Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information

Application of Electrochemical Surface Plasmon Resonance (ESPR) to the Study of Electroactive Microbial Biofilms

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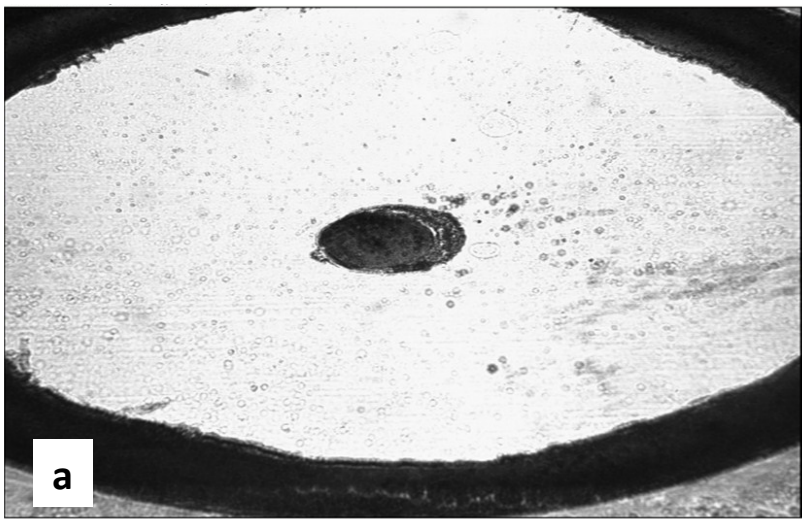

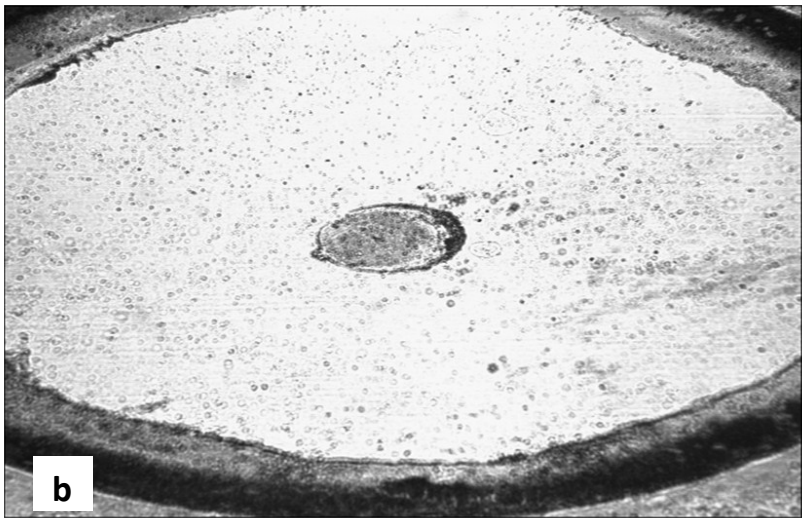

Figure S1. Images of masked SPR slide, before growth (a) and after 2 weeks of growth (b). Double-sided medical tape was cut to fit inside the SPR chamber, and a hole 2mm diameter was cut before attaching to the gold-coated SPR slide. Pixel data was extracted from the region inside the hole using ImageJ.

Figure S2. CV replicates vs potential. Shown is turnover current (a-e) and SPR signal (f-j), for the different growth phases presented in Figure 2 in the main text. Asterisk (*) denotes where CV scan began.

