

Supplementary material

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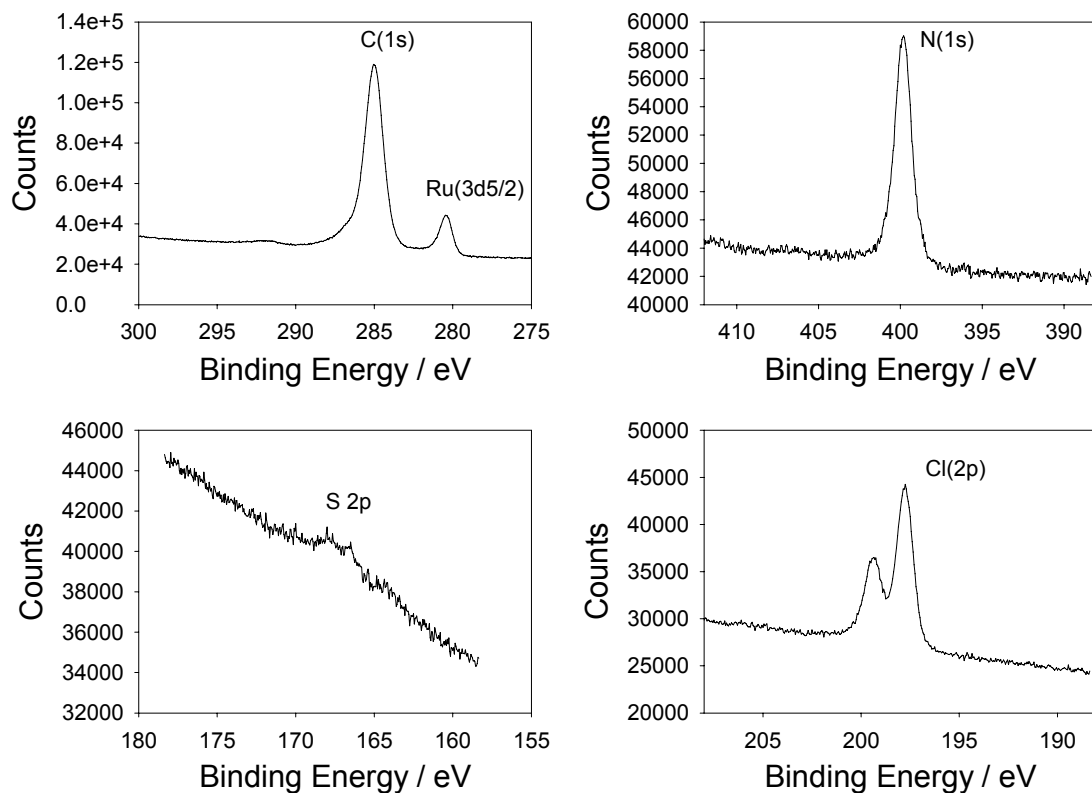


Fig. S1: XPS spectra for as deposited electropolymerised $\text{Ru}(\text{vpy})_4\text{Cl}_2$ film showing C(1s), Ru(3d), N(1s), S(2p) and Cl(2p) regions.

