Electronic Supplementary Information on:

Electrostatic Assembly of Anti-Listeria Bacteriophages on a Self-Assembled Monolayer of Aminoundecanethiol: Film Morphology and Charge Transfer Studies

Paula M. V. Fernandes, Carlos M. Pereira, José M. Campiña[*]

[1] Centre for Research in Chemistry of the University of Porto (CIQUP), Dept. of Chemistry and Biochemistry, Faculty of Sciences, Rua do Campo Alegre, s/n, 4169-007, Porto, Portugal.

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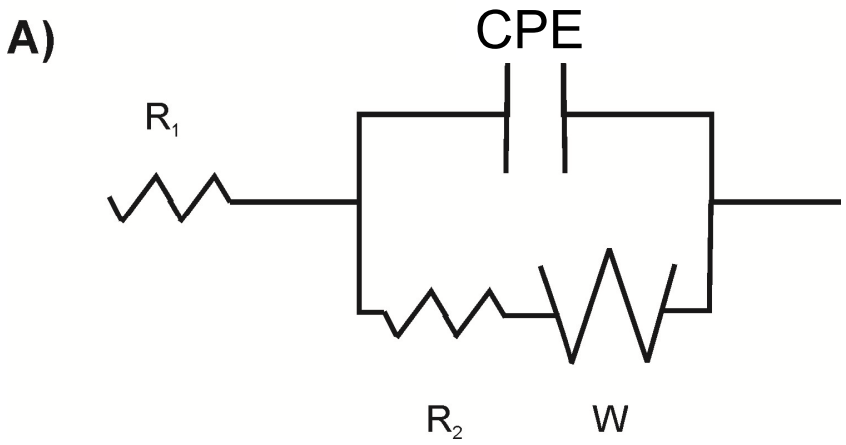
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[*] *Corresponding Author Information:* José M. Campiña (PhD), E-mail: jpina@fc.up.pt, Tel: +351 220 402 643

S.1. Randles-type Equivalent Circuits

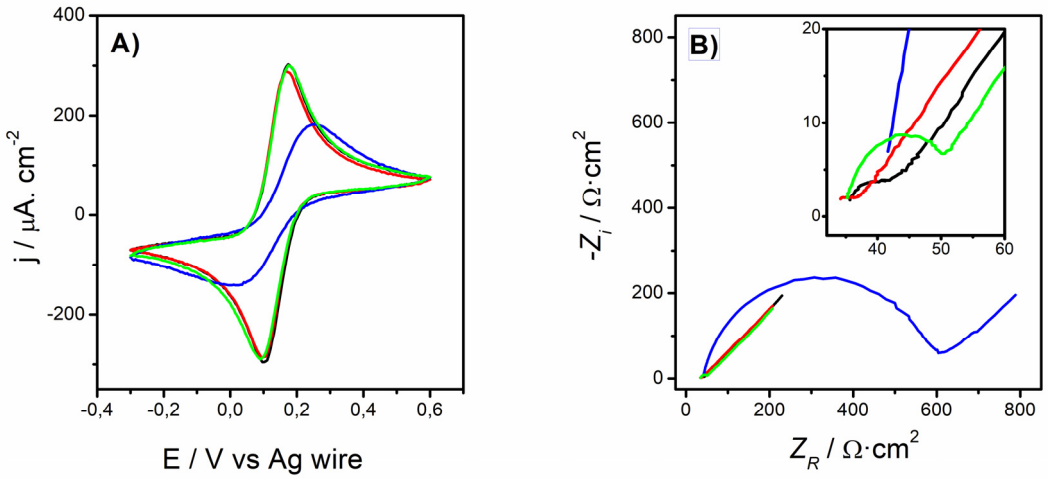
The variation of the Randles circuit [41] used in this work is referred to as R_1QR_2W (see an schematic representation in Scheme S1). The circuit includes a Constant Phase Element (CPE or Q) instead of the typical capacitor in the Randles circuit. The CPE accounts for the topological imperfections and roughness of the electrode surface. The rest of the components are described as follows: R_1 is the electrolyte resistance, R_2 accounts for the charge transfer resistance, and W represents the Warburg diffusion impedance. When the charge transfer is the rate determining step, the Warburg element can be neglected and the system is electrically equivalent to a R_1QR_2 circuit.



