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Pencil It In: Pencil Drawn Electrochemical Sensing Platforms

Christopher W. Foster[1], Dale A. C. Brownson[1], Ana P. Ruas de Souza[2], Elena. Bernalte[3], Jesus Iniesta[4], Mauro Bertotti[2] and Craig E. Banks[1*]

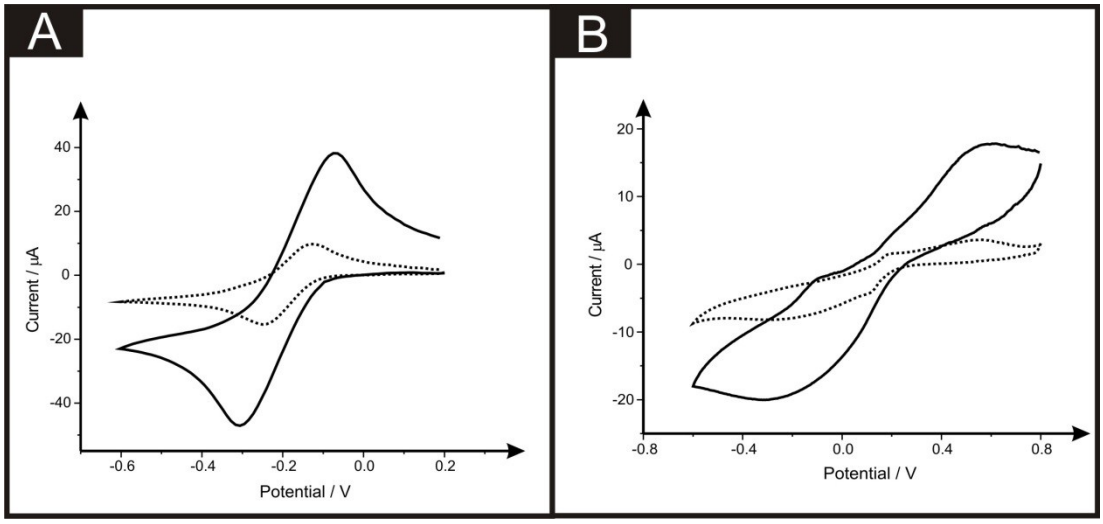
[1]: Faculty of Science and Engineering, School of Science and the Environment, Manchester Metropolitan University, Chester Street, Manchester M15 GD, UK

[2]: Instituto de Química – Universidade de São Paulo, 05508-900, São Paulo, SP, Brazil

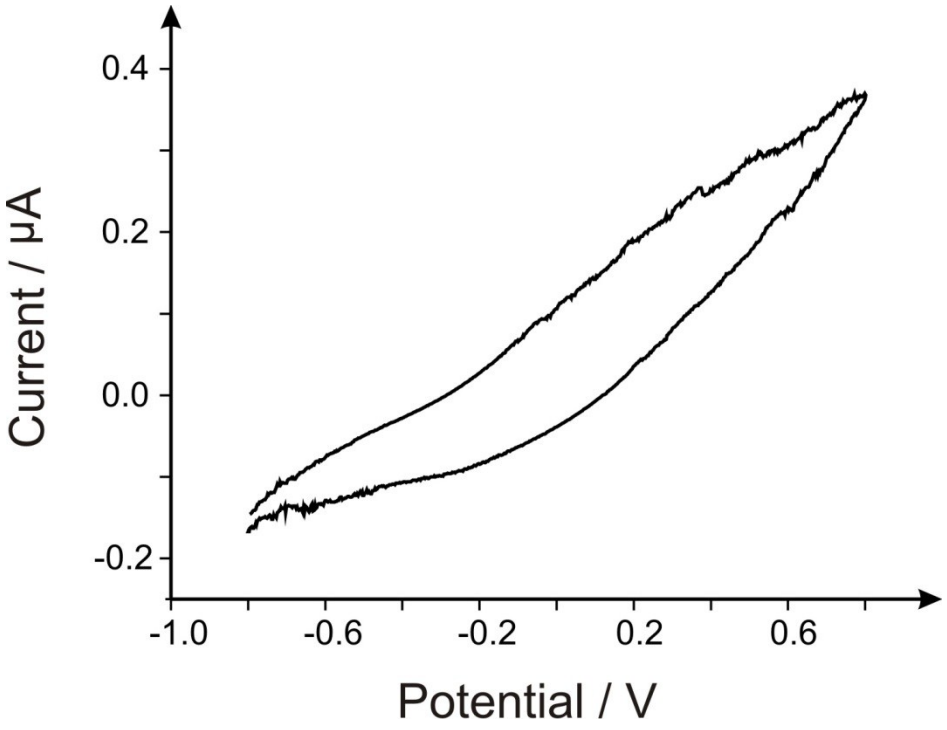
[3]: Departamento de Química Analítica e IACYS, Facultad de Ciencias, Universidad de Extremadura, Avda. de Elvas s/n, 06006, Badajoz, Spain

