Electronic Supplementary Material (ESI) for Analyst.

Supplementary Material

Predicting Neural Recording Performance of Implantable Electrodes

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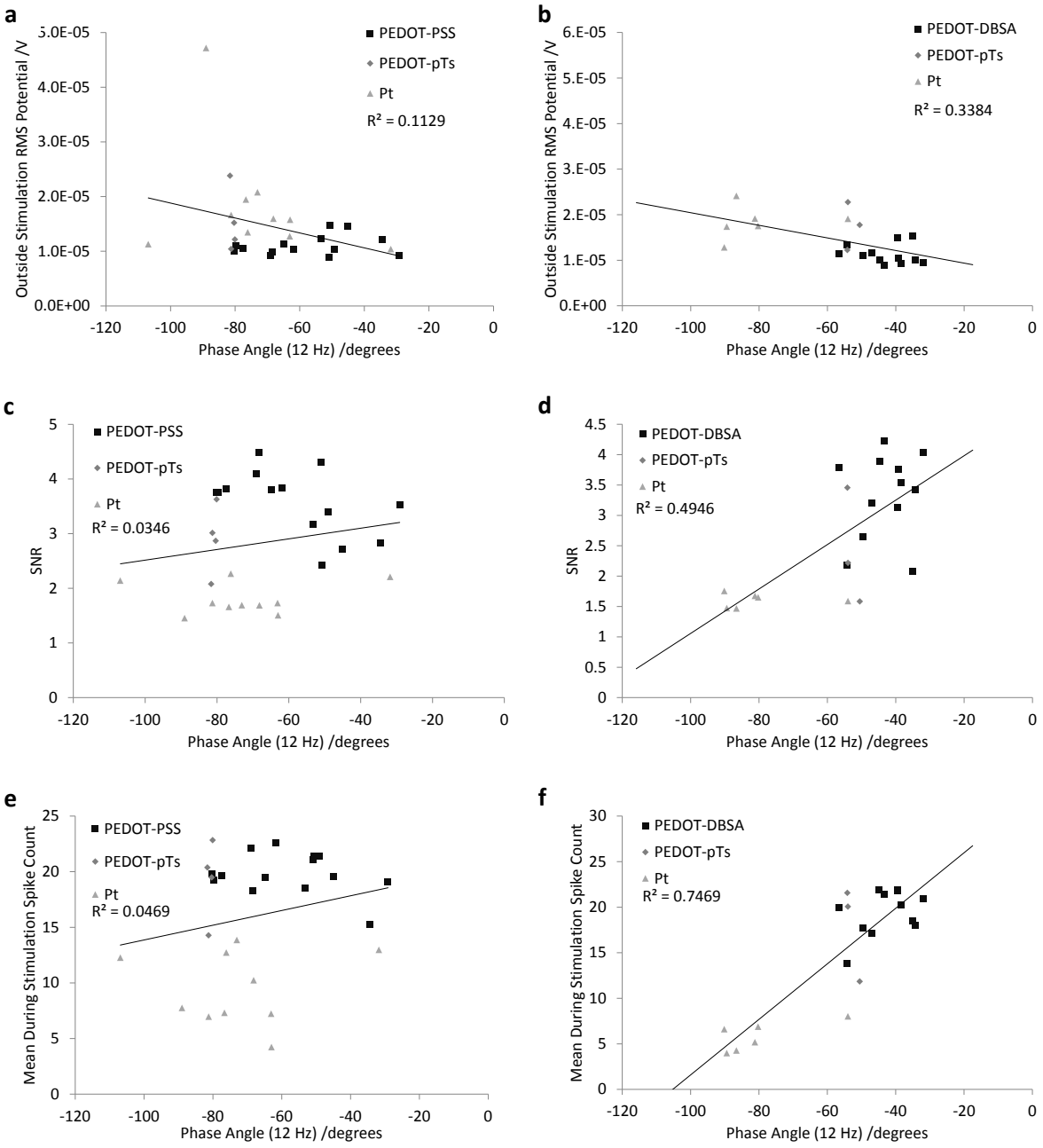

Figure S1: Phase angle at 12 Hz at (a, c, e) PEDOT-PSS and (b, d, f) PEDOT-DBSA modified electrodes versus (a-b) RMS_{bkgd}, (c-d) SNR and (e-f) mean during stimulation spike count. The fitted trendlines are linear curves.

