Electronic Supplementary Material (ESI) for RSC Advances.


**Supplementary Information**

# Edge-carboxylated graphene anchoring magnetite-hydroxyapatite nanocomposite for efficient 4-nitrophenol sensor†

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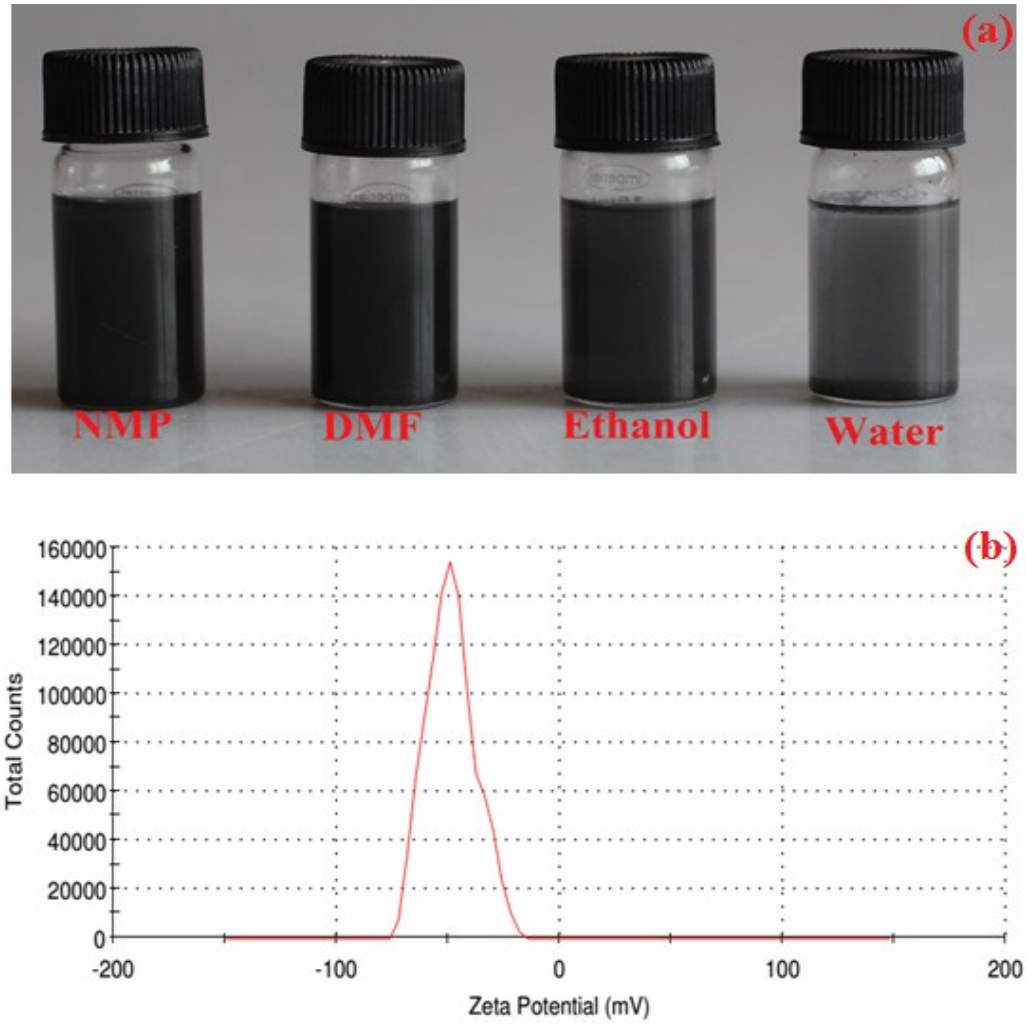
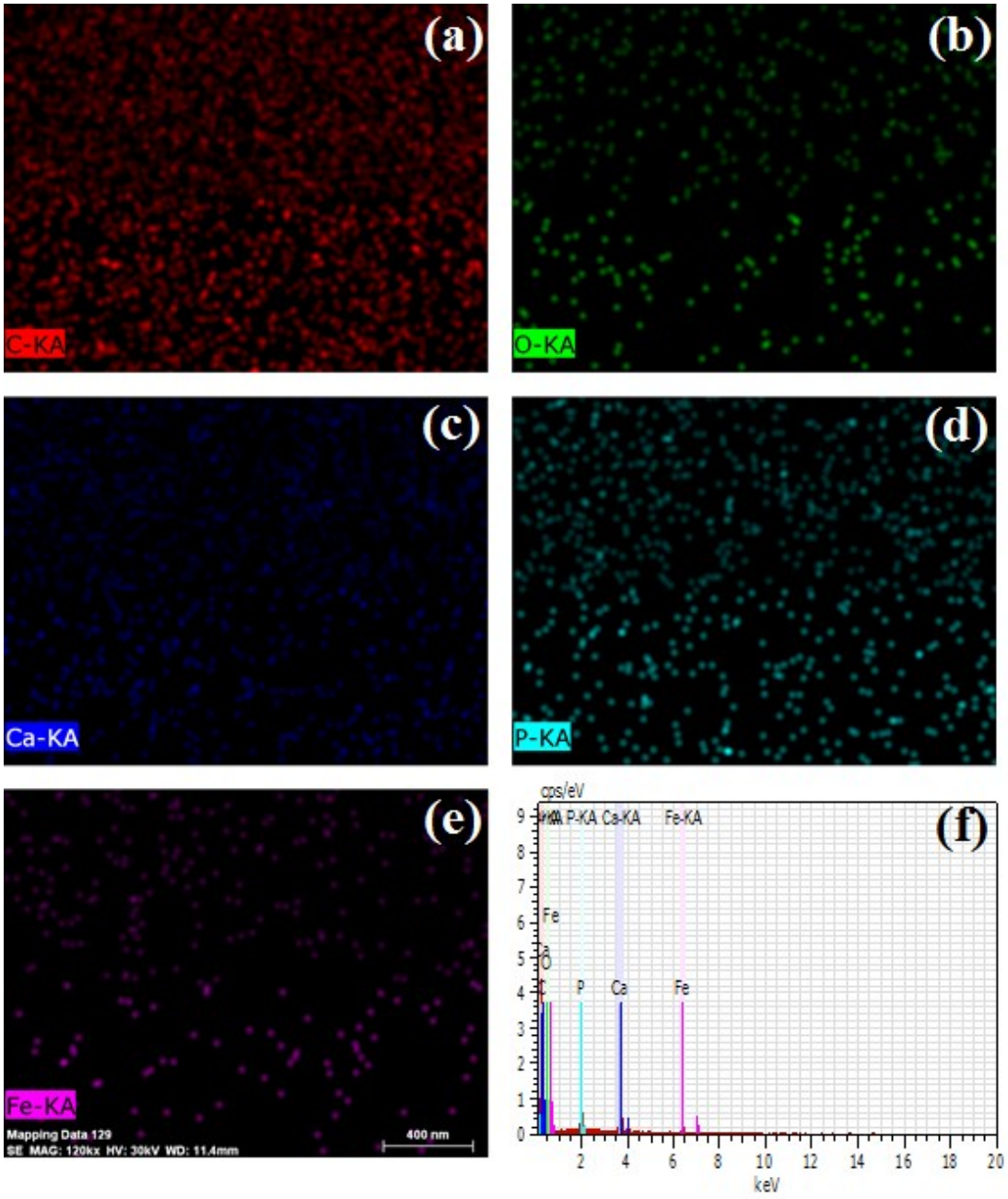
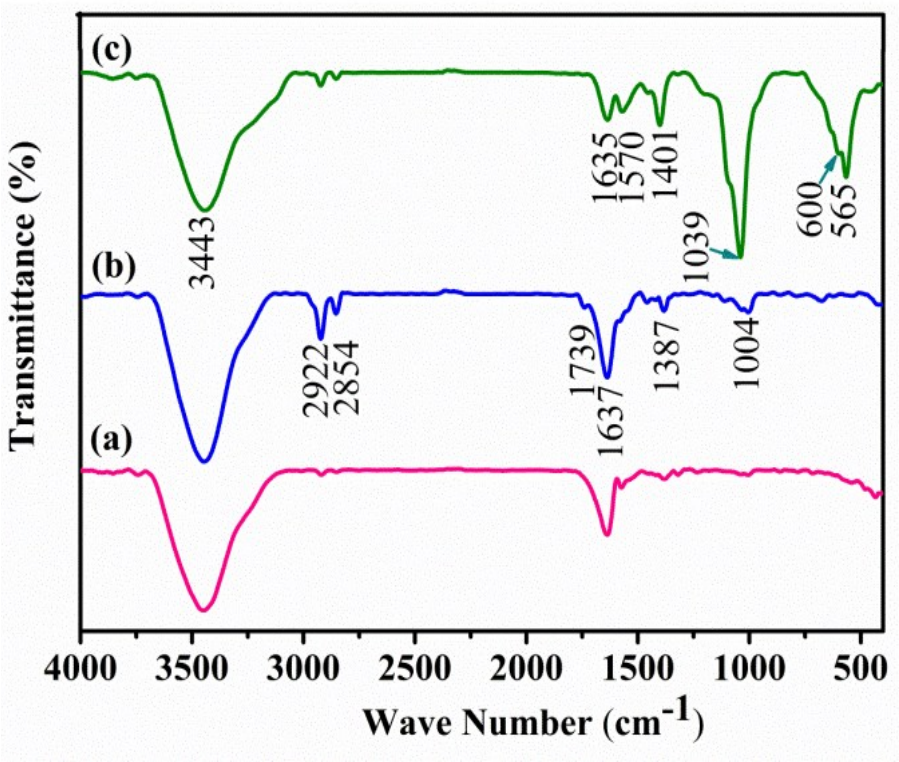