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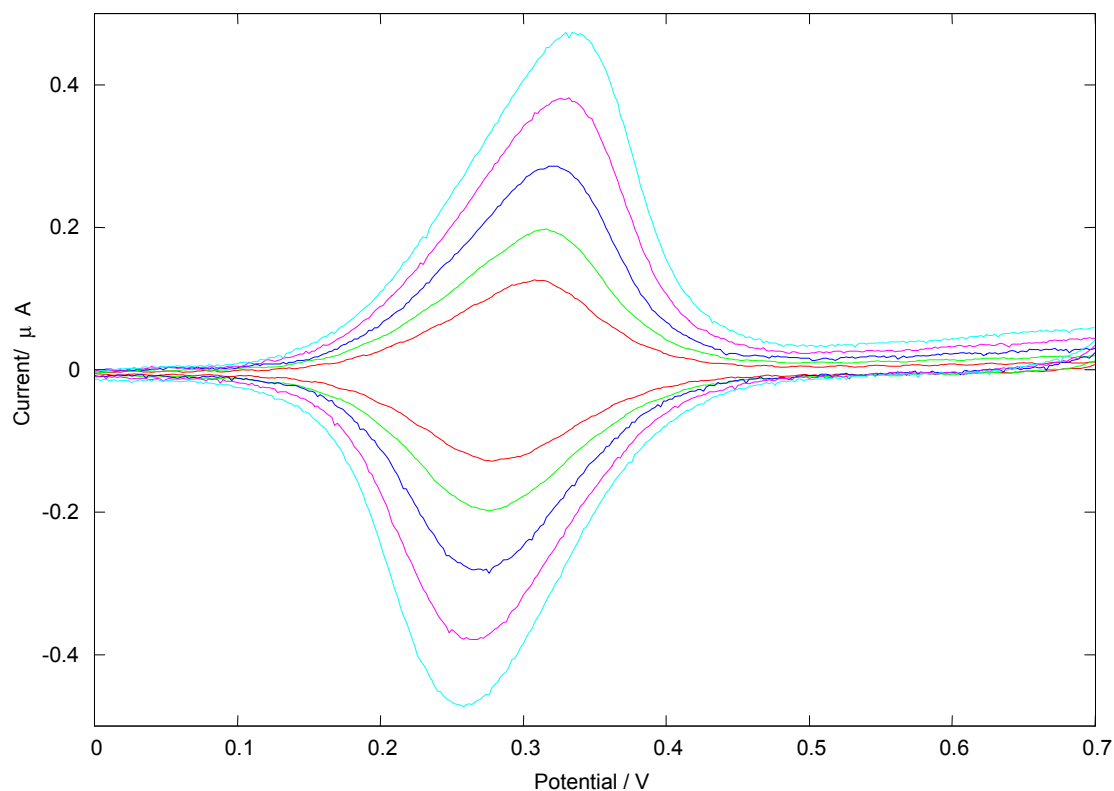


Fig S2: CVs for Ru polymer with a coverage of 28 nmol cm⁻² on a 25 μm diameter microelectrode with scan rates of 1,2,3,4,5 V s⁻¹.

