Electronic Supplementary Information

Ready-to-use paraquat sensor using a graphene-screen printed electrode modified with a molecularly imprinted polymer coating on a platinum core

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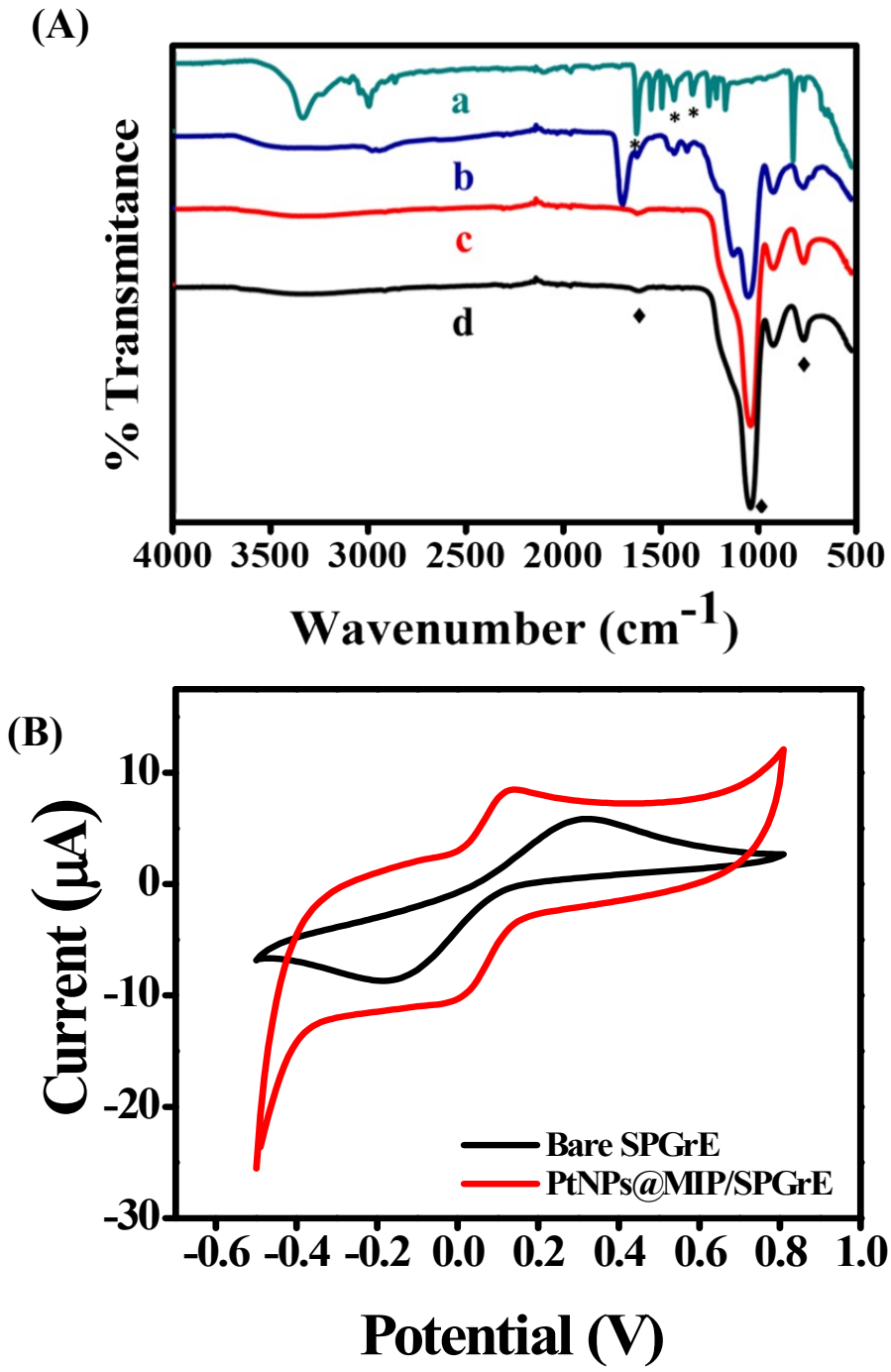

Fig. S1

(A) FT-IR spectra

of a) paraquat, b) PtNPs@MIP before removal template, c) PtNPs@MIP after removal template, and d) PtNPs@NIP. (B) Cyclic voltammograms of 1.0 mM potassium ferricyanide on a bare and PtNPs@MIP/SPGrE in 0.1 M phosphate buffer (pH 7.0) supporting solution, the scan rate employed was 50 mV s^{-1}.