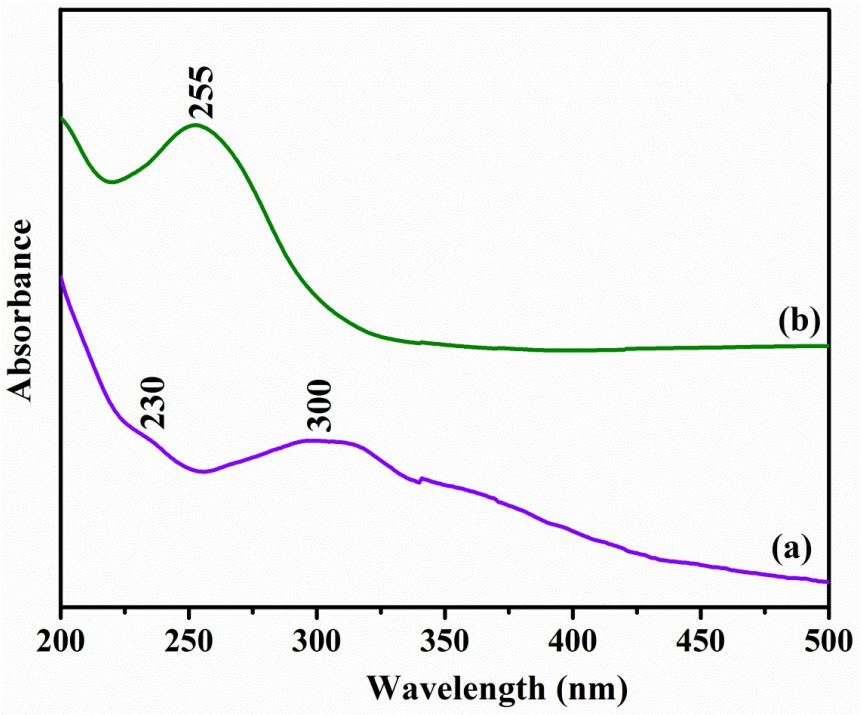

**ESI Fig. 1 (a)** Dispersion of edge-carboxylated graphene with different exfoliating solvents of water, ethanol, DMF and NMP and (b) Zeta potential of ECG sheets in water with the concentration of 0.1 mg/mL.