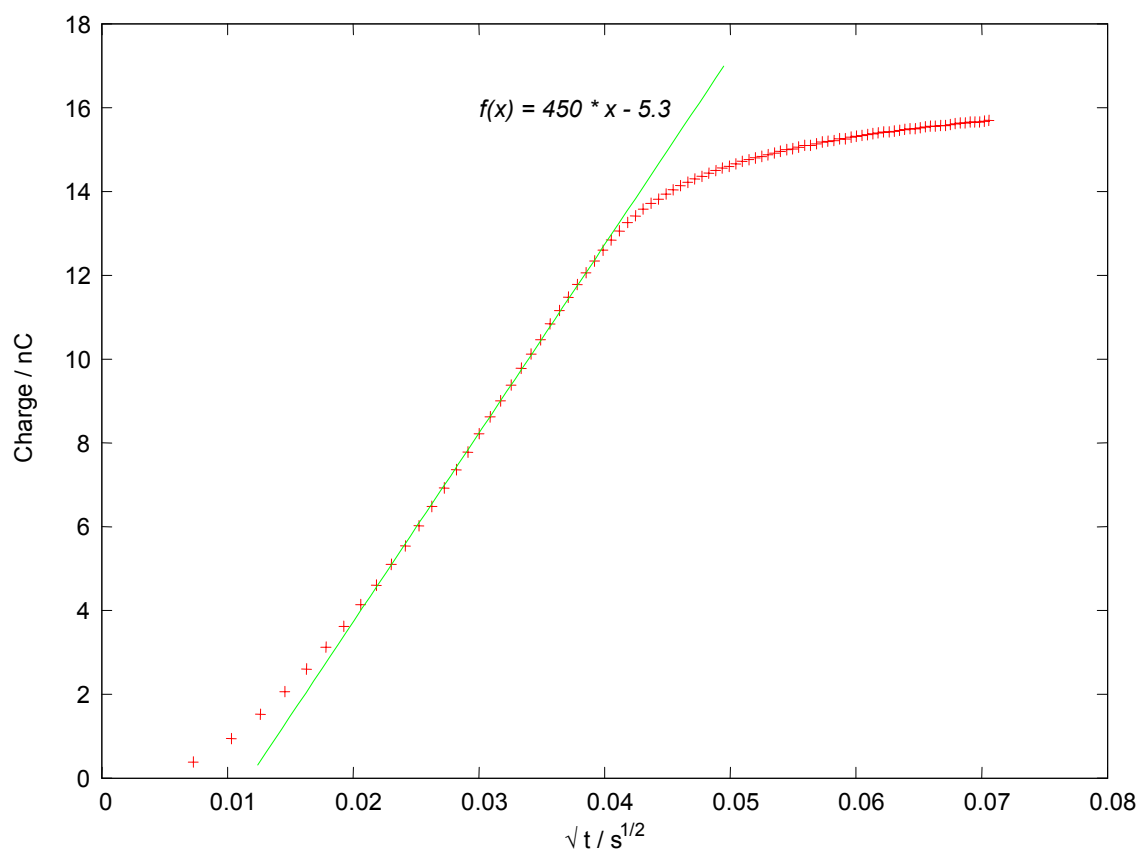
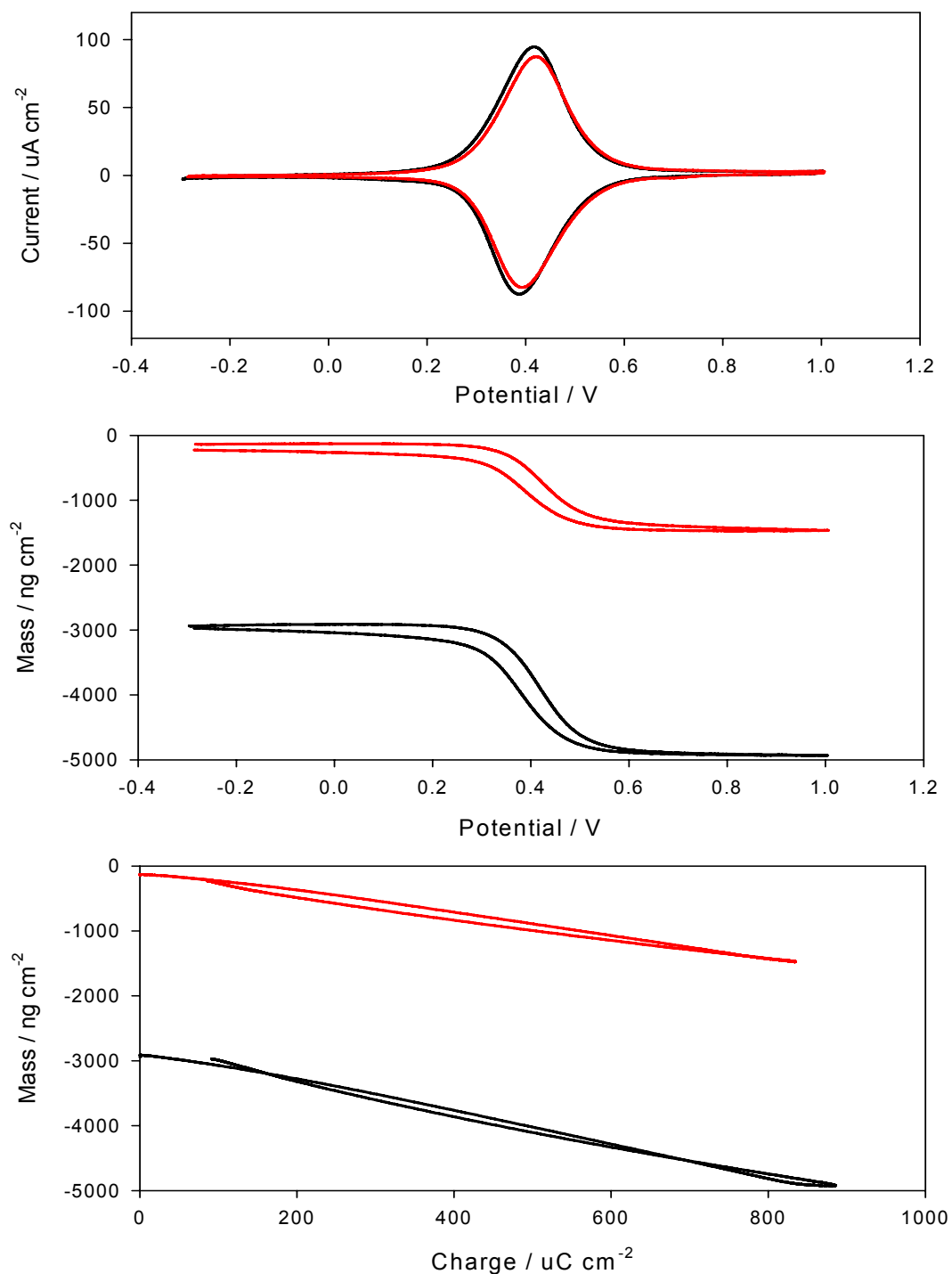