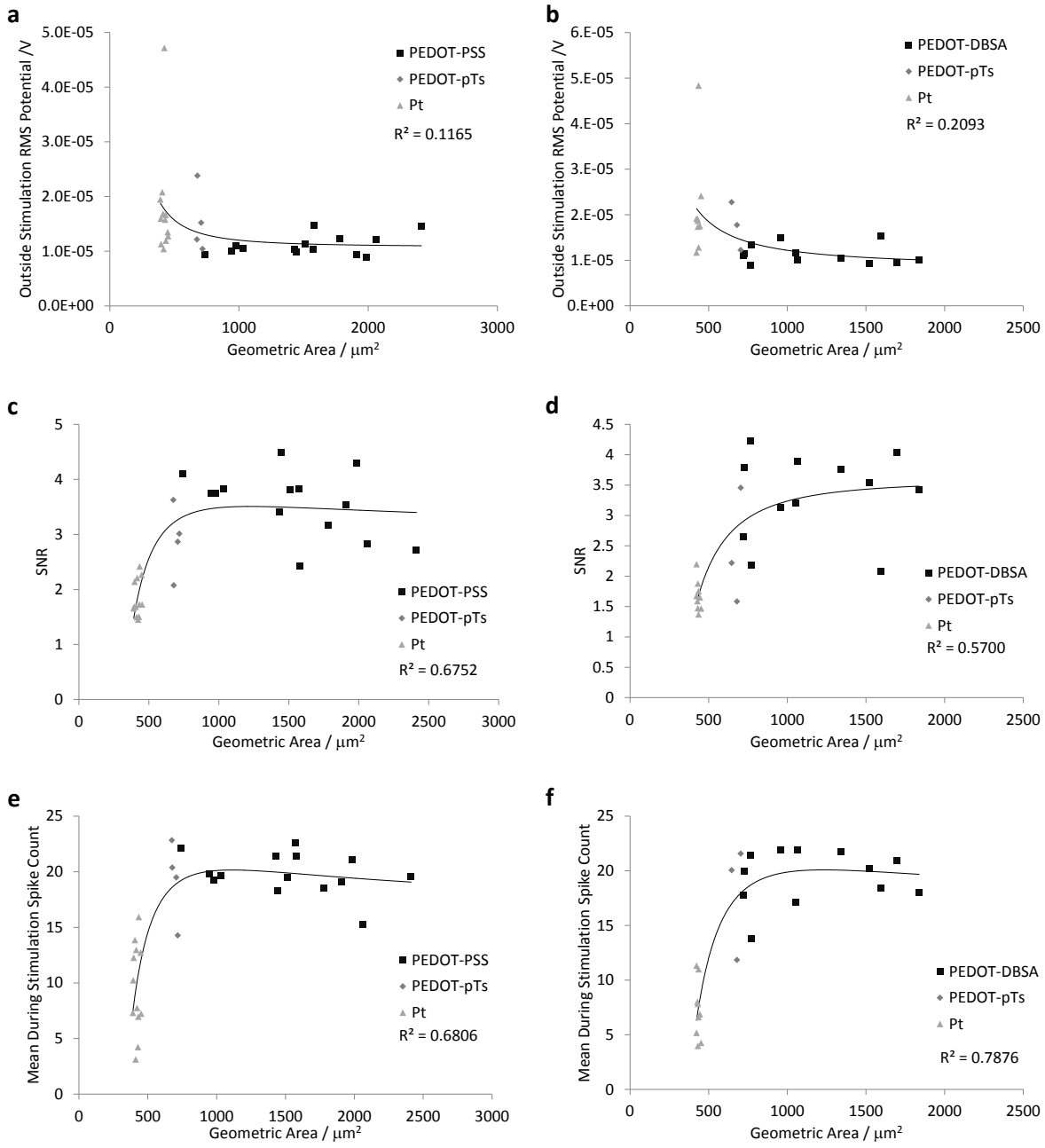

Figure S2: Optically measured electrode area of (a, c, e) PEDOT-PSS and (b, d, f) PEDOT-DBSA modified electrodes versus (a-b) RMS_{bkgd}, (c-d) SNR and (e-f) mean during stimulation spike count. The fitted trendlines are of the form $Z = \frac{a}{A^2} + \frac{b}{A} + c$.

