Electronic Supporting Information (ESI)

Fabrication of Co-Planar Screen Printed Microband Electrodes; Jonathan P. Metters, Rashid O. Kadara and Craig E. Banks*

ESI Fig 1. Dependence of the peak current on the voltammetric scan rate obtained in 1 mM hexaammine-ruthenium (III) chloride / 0.1 M KCl using the graphite-bSPE.

ESI Fig 2. Image of the graphite-bSPE arrays, left $N = 3$ and right $N = 4$. 
**ESI Fig. 3** Typical cyclic voltammetric traces obtained in 1 mM hexaammine-ruthenium (III) chloride / 0.1 M KCl using the graphite-bSPE (solid line) and at arrays of graphite-bSPE; $N = 3$ (dashed line) and $N = 4$ (dotted line). Scan rate: 5 mV/s.

**ESI Fig. 4** Typical cyclic voltammetric responses observed through scan rate studies (5 – 200 mV/s) using the gold-bSPE at 1 mM hexaammine-ruthenium (III) chloride in 0.1 M KCl.
Calculation of diffusion interaction between neighbouring microband electrode comprising the array presented in ESI figure 2:

It is inferred that the diffusion layer is given (in 3D) by:

$$\delta = \sqrt[6]{6D \left( \frac{\Delta E}{\nu} \right)}$$

(1)

If we consider the graphite-bSPE arrays shown in ESI figure 2, there should be no diffusion layer interaction between neighbouring microbands such that the diffusion layer, $\delta$, must be less than $f_{\text{greater}}$, as given by:

$$f_{\text{greater}} = \left( \frac{d_{\text{centre}}}{2} \right) - \left( \frac{d_{\text{electrode}}}{2} \right)$$

(2)

where $d_{\text{centre}}$ is the centre-to-centre separation between the electrodes and $d_{\text{electrode}}$ is the diameter $D$ is the diffusion coefficient, $\nu$ the voltammetric scan rate employed and $\Delta E$ is the potential range over which electrolysis has occurred. When a single array comprising three graphite-bSPE is utilised, $N = 3$ while when four graphite-bSPE is used, $N = 4$, the diffusion layer, $\delta$, can be estimated over the range of experimentally utilised scan rates which spans between 112.7 and 567.5 $\mu$m for the fastest (200 $\text{mVs}^{-1}$) and slowest (5 $\text{mVs}^{-1}$) applied voltammetric scan rates respectively for the three electrode graphite-bSPE array and between 120.2 and 622.6 $\mu$m for the four electrode graphite-bSPE array. Using equation (2) $f_{\text{greater}}$ was deduced for our graphite-bSPE to equate to 2475 $\mu$m. Thus given that the diffusion layer will reach a maximum of 509.1 $\mu$m at the slowest applied voltammetric scan rate (for $N = 4$), the graphite-bSPE has no diffusional interaction/overlapping diffusion layers between the electrodes comprising the array.