[4]: Physical Chemistry Department and Institute of Electrochemistry, University of Alicante, 03690 San Vicente del Raspeig, Alicante, Spain

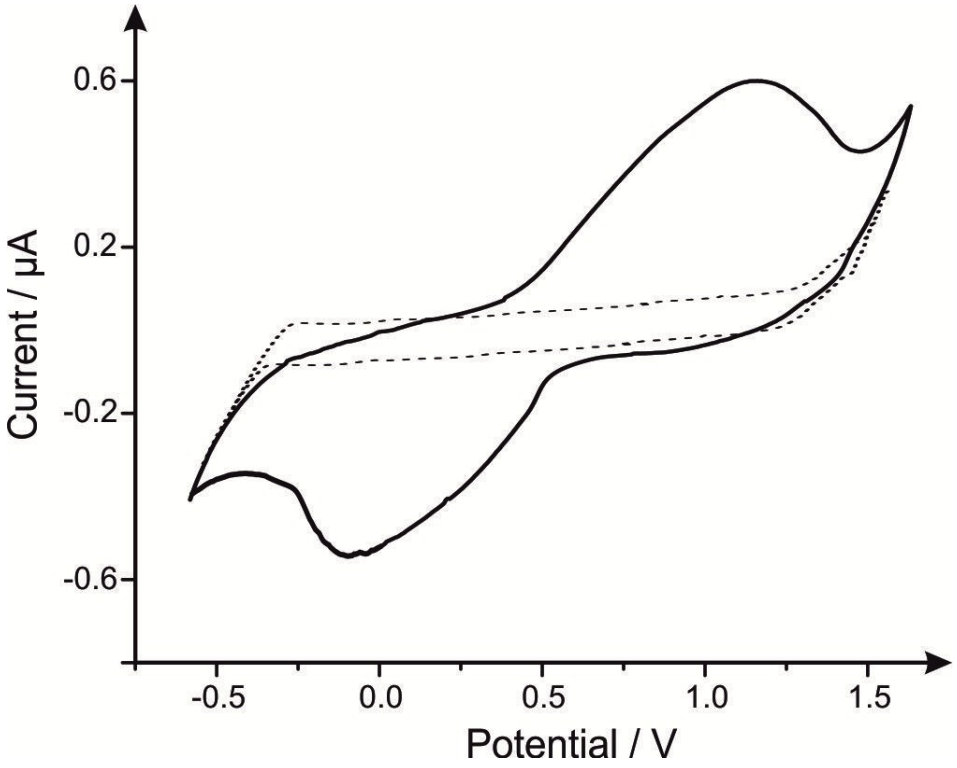
ESI Figure 1: Typical cyclic voltammetric responses towards 1 mM hexaammineruthenium (III) chloride / 0.1 M KCl (A) and 1 mM potassium ferricyanide / 0.1 M KCl (B). Recorded at 5 mV s^{-1} (dotted line) and 100 mV s^{-1} (solid line), using the 6B PDE drawn ten times (*vs.* SCE).