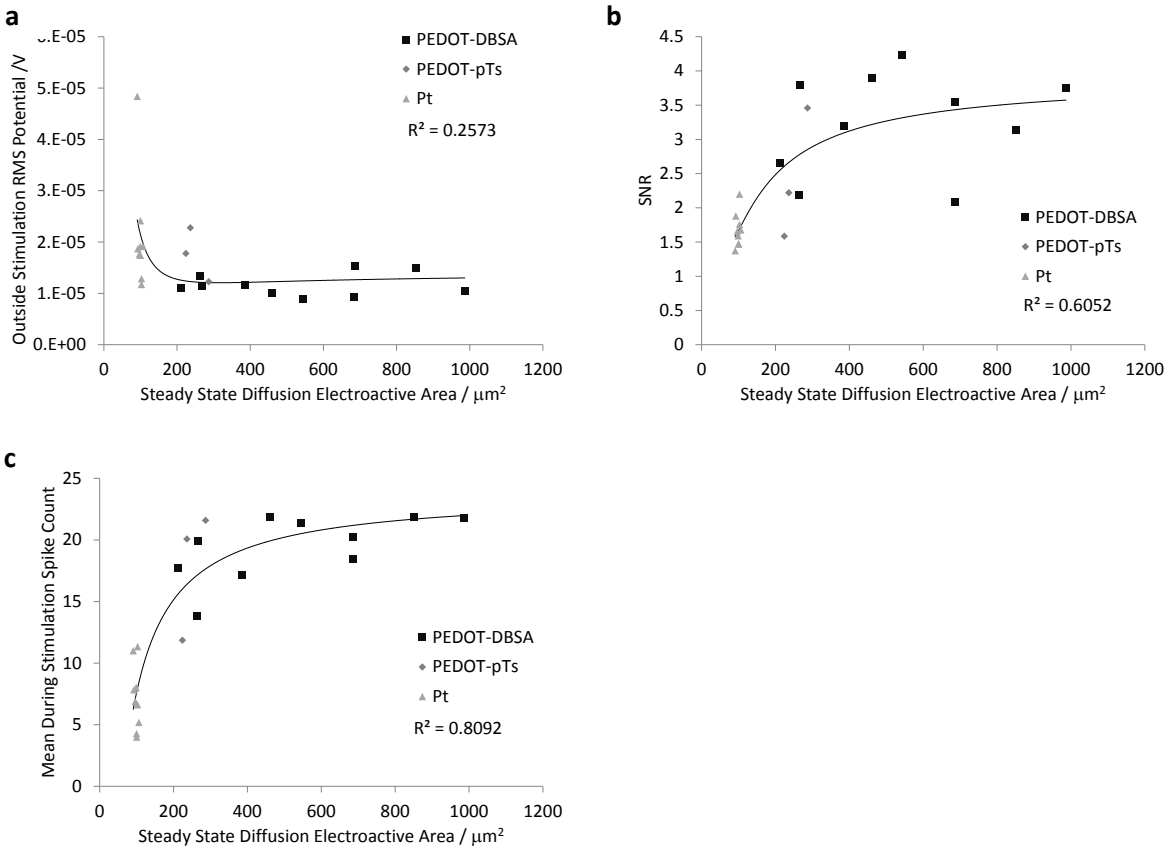

Figure S3: Electrochemically measured electrode area by reduction of 5 mM $Ru(NH_3)_6^{3+}$ with steady state diffusion at PEDOT-DBSA modified electrodes versus (a) RMS_{bkgd}, (b) SNR and (c) mean during stimulation spike count. The fitted trendlines are of the form $Z = \frac{a}{A^2} + \frac{b}{A} + c$.