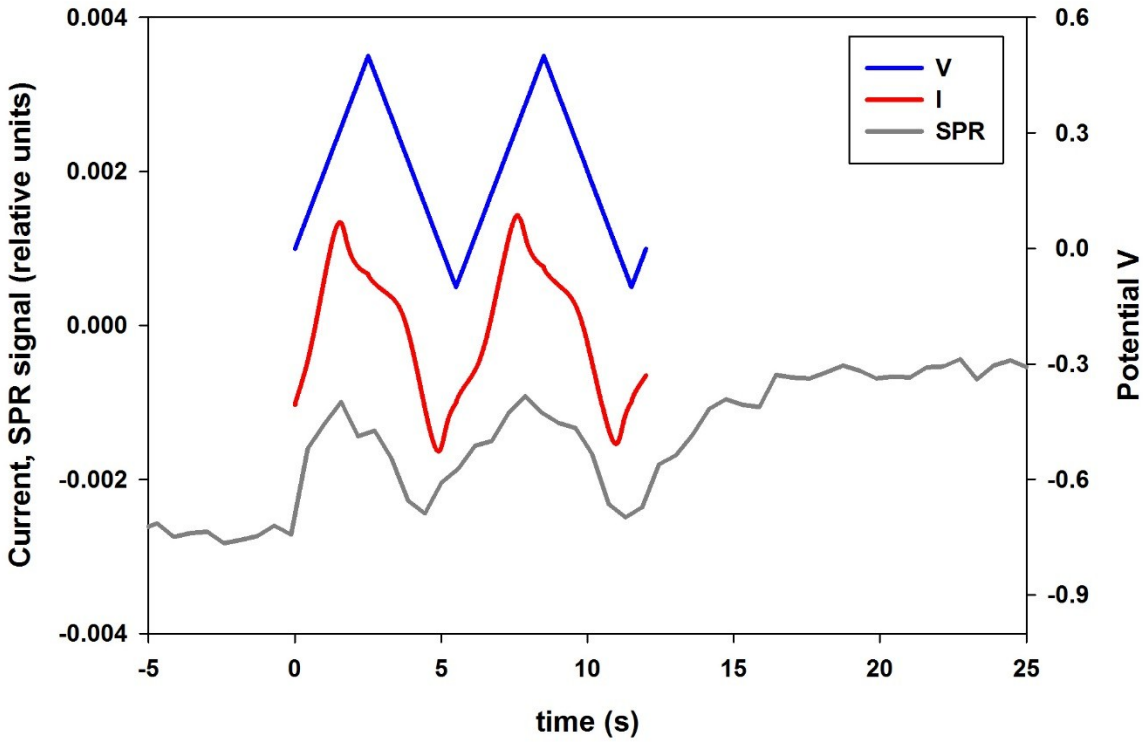

Figure S3. CV in Ferrocenemethanol. CVs performed in Ferrocenemethanol did not exhibit the trapping behavior of the biofilms.

