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Electronic Supplementary Information

Reduced graphene oxide/platinum nanoparticles/nafion nanocomposite as a novel 2D electrochemical sensor for voltammetric determination of aliskiren

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The electroactive surface area of developed sensor was calculated by CV in 1.0 mM $K_3Fe(CN)_6$ as a probe redox system according to the Randles-Sevcik equation[1];

$$I_p = 2.69 \times 10^5 \, ACn^{3/2}D^{1/2}v^{1/2} \qquad (1S)$$

Where I_p is the peak current (A), A is the electroactive area (cm^2), C is the molar concentration of the probe molecule, n is the number of transferred electron in the redox reaction, D is the diffusion coefficient of probe molecule ($cm^2\ s^{-1}$) and *v* is the scan rate ($V\ s^{-1}$). The number of transferred electron (n) is 1 and diffusion constant (D) is 7.6×10^{-6} $cm^2\ s^{-1}$ for $[Fe(CN)_6]^{3-/4-}$ redox probe system. From the slope of the linear plot of I_p vs. *v*, the electroactive surface areas of GCE and rGO/PtNPs/NFN/GCE were calculated to be 31.00 mm^2 and 40.0 mm^2, respectively.

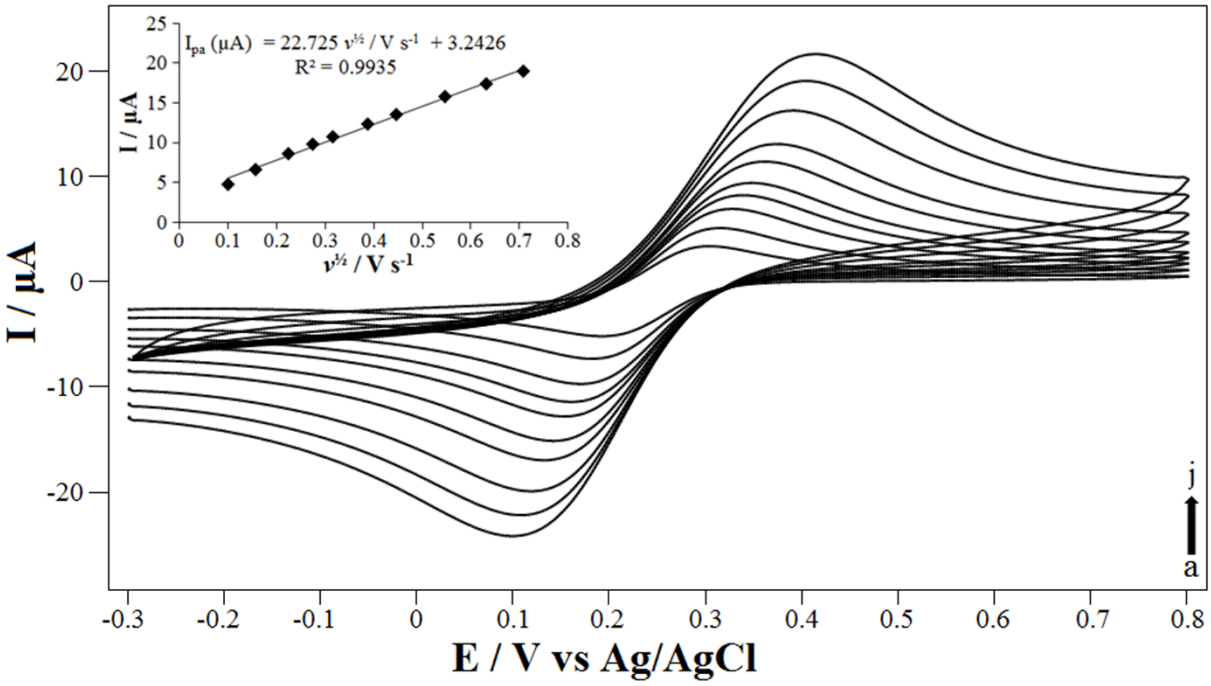

Fig. S1 CVs of 1.0 mM $K_3Fe(CN)_6$ in 0.1 M KNO_3 at various scan rates (a-j) (10, 25, 50, 75, 100, 150, 200, 300, 400 and 500 mV s^{-1}) on GCE (Inset: the slope of I_{pa} vs. $v^{1/2}$ for 1.0 mM $K_3Fe(CN)_6$ on GCE).