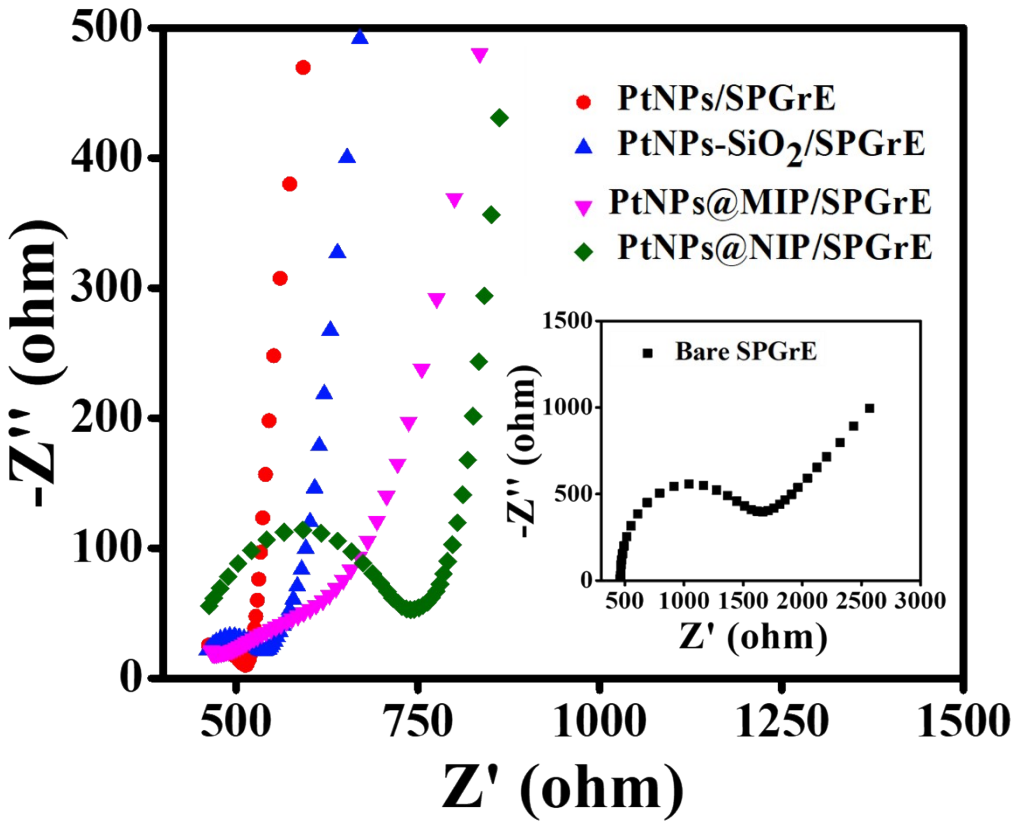

Fig. S2 Nyquist plot observed for bare SPGrE (inset), PtNPs/SPGrE, PtNPs-SiO_2@MIP/SPGrE, PtNPs@MIP/SPGrE and PtNPs@NIP/SPGrE in 0.1 M KCl containing 5 mM $[Fe(CN)_6]^{3-/4-}$ over the frequency range 0.1 Hz to 100 kHz; amplitude = 10 mV. Inset: Randles equivalent circuit model; here R_s, C_{dl}, R_{ct} and Z_w are stand for the ohmic resistance of electrolyte (R_s), double layer capacitance (C_{dl}), electron transfer resistance (R_{ct}) and Warberg impedance (Z_w).

