Supplementary information



Fig. S1 (A) Chronocoulometric response curves obtained in 1×10^{-4} mol L⁻¹ [Fe(CN)₆]^{3-/4-} containing 1.0 mol L⁻¹ KCl of bare GCE (a), PDDA-GR/GCE (b) and PDDA-GR-Pt/GCE (c). (B) The plots of Q-t^{1/2}.

Chronocoulometry was applied to measure the active areas of modified electrodes. Bare GCE, PDDA-GR/GCE and PDDA-GR-Pt/GCE in 1×10^{-4} mol L⁻¹ Fe(CN)₆^{3-/4-} containing 1.0 mol L⁻¹ potassium chloride. Extracting data from Fig. S1A (Q-t), the linear relations between Q and t^{1/2} were obtained (Fig. S1B) and were expressed as: Q(10⁻⁵ C) = 0.3689 t^{1/2} + 1.7487, R² = 0.998 (GCE: curve a), Q(10⁻⁵ C) = 1.0583 t^{1/2} + 2.3716, R² = 0.999 (PDDA-GR/GCE: curve b), Q(10⁻⁵ C) = 1.3772 t^{1/2} + 7.1424, R² = 0.998 (PDDA-GR-Pt/GCE: curve c). Based on Anson's theory [1] formula :

 $Q = \frac{2nFAc(Dt)^{1/2}}{\pi^{1/2}} + Q_{dl} + Q_{ads}$. Where A is the surface area of electrode, D is diffusion coefficient, c is the concentration of the species, t is the potential pulse width, Q_{dl} is the double-layer charge, Q_{ads} is the Faradaic charge. n=1 and D=7.6×10⁻⁶ cm² s⁻¹ [2]. Due to the different value of the slope based on the regression equation of Q-t^{1/2}.

References

[1] F. C. Anson, Anal. Chem. 1964, **36**, 932-934.

[2] B. Rezaei and S. Damiri, Sens. Actuators B, 2008, **134**, 324-331.