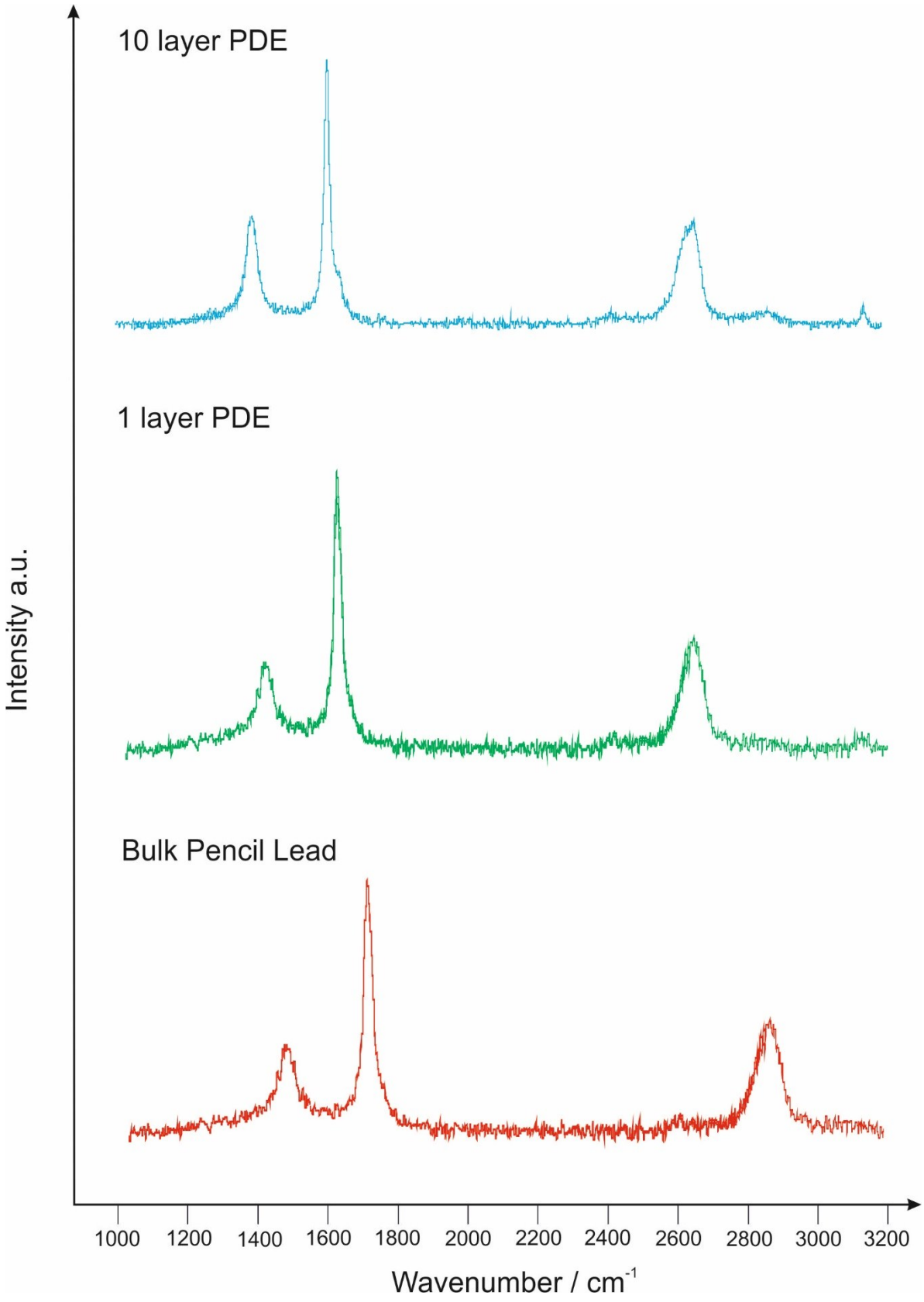
ESI Figure 2: Typical cyclic voltammetric response using the 6B PDE drawn ten times recorded in 1 mM potassium ferrocyanide / 0.1 M KCl. Scan rate: 100 mV s^{-1} (*vs.* SCE). *Note that this figure reiterates that electrochemical processes requiring an electrochemical oxidation step first, give rise to featureless voltammetric profiles.*



ESI Figure 3: Typical cyclic voltammetric response using the 6B PDE drawn ten times recorded in 1 mM ammonium iron (II) sulfate / 0.2 M $HClO_4$. Scan rate: 25 mV s^{-1} (*vs.* SCE).



ESI Figure 4: Raman spectra for the bulk 6B pencil lead (red line; pencil lead analysis as received), 6B PDE drawn one time (green line) and ten times (blue line).



ESI Table 1: De-convoluted data from the XPS spectra for the bulk 6B pencil lead (prior to fabricating PDEs) and assignments based on binding energies (BE).

Element	Element atom %	Assignment	Atom %	BE / eV
C 1s	91.92	Graphite	37.17	284.5
		C-C	39.98	285.2
		C-O / C-O-C / C-OH	11.40	286.2
		-O / C=O	3.37	289.5
O 1s	7.90	C-O / C-OH	6.07	532.4
		-O / C=O	1.83	534.0

ESI Table 2: Anodic stripping voltammetry of lead (II) and cadmium (II) utilising a 6B PDE as a function of different times drawn. Deposition time and potential of 120 seconds and -1.5 V (*vs.* SCE) respectively; $N = 3$.

	Lead (II)		**Cadmium (II)**	
Times Drawn	Average Peak Height / μA	% RSD	Average Peak Height / μA	% RSD
1	1.7	4.8	0.08	5.2
3	3.6	4.6	0.30	5.0
5	4.7	4.9	0.57	5.0
10	5.5	4.8	0.60	4.8