Scheme S1 – *Randles-type circuit used to fit the impedance data acquired in this work.*

S.2. Supplementary Results

S.2. 1 Electrochemical Data



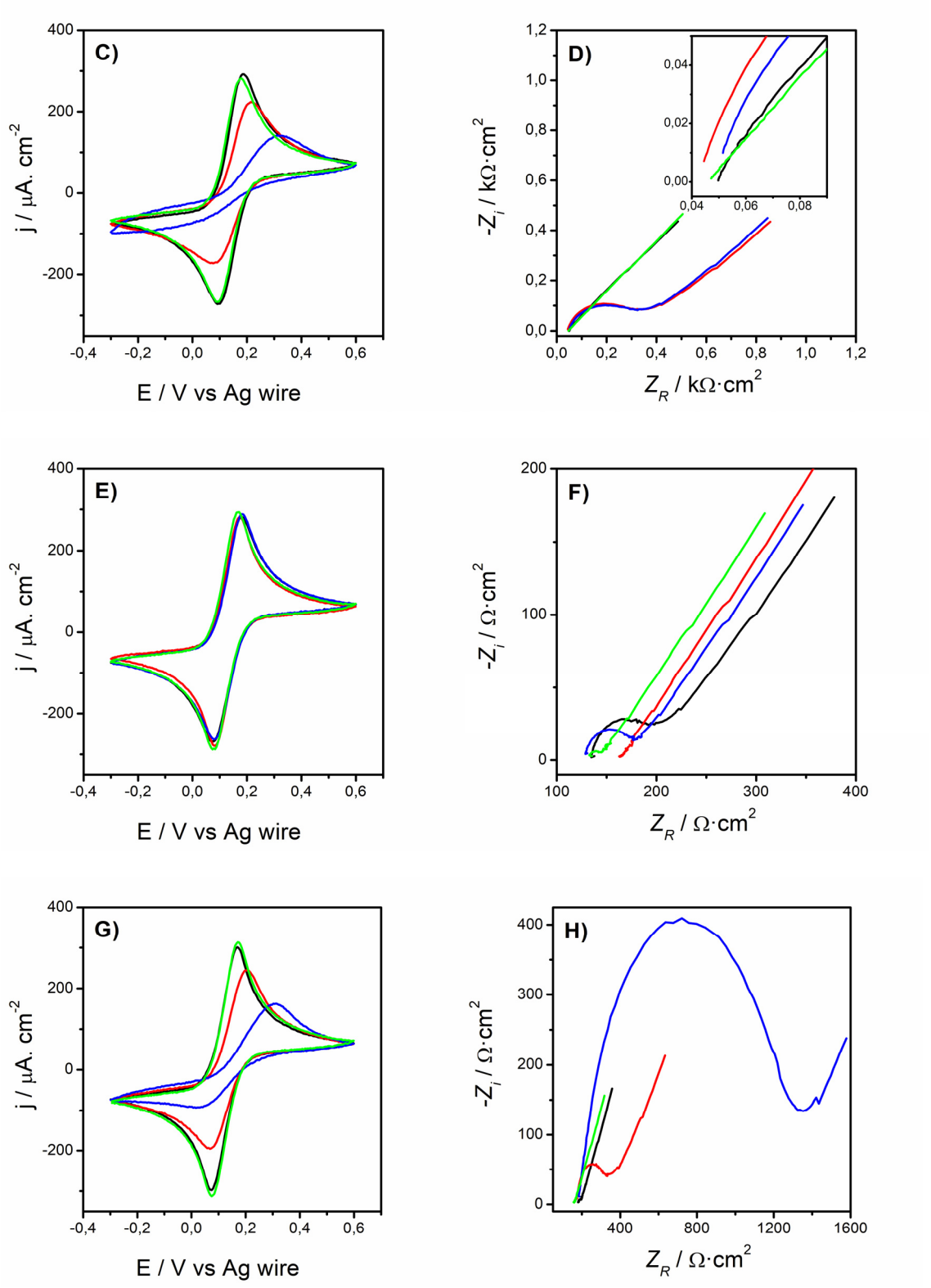
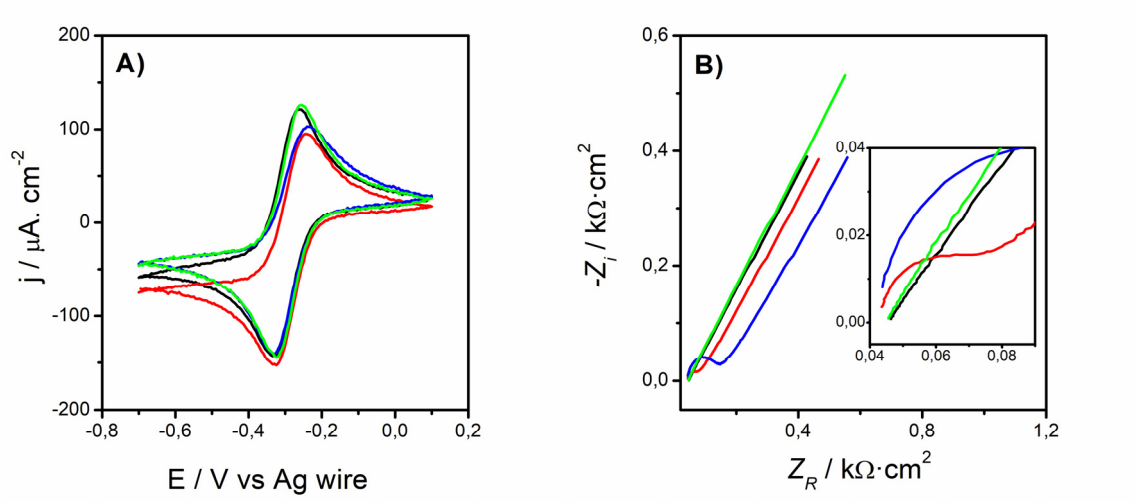
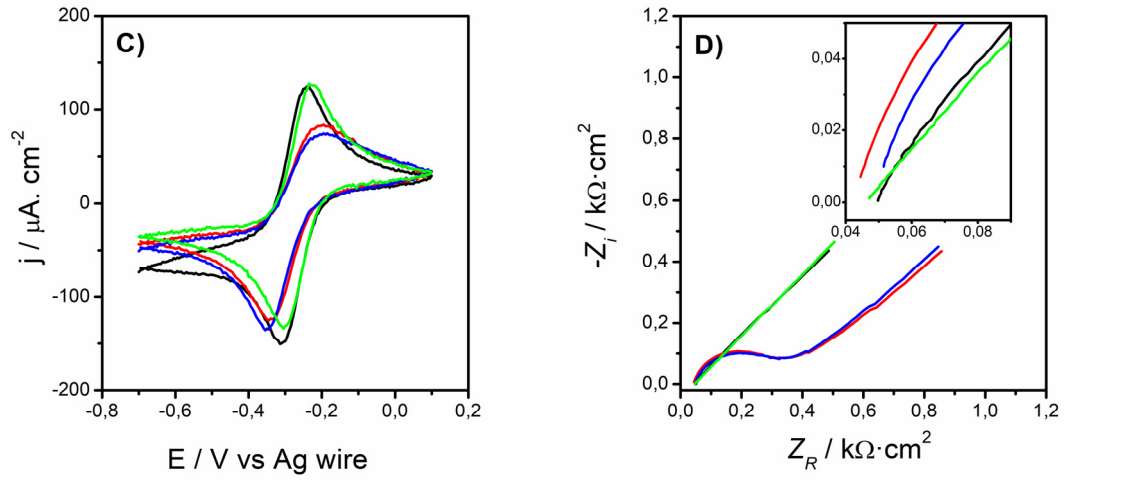
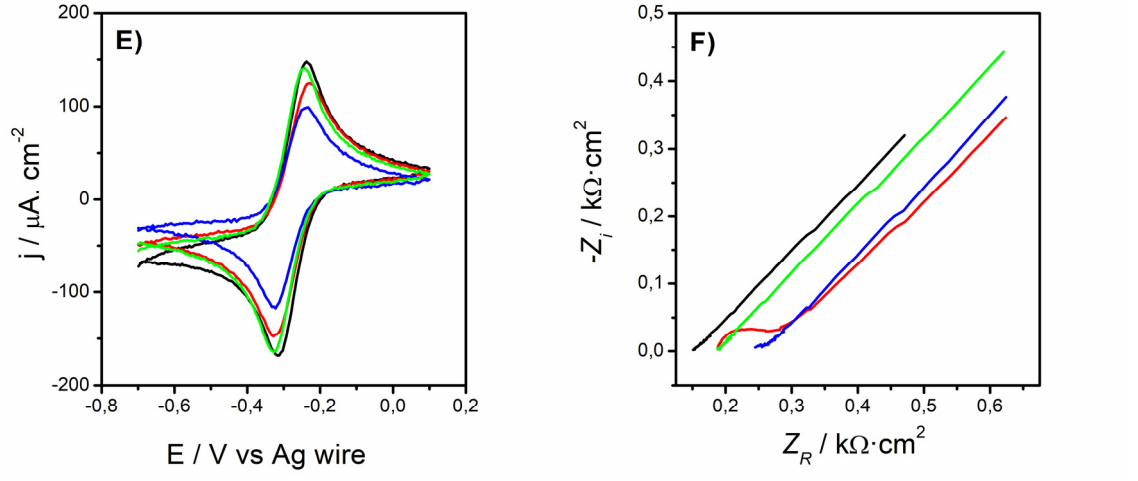