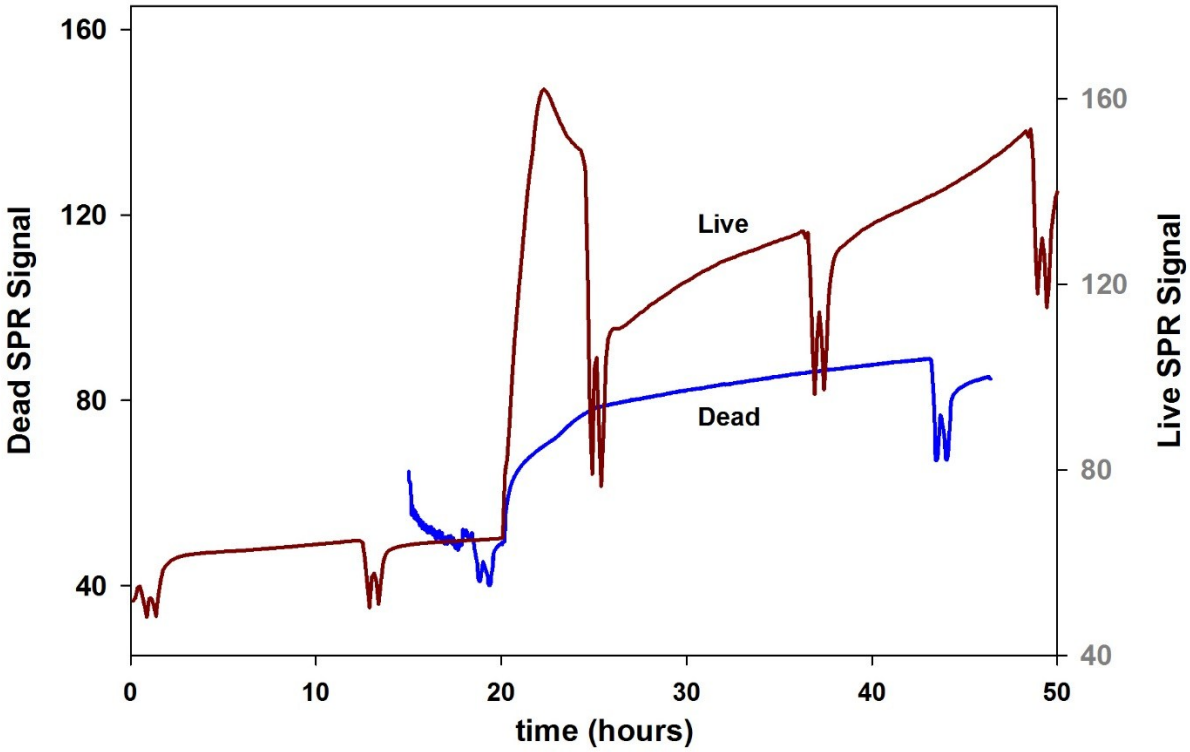

Figure S4. Compare inoculation with live and dead cells. Inoculated the SPR chamber with Geobacter that was heat-killed (50 deg C for 5 hours). Live (brown) and dead (blue) responses are shown.

Phase delay of SPR signal Data. Data presented in Fig 2 of the main text shows SPR response for different stages of biofilm growth. While the potentiostat current is in phase with the potential sweep, i.e. the current peaks occur at the same time as the potential peaks, the SPR signal peaks are delayed slightly. This delay became smaller as the biofilm matured. Fig S5 shows the SPR signal delay, as a percent of the CV scan period, for the different growth stages. Near full maturity, the SPR signal lagged by ~ 5% of the period.

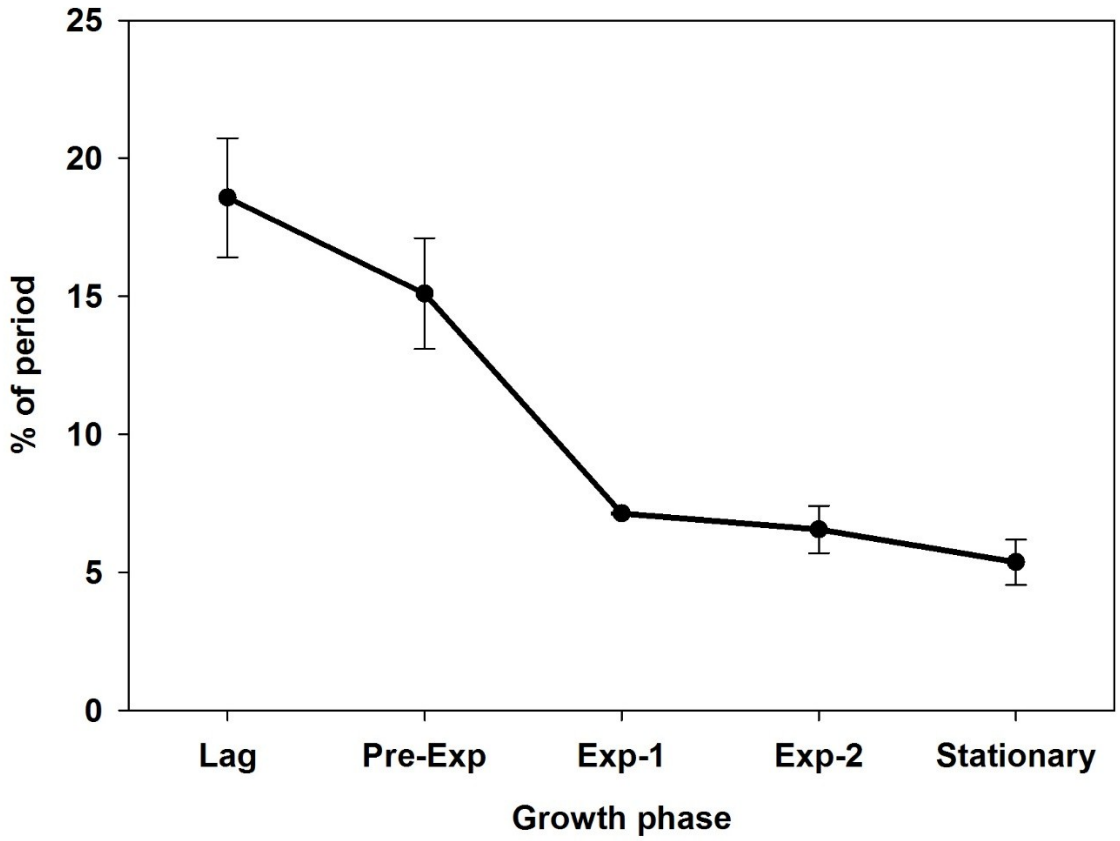

Figure S5. SPR Phase lag decreases with biofilm maturity. Shown is SPR phase lag (as % of CV scan period) for different stages of biofilm growth.