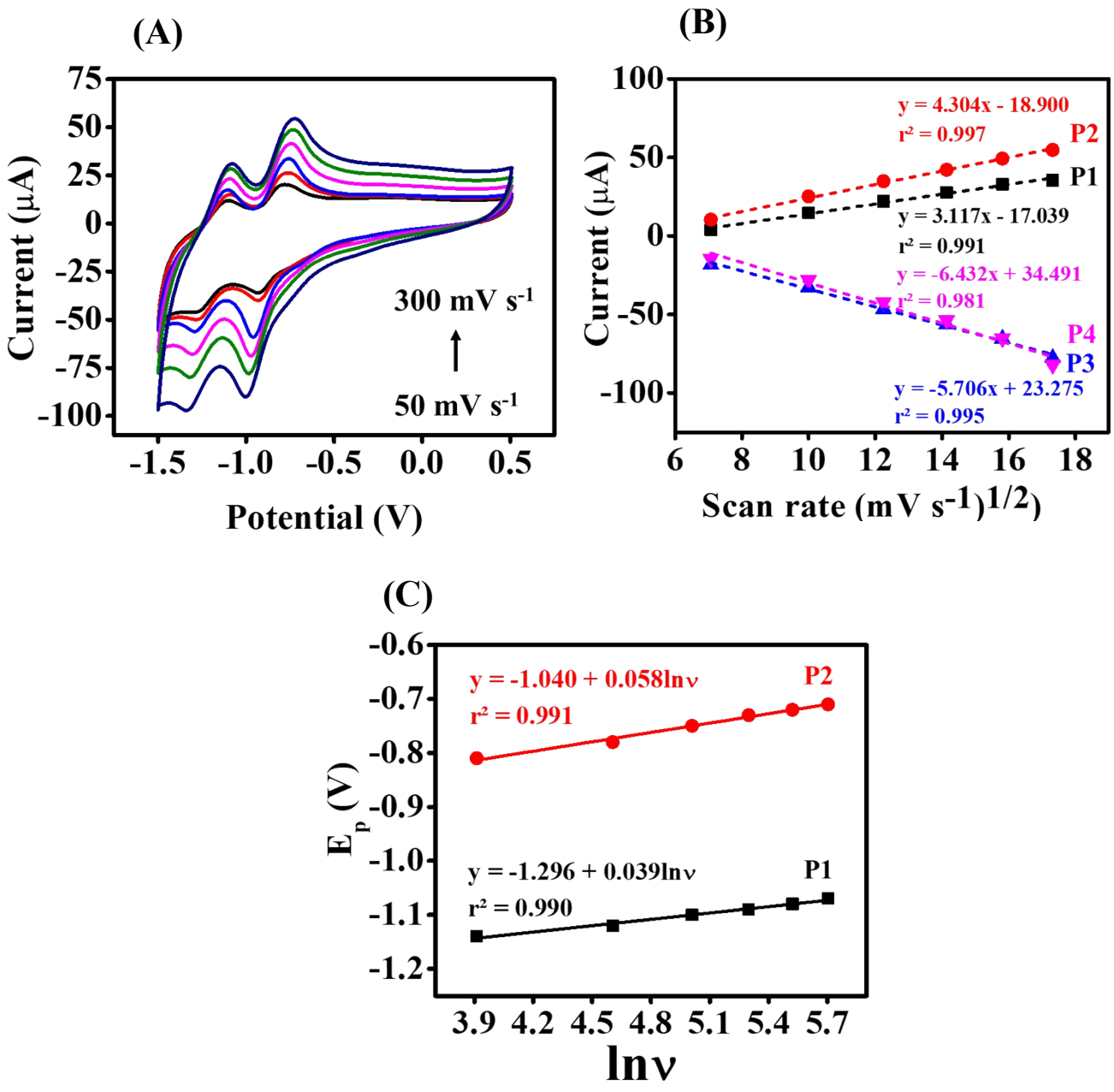
(A)
Current (μA)
Potential (V)
300 mV s-1
50 mV s-1
(B)
Current (μA)
Scan rate (mV s-1)1/2
y = 4.304x - 18.900
r² = 0.997
P2
P1
y = 3.117x - 17.039
r² = 0.991
y = -6.432x + 34.491
r² = 0.981
P4
P3
y = -5.706x + 23.275
r² = 0.995
(C)
Ep (V)
lnν
y = -1.040 + 0.058lnν
r² = 0.991
P2
y = -1.296 + 0.039lnν
r² = 0.990
P1

Fig. S3 (A) Cyclic voltammograms of 500 μM PQ on PtNPs@MIP/SPGrE in 0.1 M K_2SO_4 solution at a scan rate ranging from 50 to 300 mV s^{-1} and (B) Relationship between peak currents and square root of the scan rate.