Fig S3: Chronocoulometry plot for Ru polymer with a coverage of 28 nmol cm^{-2} on a $25 \text{ }\mu\text{m}$ diameter $15 \text{ }\mu\text{m}$ microelectrode (as in Fig. S2) from 0.0 V to $+0.6 \text{ V}$ with step time of 5 ms . The slope was taken from the region of the plot between x values of 0.02 and 0.04 . After this time the curve reaches the saturation charge associated with the full conversion of Ru(II) sites to Ru(III) . The deviation at short times is associated with the resistance of the cell.



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Fig. S4: Black traces $\text{Ru}^{2+/3+}$ CVs vs. Ag/AgCl in background electrolyte I immediately after deposition (i.e. without drying the film); grey traces, CVs after rinsing and drying film followed by re-immersion background electrolyte. Mass zero offset to value of dried film immersed in solvent.

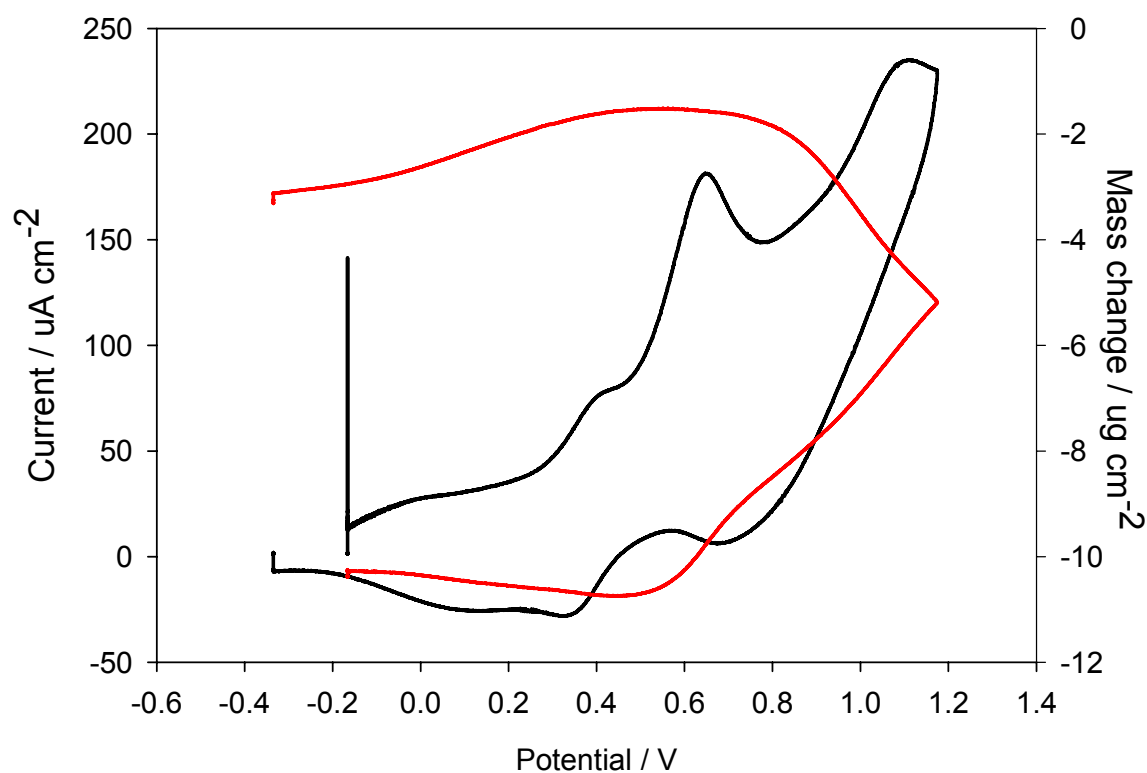


Fig. S5: Mass changes (grey line) of a bare Au QCM electrode during redox sweep of bulk reduced Ru^{2+} solution after bulk reductive electrolysis. Black, current trace shows substantial loss of $\text{Ru}^{2+/3+}$ activity at 0.4 V (corresponding to Ru species with Cl^- ligands) and peak at +0.6 V is accompanied by mass loss indicating dissolution of the Au electrode. Ag/AgCl reference.