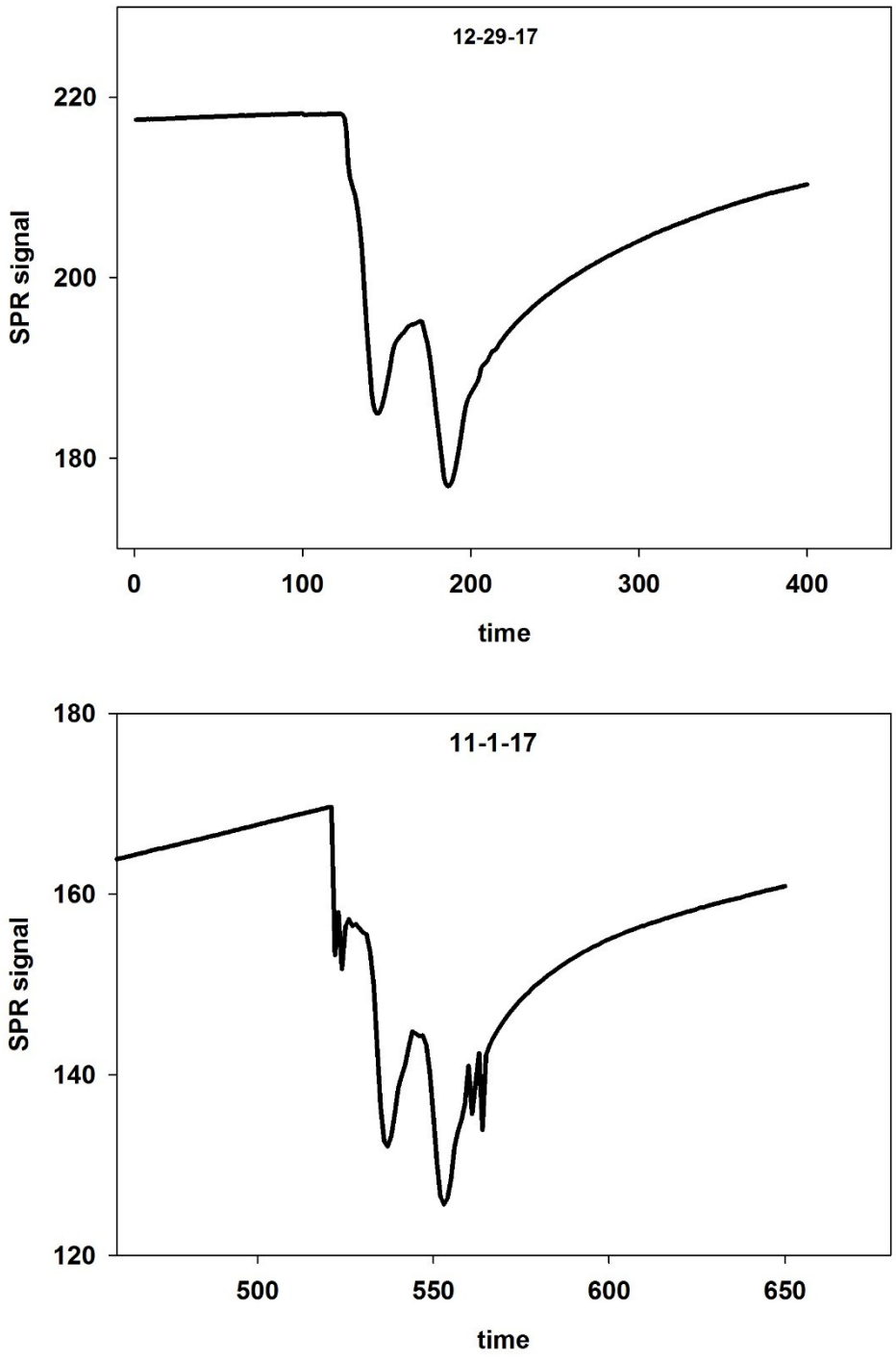

Figure S6. Other examples of trapping.