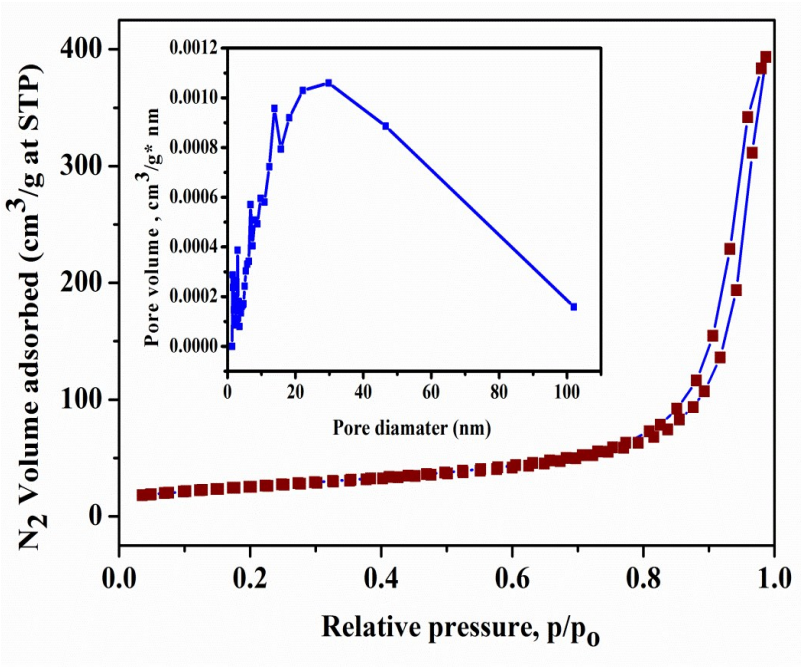

**ESI Fig. 2** EDX spectrum and elemental mapping of **m**HAp/ECG nanocomposite. (a-e) elemental mapping of carbon (C), oxygen (O), calcium (Ca), phosphate (P) and iron (Fe) species. (f) EDX spectrum of mHAp/ECGs nanocomposite.



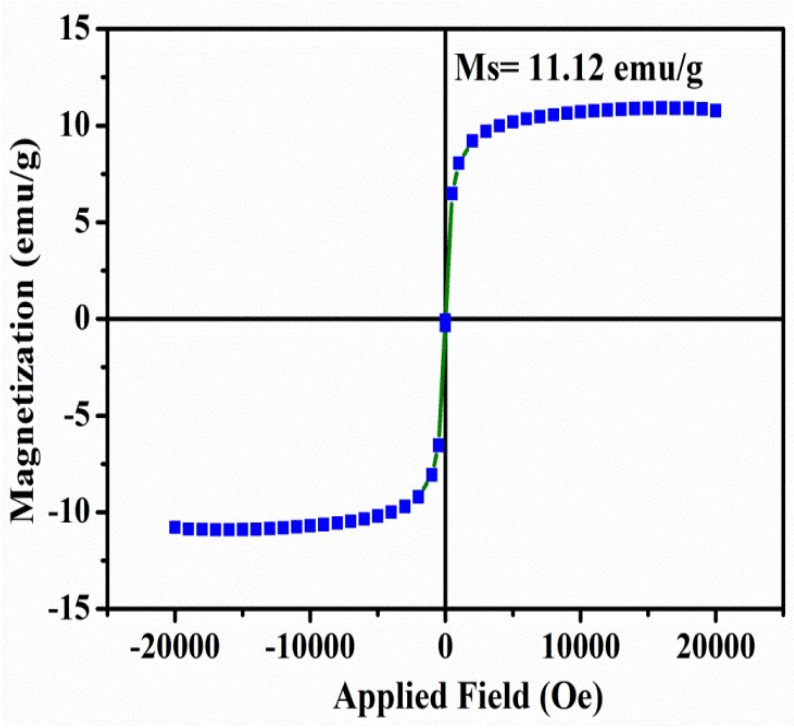

**ESI Fig. 3** FTIR spectra for (a) pure natural graphite flakes, (b) ball milled edge-carboxylated graphene sheets and (c) mHAp/ECG nanocomposites