Figure S1 - *CVs (**A**, **C**, **E**, **G**) and Nyquist plots (**B**, **D**, **F**, **H**) acquired for the bare Au (black), Au/AUT (red), Au/AUT/P100 (blue), and Au/P100 electrodes (green) in electrolytes FE7 (**A** & **B**), FE6 (**C** & **D**), FE5 (**E** & **F**), and FE4 (**G** & **H**). The scan rate and oscillating amplitude for the CVs and impedance spectra were 0.05 V·s^{-1} and 0.01 V, respectively.*


A)
B)
j / µA. cm-2
E / V vs Ag wire
-Zi / kΩ·cm2
ZR / kΩ·cm2


C)
D)
j / µA. cm-2
E / V vs Ag wire
-Zi / kΩ·cm2
ZR / kΩ·cm2


E)
F)
j / µA. cm-2
E / V vs Ag wire
-Zi / kΩ·cm2
ZR / kΩ·cm2

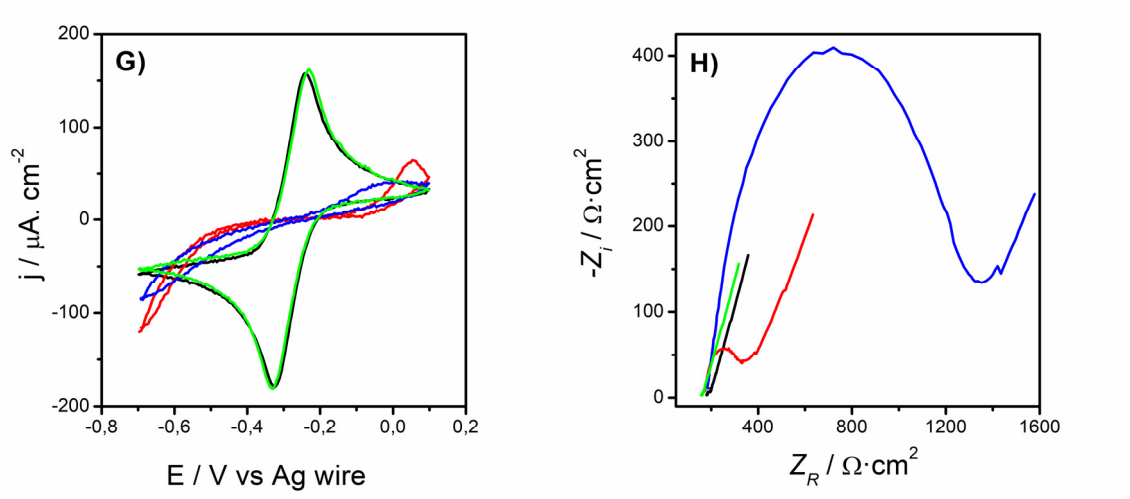


Figure S2 - *CVs (**A**, **C**, **E**, **G**) and Nyquist plots (**B**, **D**, **F**, **H**) acquired for the bare Au (black), Au/AUT (red), Au/AUT/P100 (blue), and Au/P100 electrodes (green) in electrolytes RU7 (**A** & **B**), RU6 (**C** & **D**), RU5 (**E** & **F**), and RU4 (**G** & **H**). The scan rate and oscillating amplitude for the CVs and impedance spectra were 0.05 V·s^{-1} and 0.01 V, respectively.*

Table S1 – *Anodic and cathodic peak current densities (j_{PA} and j_{PC}), potentials (E_{PA} and E_{PC}), peak-to-peak potential difference (ΔE_P), and apparent charge transfer resistances (R_2) derived from the CVs and Nyquist plots in **Fig S1**.*

pH	*Electrode*	j_{PA} / µA·cm^2	*Epa / mV*	j_{PC} / uA·cm^2	*Epc / mV*	*ΔEp / mV*	R_2 / kΩ
7	Au	331	174	-325	101	73	0.150
	Au/AUT	319	169	-317	96	73	0.036