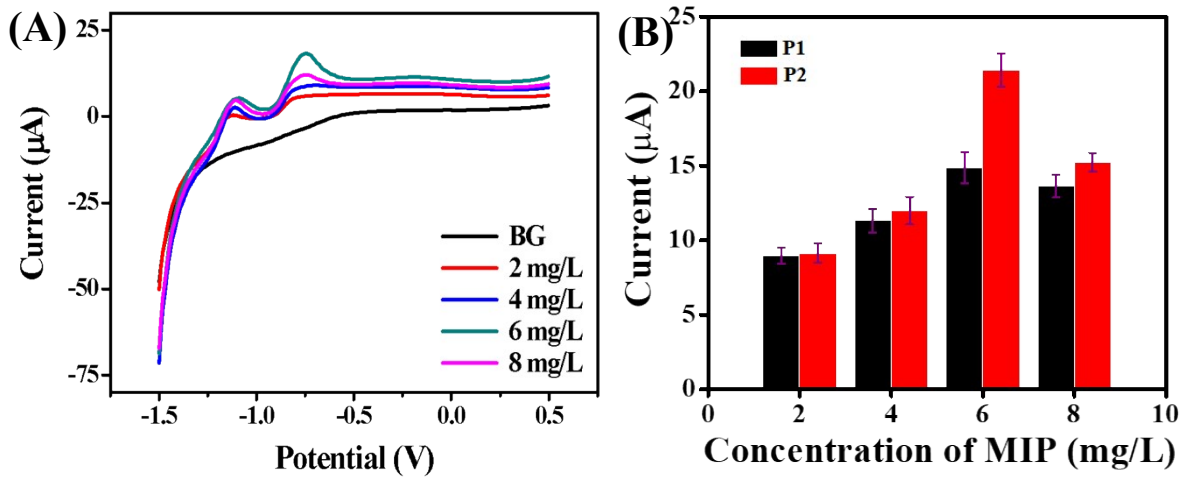

Fig. S4 (A) LSV signals of 500 μM paraquat containing 0.1 M K_2SO_4 solution on the PtNPs@MIP/SPGrE at a series of MIP loading values and (B) Effect of MIP loading on the current of paraquat determination.

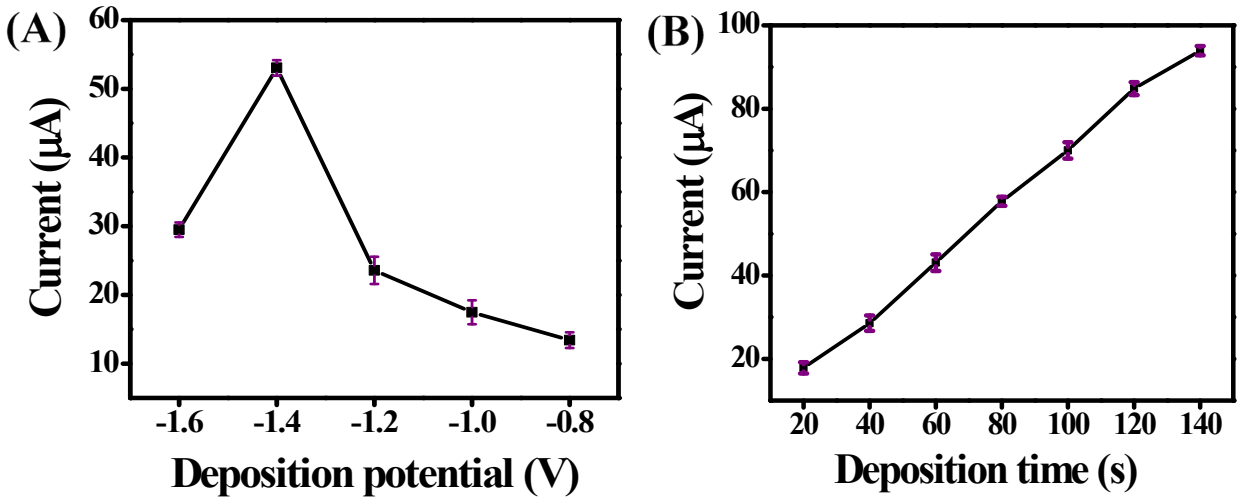

Fig. S5 Effect of (A) deposition potential and (B) deposition time on the anodic stripping peak current of PQ (P2) at PtNPs@MIP/SPGrE. The paraquat concentration was 500 μM; the supporting electrolyte, 0.1 M K_2SO_4 solution.