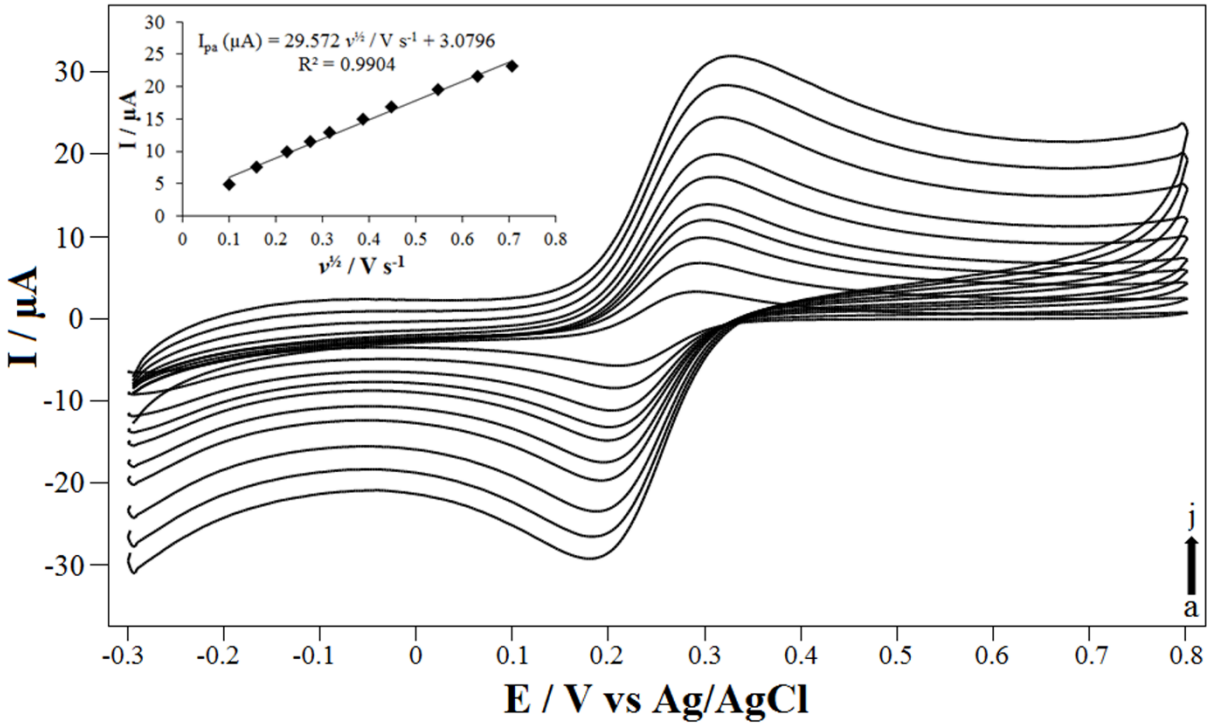

Fig. S2 CVs of 1.0 mM $K_3Fe(CN)_6$ in 0.1 M KNO_3 at various scan rates (a-j) (10, 25, 50, 75, 100, 150, 200, 300, 400 and 500 mV s^{-1}) on rGO/PtNPs/NFN/GCE (Inset: the slope of I_{pa} vs. $v^{1/2}$ for 1.0 mM $K_3Fe(CN)_6$ on rGO/PtNPs/NFN/GCE).

The heterogeneous electron transfer rate constant ($k°$) value for rGO/PtNPs/NFN/GCE was estimated by CV using the Nicholson method[2], which is applicable for reversible electrode reaction. According to the following equation developed by Nicholson,

$$\psi = k^o \left[\frac{\pi D n v F}{RT}\right]^{-1/2} \quad (2S)$$

Where ψ is a kinetic parameter, *D* is the diffusion coefficient of $[Fe(CN)_6]^{3-/4-}$ probe molecule ($D=7.6\times10^{-6}$ cm^2 s^{-1} in supporting electrolyte solution), *n* is the number of transferred electron in the redox reaction, *v* is the scan rate (V s^{-1}), and other symbols (F,R and T) are their usual meaning. k^0 value was calculated as 6.84×10^{-3} using the slope of peak potential separation vs. scan rates ($\Delta E_p - v$) in 1.0 mM $[Fe(CN)_6]^{3-/4-}$ redox solution.

References

1. A.J. Bard, L.R. Faulkner, Electrochemical Methods: Fundamentals and Applications, 2nd edition, John Wiley & Sons, New York, USA, 2001.
2. R.S. Nicholson, Theory and application of cyclic voltammetry for measurement of electrode reaction kinetics, *Anal. Chem.*, 1965, 37, 1351–1355.