	Au/AUT/P100	195	249	-147	10	239	9.395
	Au/P100	329	174	-322	91	83	0.322
6	Au	321	184	-304	97	87	0.135
	Au/AUT	240	214	-196	76	139	5.787
	Au/AUT/P100	119	317	-	-	>617	34.35
	Au/P100	308	178	-292	91	87	0.522
5	Au	306	181	-297	73	108	1.207
	Au/AUT	308	174	-306	84	90	<0.001
	Au/AUT/P100	316	182	-293	78	104	0.905
	Au/P100	326	168	-317	78	89	0.273
4	Au	331	168	-326	74	94	0.399
	Au/AUT	262	204	-224	67	137	2.708
	Au/AUT/P100	157	307	-109	22	286	19.59
	Au/P100	350	171	-344	74	97	0.076

Table S2 – *Anodic and cathodic peak current densities (j_{PA} and j_{PC}), potentials (E_{PA} and E_{PC}), peak-to-peak potential difference (ΔE_P), and apparent charge transfer resistances (R_2) derived from the CVs and Nyquist plots in* ***Fig S2****.*

pH	*Electrode*	j_{PA} / $\mu A \cdot cm^2$	*Epa / mV*	j_{PC} / $uA \cdot cm^2$	*Epc / mV*	*ΔEp / mV*	R_2 / $k\Omega$
7	Au	145	-260	-147	-334	74	<0.001
	Au/AUT	150	-240	-155	-329	89	0.540
	Au/AUT/P100	125	-235	-144	-334	99	1.782
	Au/P100	151	-255	-149	-324	69	<0.001
6	Au	144	-240	-155	-314	74	<0.001
	Au/AUT	102	-200	-127	-340	139	5.048
	Au/AUT/P100	94	-190	-130	-349	159	5.372
	Au/P100	143	-225	-145	-304	79	<0.001
5	Au	170	-237	-176	-318	81	<0.001
	Au/AUT	146	-232	-155	-327	95	1.497
	Au/AUT/P100	114	-237	-121	-327	90	<0.001
	Au/P100	169	-247	-169	-327	80	<0.001
4	Au	188	-244	-188	-326	82	<0.001
	Au/AUT	53	54	-	-	>754	1.631
	Au/AUT/P100	16	14	-	-	>714	200.0
	Au/P100	187	-231	-182	-334	103	<0.001

