D) indicating steady-state current. Insets show a zoom of oxidation current. All other conditions like in Figure 6.

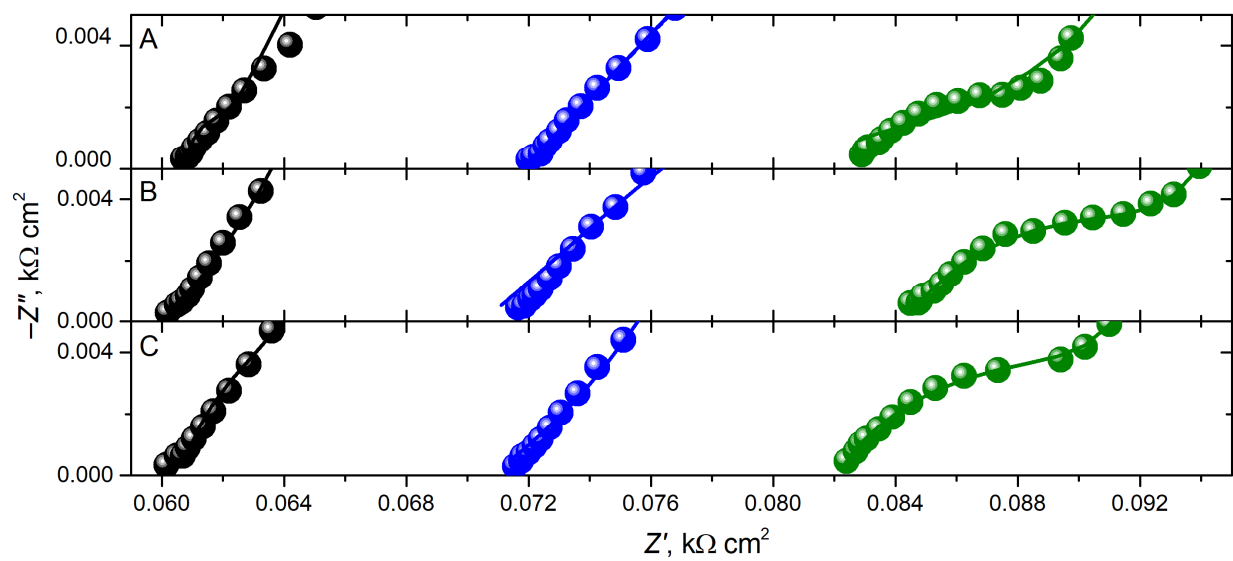


Figure S3. Beginnings of complex plane spectra at LIG532 (black symbols), Chit/LIG532 (blue symbols) and PFA/Chit/LIG532 (green symbols) in 0.1 M PBS solution of pH 7.0, at different potentials: -0.74 V (**A**), 0.0 V (**B**) and $+0.43$ V (**C**).

Table S1. Warburg element parameters calculated at LIG532 from Figure 5F using an equivalent circuit depicted in Figure S1B.

E, V	$R_{\text{dif}}, \Omega \text{ cm}^2 (W_0)$	$\tau, \text{s} (W_0)$	$\alpha (W_0)$
-1.50	707	4.63	0.469
0.00	21.5	0.099	0.443
+1.30	77.6	15.4	0.432

Table S2. Analysis of EIS spectra at modified LIG532 from Figure 11 using an equivalent circuit depicted in Figure S1C.

Electrode	$E, \text{ V}$	$R_{\Omega},$ $\Omega \text{ cm}^2$	$R_{ct},$ $\Omega \text{ cm}^2$	$C_{dl},$ mF cm^{-2}	α	$R_{dif},$ $\Omega \text{ cm}^2$	$\tau, \text{ s}$	α_1
LIG532	-0.74	60.69	0.754	0.221	0.999			
Chit/LIG532		73.3	362	6.61	1.00	490	4.29	0.468
PFA/Chit/LIG532		80.6	10.1	1.27	0.989	509	1.41	0.440
LIG532	0.00	60.6	4.96	3.13	0.916			
Chit/LIG532		70.5	824	1.01	0.999	27.7	0.056	0.460
PFA/Chit/LIG532		84.4	9.95	2.58	0.964			
LIG532	+0.43	60.7	4.59	0.520	0.905		1.38	0.869
Chit/LIG532		70.8	2657	1.45	0.960	27.9	0.134	0.440
PFA/Chit/LIG532		82.0	10.3	1.39	0.901		7.95	0.864