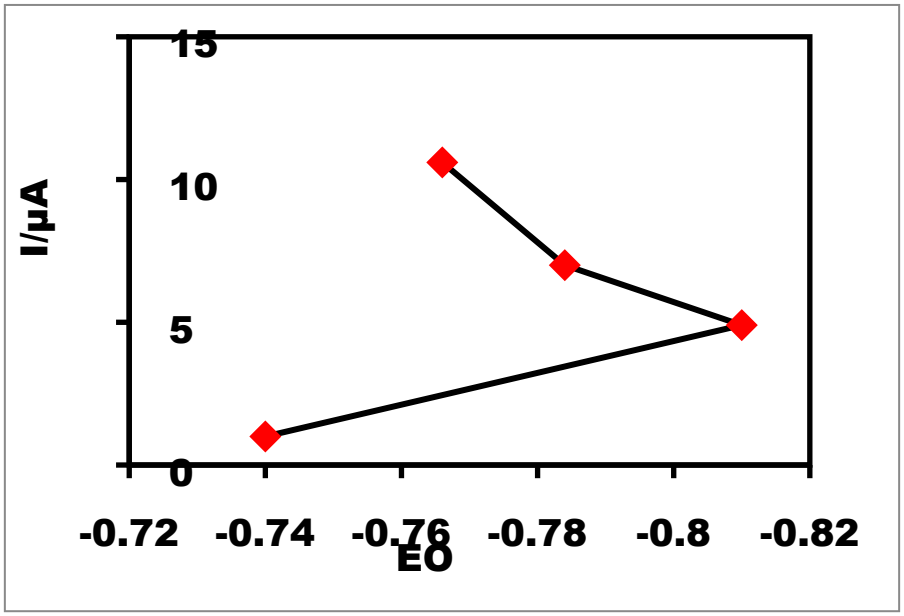

**ESI Fig. 4** The UV-vis absorption spectra for (a) edge-carboxylated graphene sheets and (b) mHAp/ECG nanocomposite with the concentration of 0.1 mg/mL.



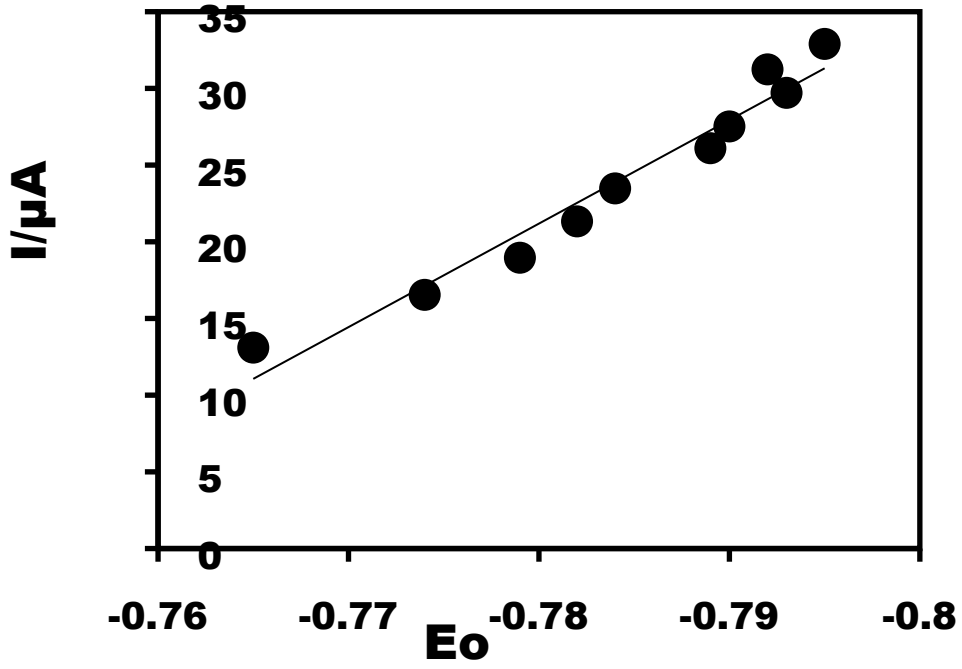

**ESI Fig. 5** Nitrogen-adsorption/desorption isotherms and the inset shows the pore-size distribution of the mHAp/ECG nanocomposite