B. 2 AFM: Height Profiles

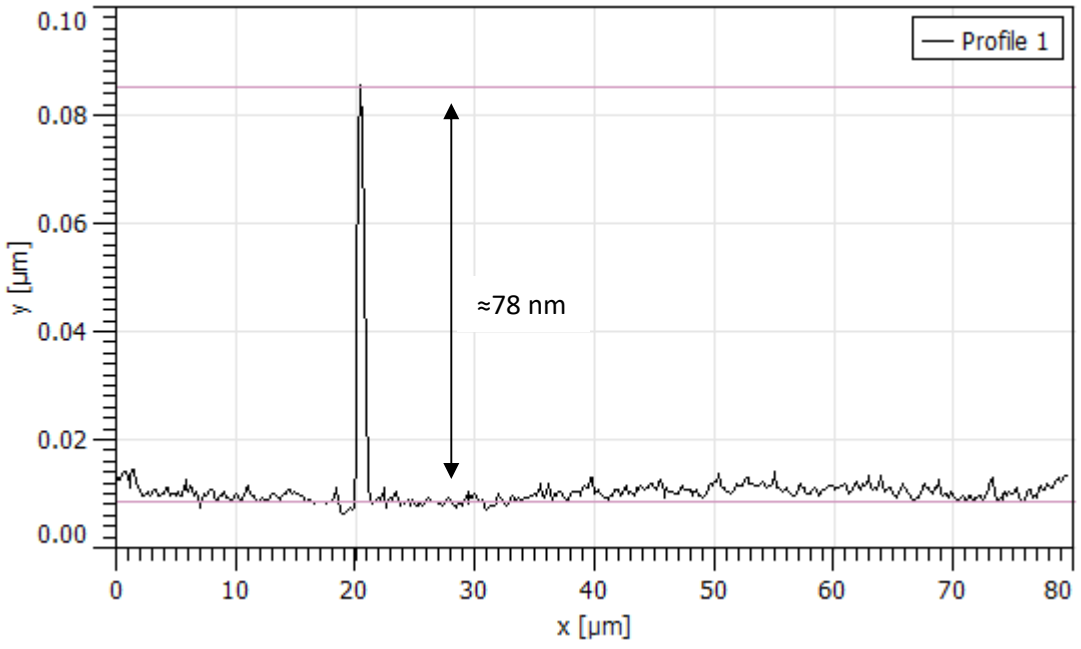


Figure S3 –*Height profile extracted along the blue line in* ***Fig 3A****.*

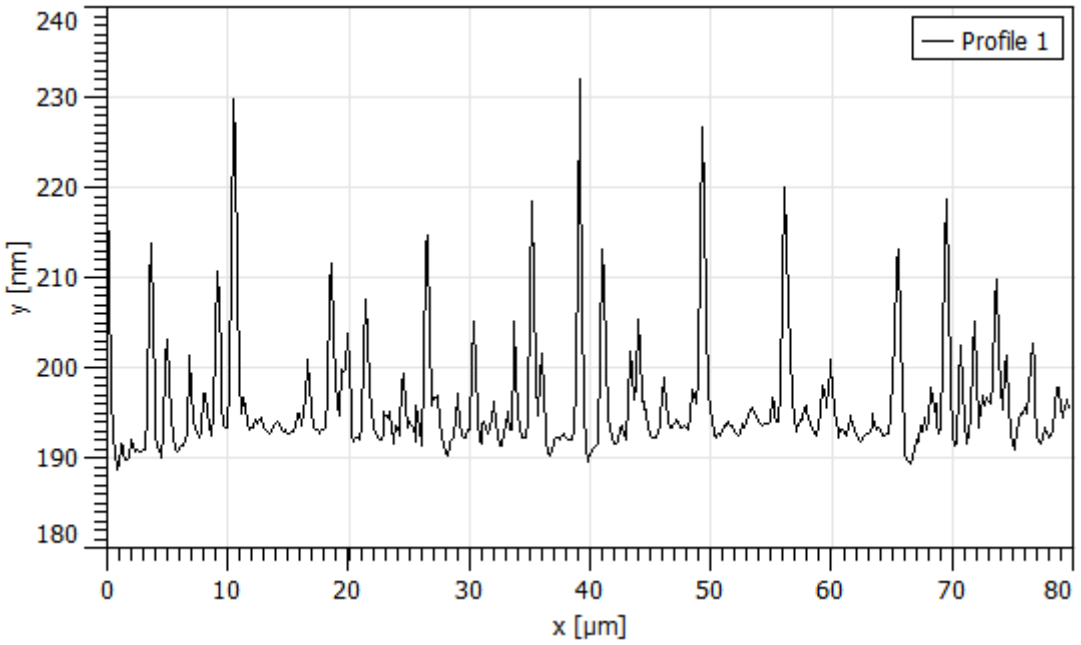


Figure S4 – *Height profile extracted along the red line in **Fig 3C**.*

S.2. 4 Biological Assays