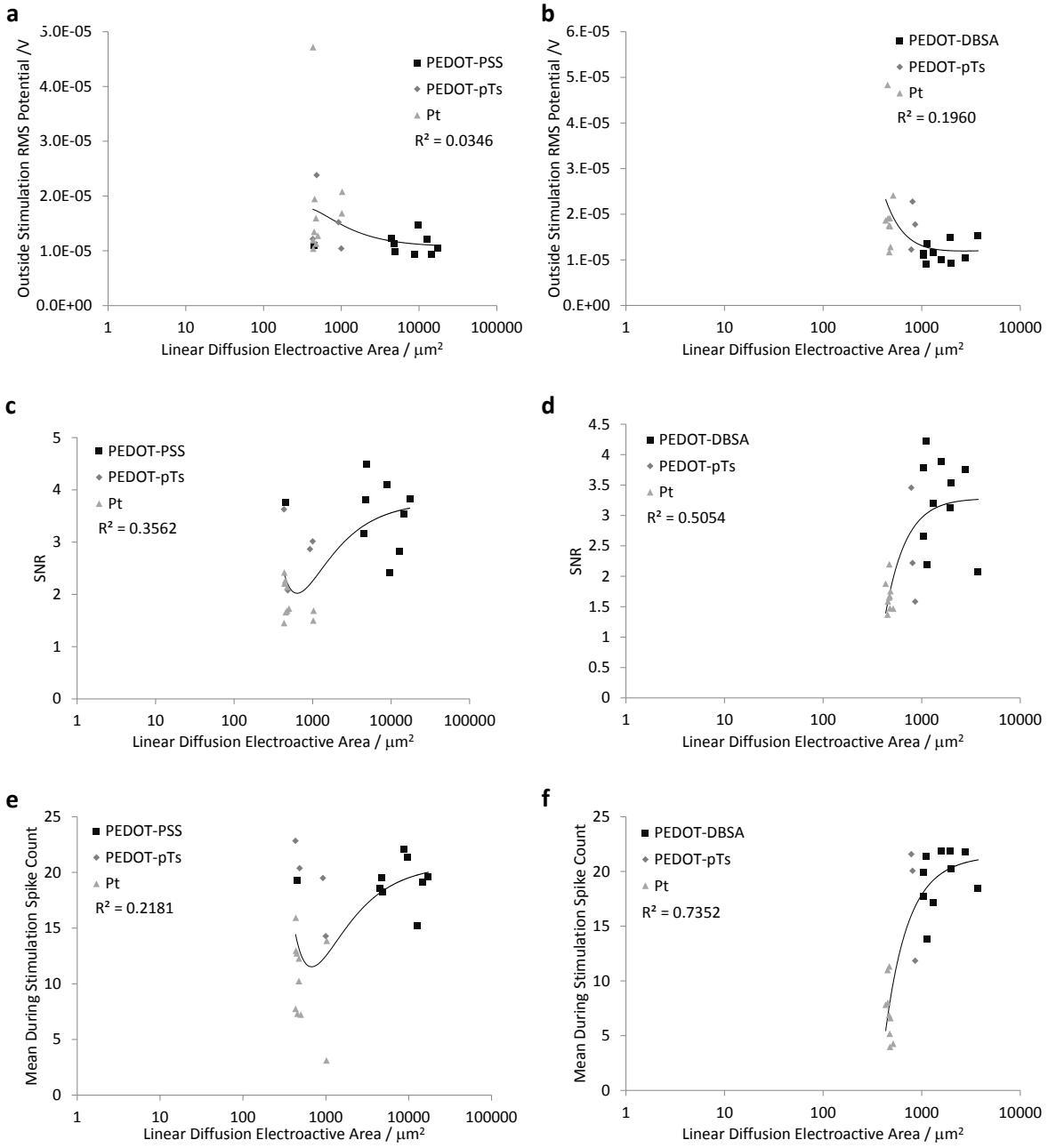

Figure S4: Electrochemically measured electrode area by reduction of 5 mM $Ru(NH_3)_6^{3+}$ with linear diffusion at (a, c, e) PEDOT-PSS and (b, d, f) PEDOT-DBSA modified electrodes versus (a-b) RMS_{bkgd}, (c-d) SNR and (e-f) mean during stimulation spike count. The fitted trendlines are of the form $Z = \frac{a}{A^2} + \frac{b}{A} + c$.

Table S1. Signal-to-noise ratio average of standard deviation in the IC for multiunit activity and local field potentials.