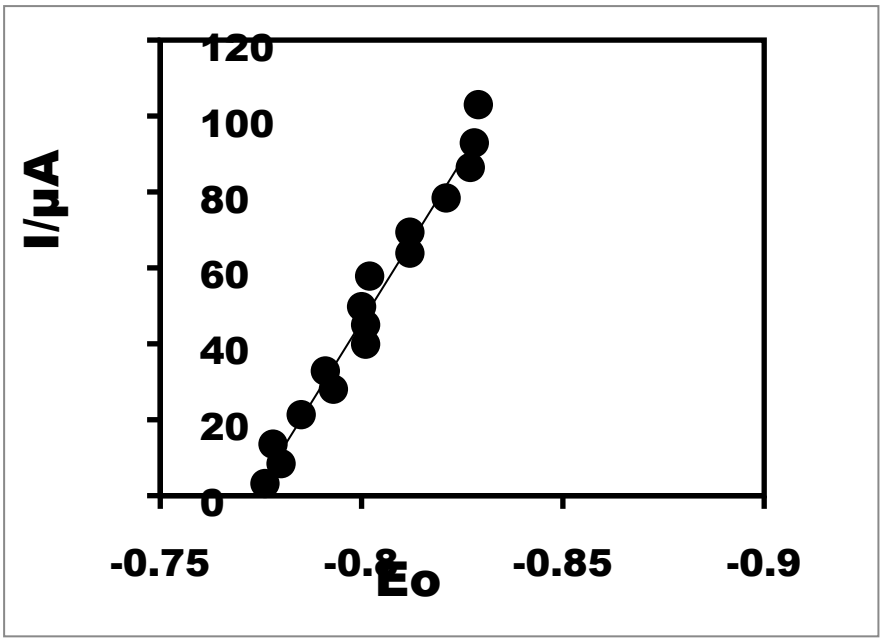

**ESI Fig. 6** Magnetic hysteresis loop for the m-HAp/ECG nanocomposite at room temperature.



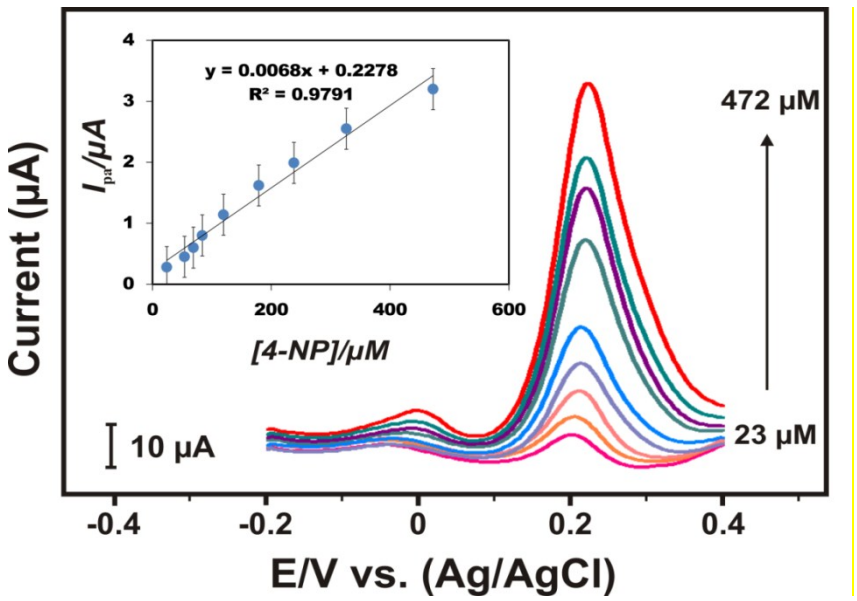

**ESI Fig. 7** Calibration plot for $E_0$ vs current density of Fig. 9.




**ESI Fig. 8** Calibration plot for $E_0$ vs current density of Fig. 10.




**ESI Fig. 9** Calibration plot for $E_0$ vs current density of Fig. 12 (4-NP reduction).




**ESI Fig. 10.** DPV curves of mHAp/ECG nanocomposite modified GCE under various 4-NP concentrations from 23-472 μM. Inset; anodic oxidation peak current ($I_{pa}$) *vs* 4-NP concentration.

Table S1. Determination of 4-NP in various water samples using DPV.

| **Real samples** | **Analyte** | **Added (nM)** | **Found (nM)** | **Recovery (%)** |
|---|---|---|---|---|
| **Tap water** | 4-NP | 50 | 48.7 | 97.4 |
| | | 100 | 102.1 | 102.1 |
| **Rain water** | 4-NP | 50 | 49.6 | 99.2 |
| | | 100 | 105.9 | 105.9 |