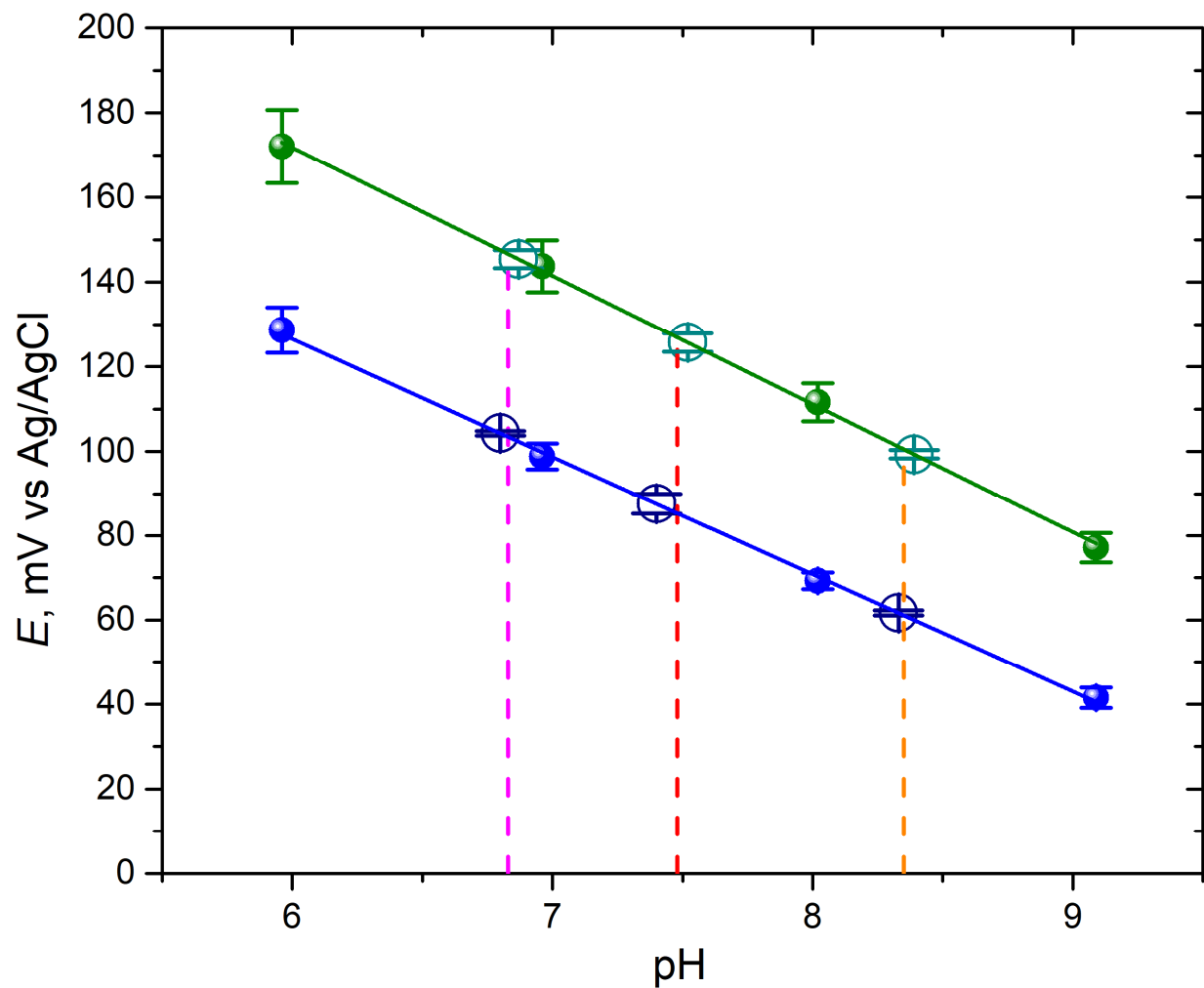


Figure S4. Validation of PFA/Chit/LIG355 (blue colour) and PFA/Chit/LIG532 (green colour) sensors in solutions with different pH using calibration plots ($n=3$). Empty circles show detected pH in test solutions with the respective sensors and the dashed lines show values obtained with pH-meter: 6.83 pink (0.1 M KCl), 7.48 red (0.1 M PBS), and 8.35 orange (1 M Tris hydrochloride).