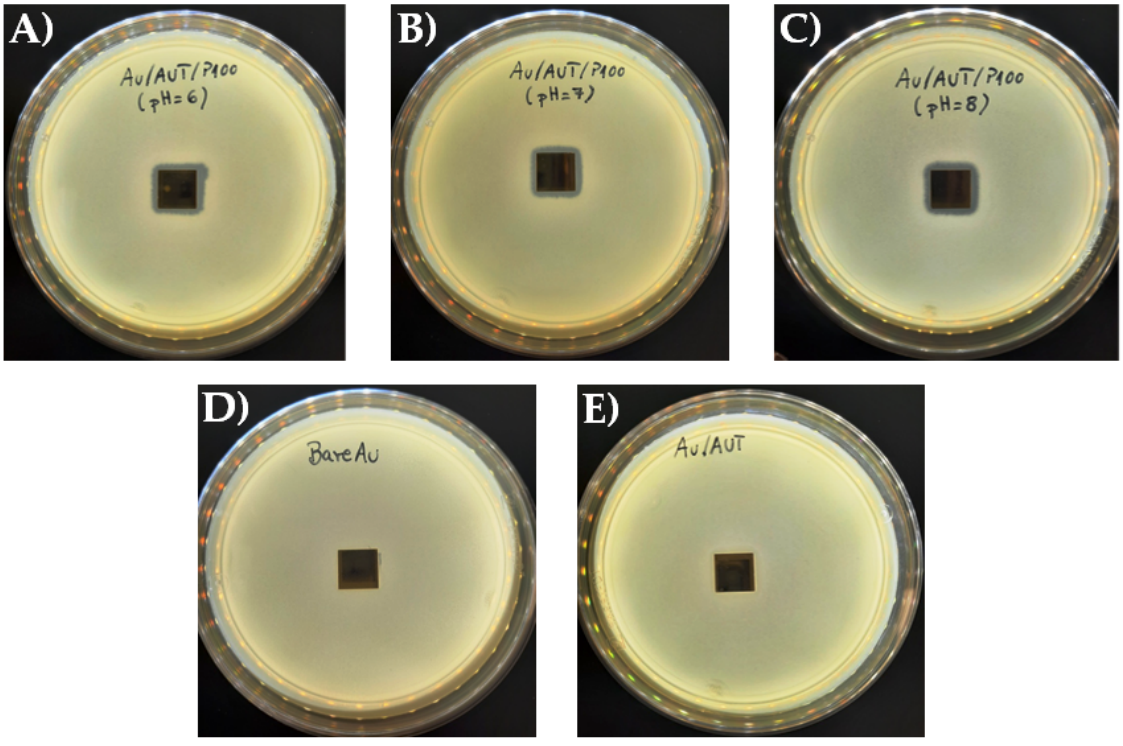


Figure S5 – *Modified plaque assay for Au/AUT/P100 slides prepared from the P100 dispersions buffered at pH 6 (A), 7 (B) and 8 (C).The images obtained for the phage-free bare Au (D) and Au/AUT (E) slides are also shown for comparison.*