Polymer coating	Multiunit Activity	Local Field Potentials
15s PEDOT-PSS	1.18	0.53
30s PEDOT-PSS	1.57	0.49
45s PEDOT-PSS	0.96	0.36
60s PEDOT-PSS	0.91	0.61
45s PEDOT-pTs	0.64	0.44
Uncoated	0.19	0.12

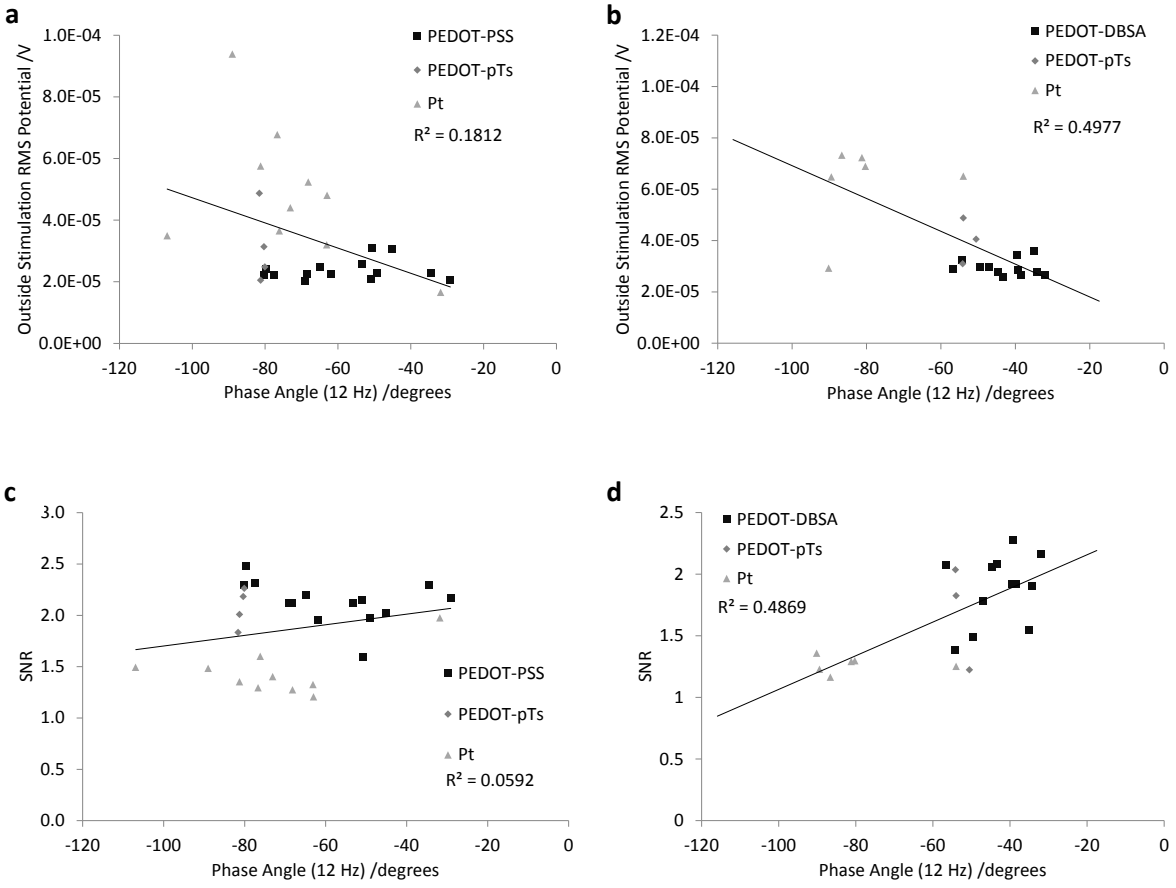

Figure S5: Phase angle at 12 Hz at (a, c, e) PEDOT-PSS and (b, d, f) PEDOT-DBSA modified electrodes versus local field potential (a-b) RMS_{bkgd} and (c-d) SNR. The fitted trendlines are linear curves.