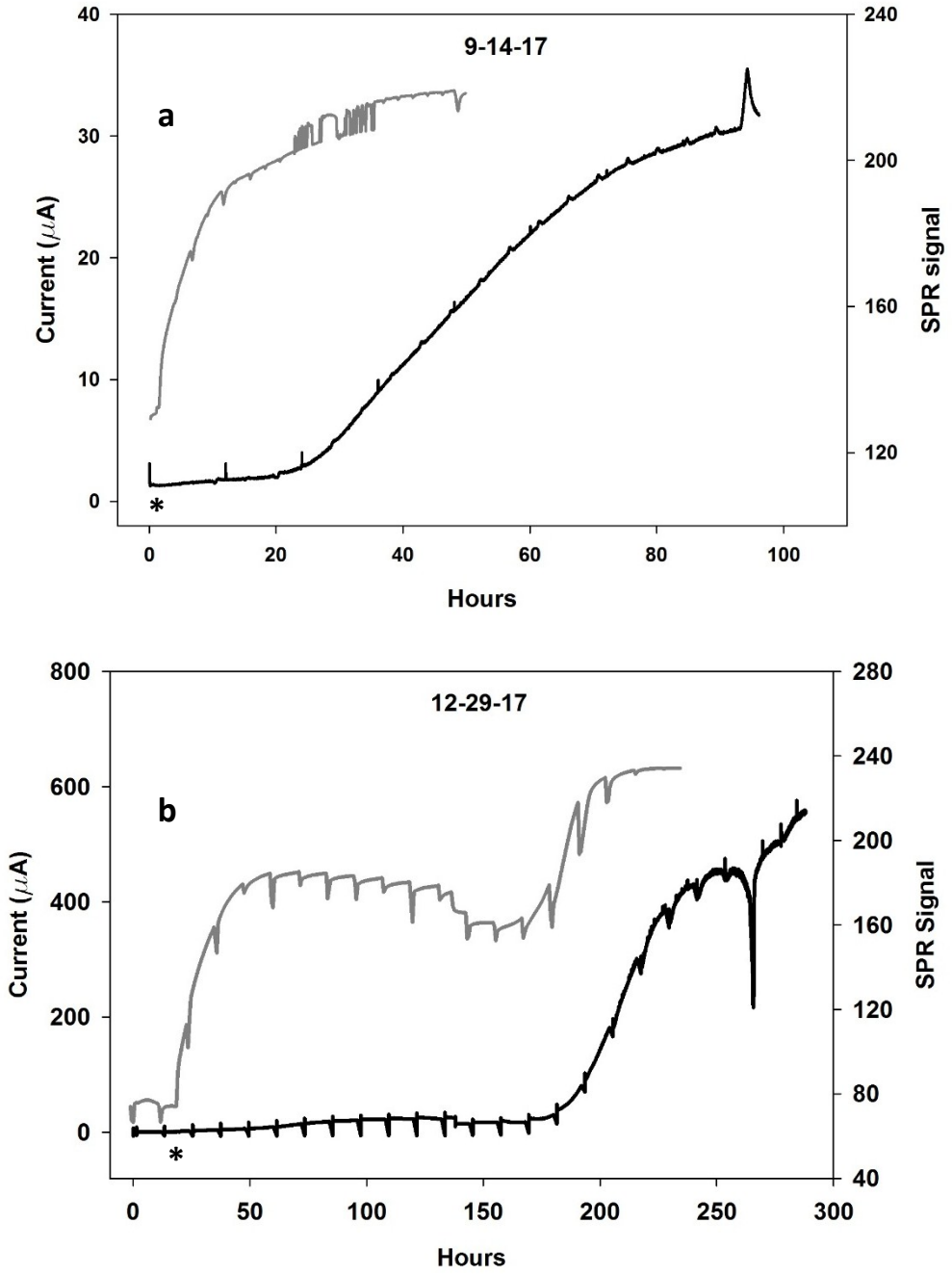

Figure S7. Other examples of SPR signal and current during Chronoamperometry. SPR signal (gray) shows increase upon inoculation (*), and plateau's well before significant current appears (black). Panel b shows slight current after inoculation, and then significant current growth after a long lag phase.