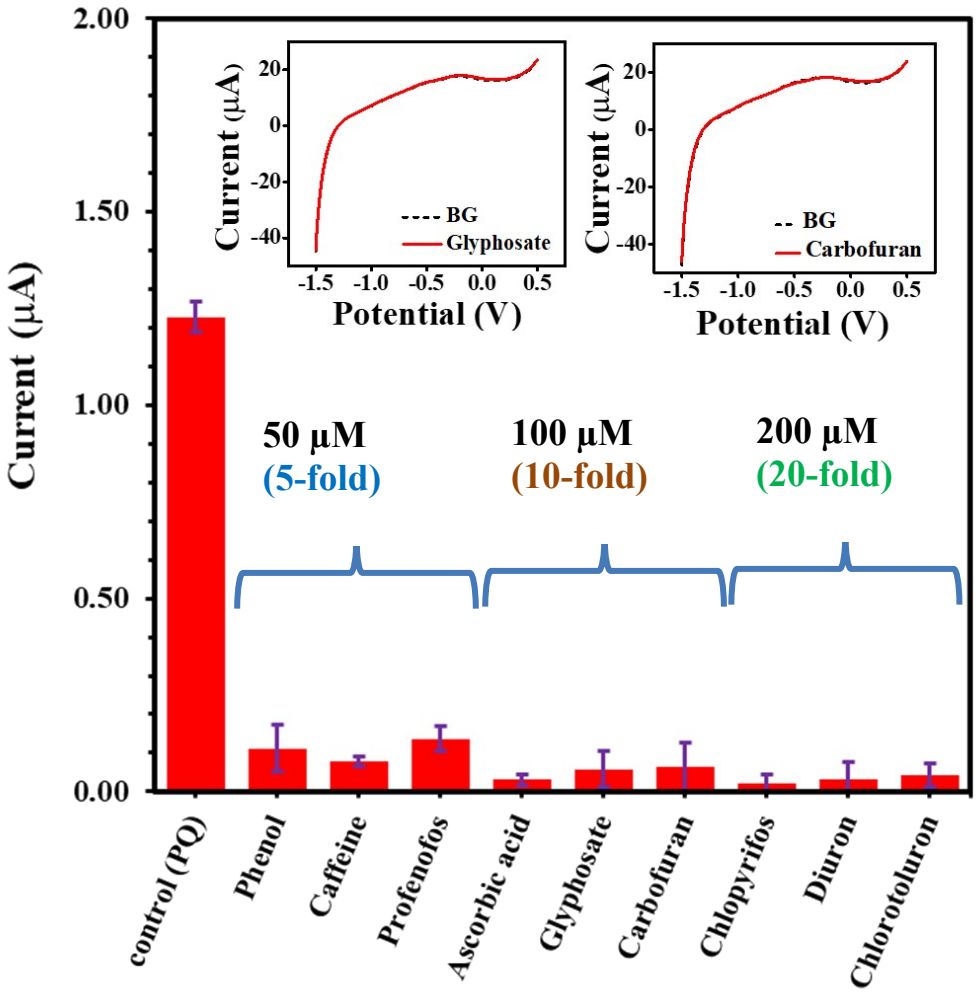

Fig.S6 Current response of various species only, 10 μM PQ (control) and the currents of phenol, caffeine and profenofos at the concentration of 50 μM (5- fold), ascorbic acid, glyphosate and carbofuran at the concentration 100 μM (10- fold), and chlorpyrifos, diuron

and chlorotoluron at the concentration 200 μM (20-fold). The insets are the voltammograms of 50 μM glyphosate and carbofuran and the corresponding background, supporting electrolyte, 0.1 M K_2SO_4 solution.