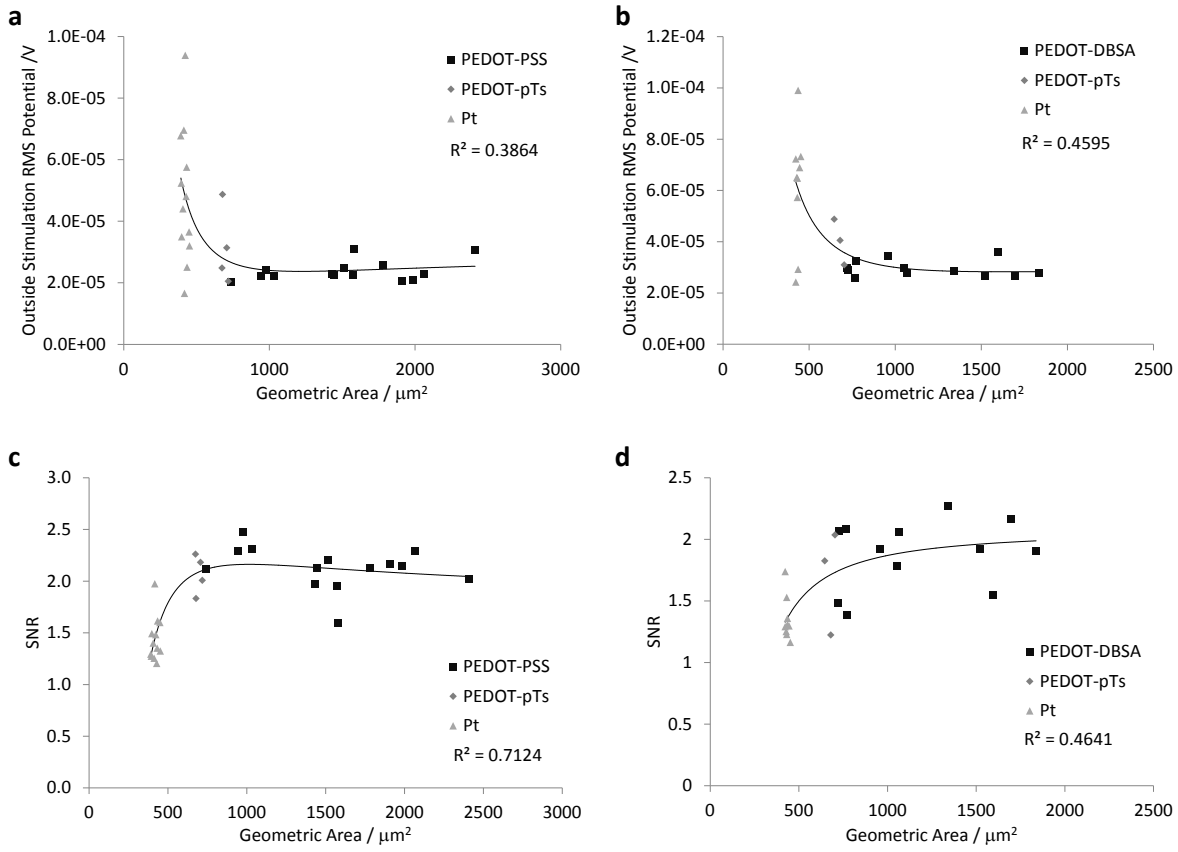

Figure S6: Optically measured electrode area of (a, c, e) PEDOT-PSS and (b, d, f) PEDOT-DBSA modified electrodes versus local field potential (a-b) RMS_{bkgd} and (c-d) SNR. The fitted trendlines are of the form $Z = \frac{a}{A^2} + \frac{b}{A} + c$.

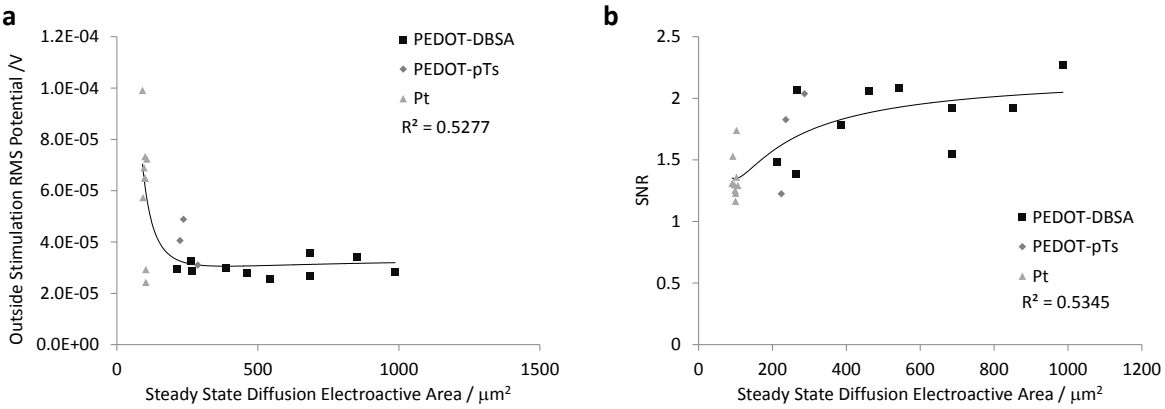

Figure S7: Electrochemically measured electrode area by reduction of 5 mM $Ru(NH_3)_6^{3+}$ with steady state diffusion at PEDOT-DBSA modified electrodes versus local field potential (a) RMS_{bkgd} and (b) SNR. The fitted trendlines are of the form $Z = \frac{a}{A^2} + \frac{b}{A} + c$.

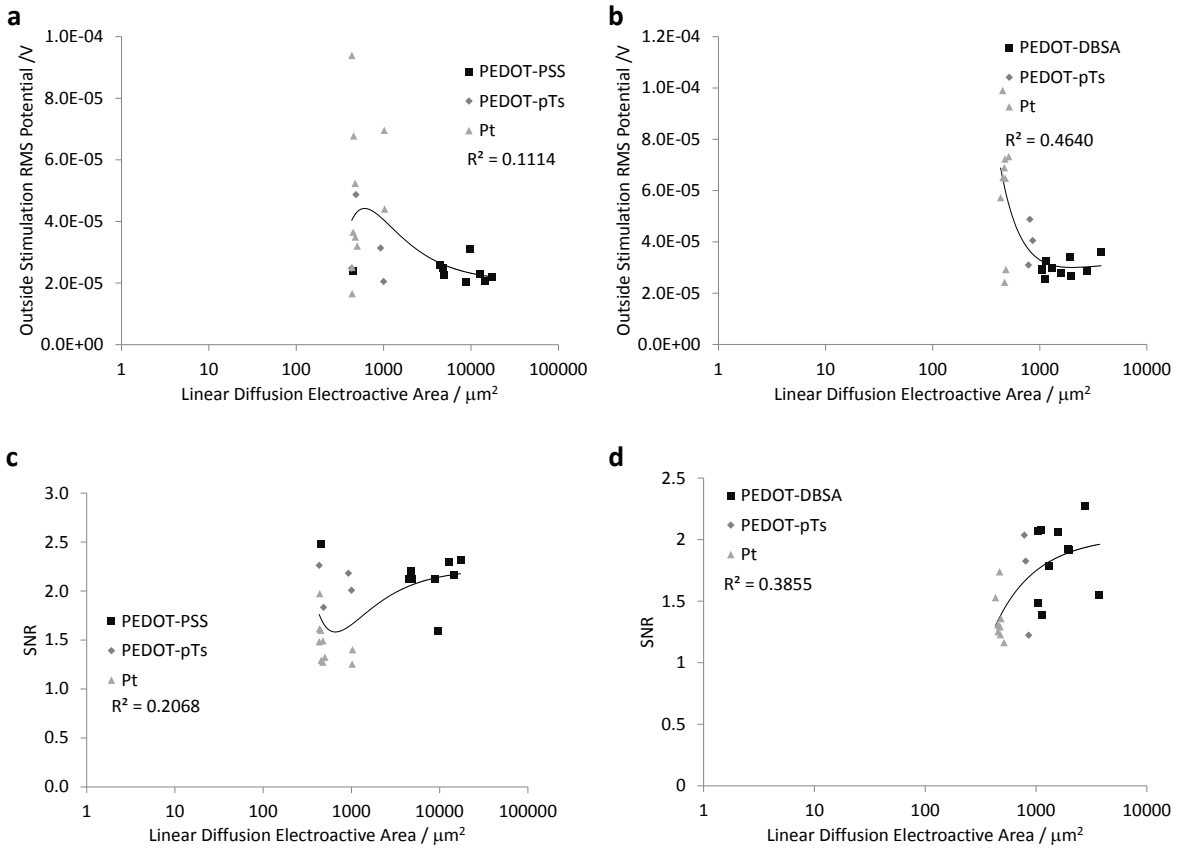

Figure S8: Electrochemically measured electrode area by reduction of 5 mM $Ru(NH_3)_6^{3+}$ with linear diffusion at (a, c, e) PEDOT-PSS and (b, d, f) PEDOT-DBSA modified electrodes versus local field potential (a-b) RMS_{bkgd} and (c-d) SNR. The fitted trendlines are of the form $Z = \frac{a}{A^2} + \frac{b}{A} + c$.