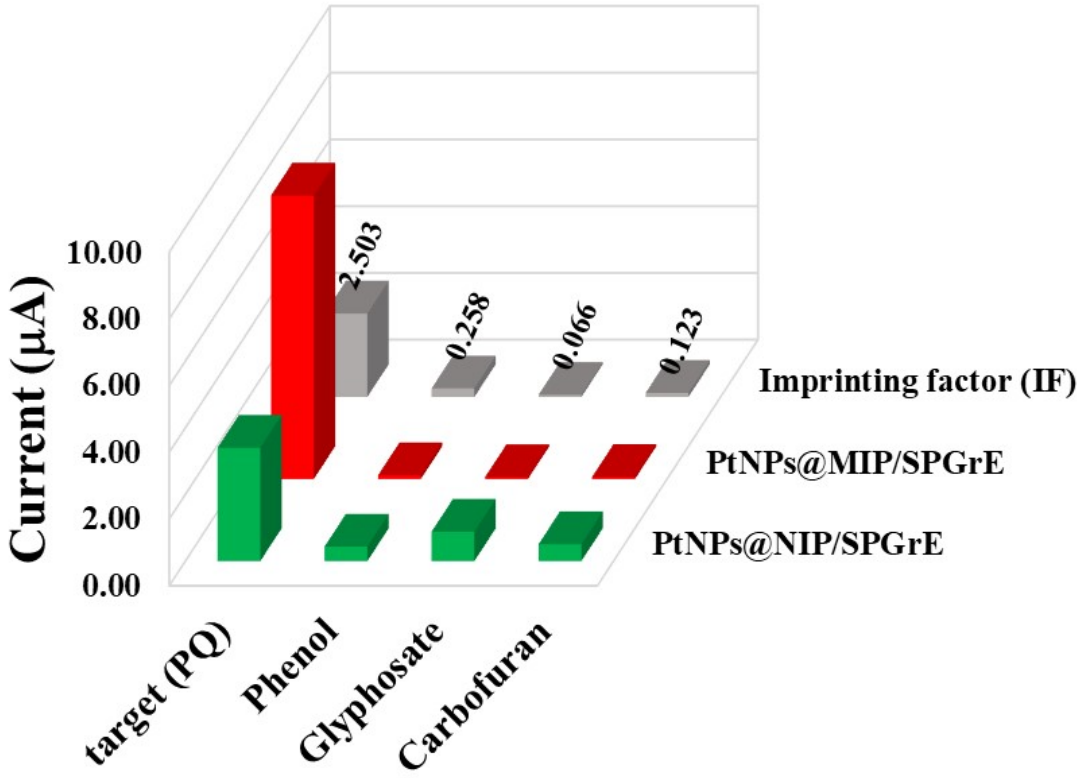

Fig.S7 Selectivity pattern of PtNPs@MIP/SPGrE toward PQ, phenol, glyphosate and carbofuran at a concentration of 100 μM.

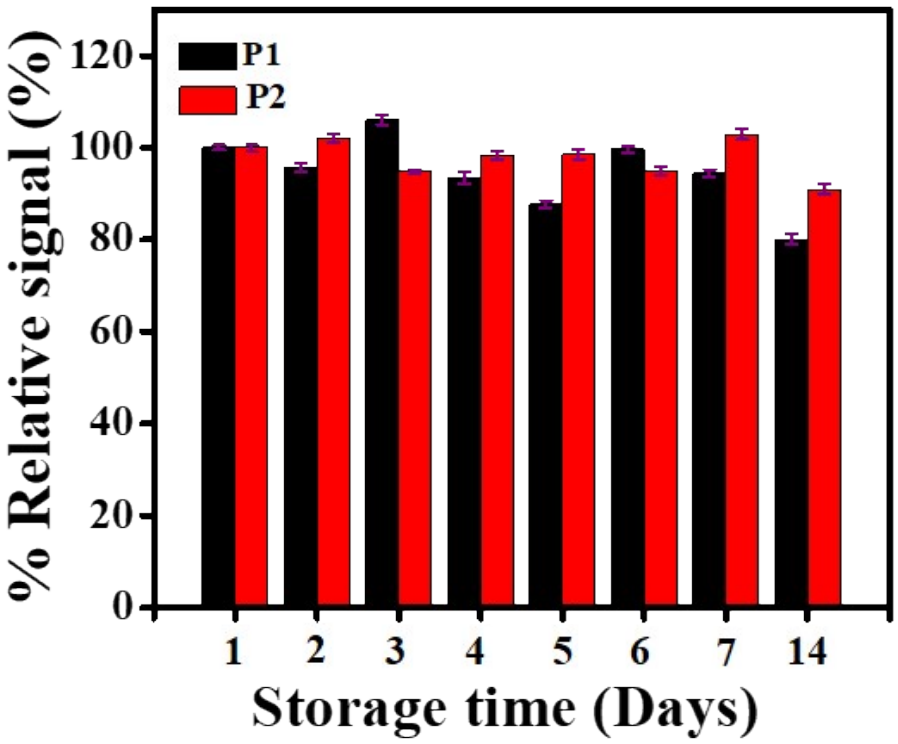

Fig.S8 stability during the storage period of 2 weeks in room temperature.