Electronic Supplementary Material (ESI) for Analyst.

Supplementary Data

For

A novel electrochemical detection method for butylated hydroxyanisole (BHA) as antioxidant: BHA imprinted polymer based on nickel ferrite@graphene nanocomposite and its application

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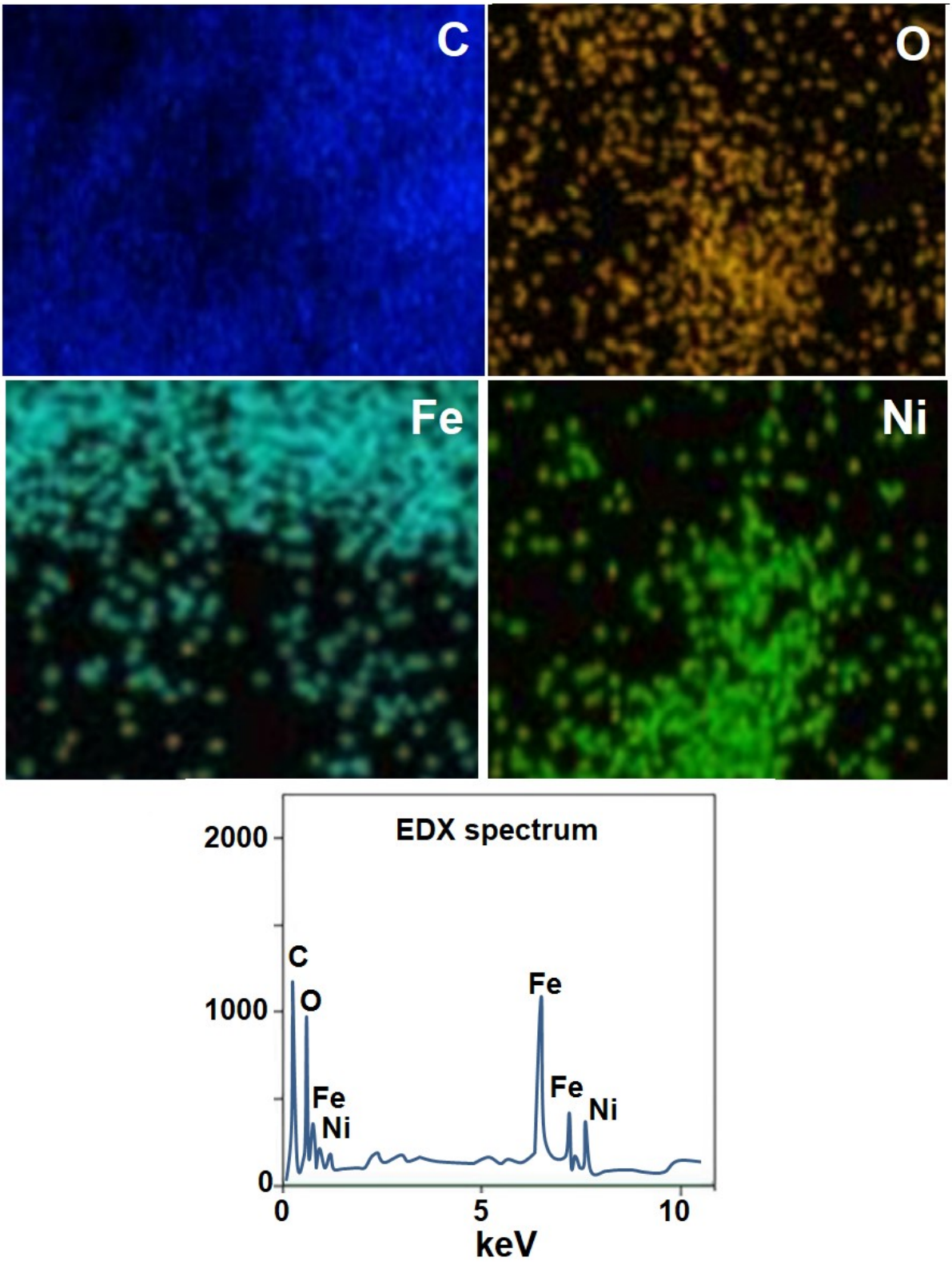

Fig. S1. EDS elemental distrubition and EDX spectrum of $NiFe_2O_4$@Gr(0.6)

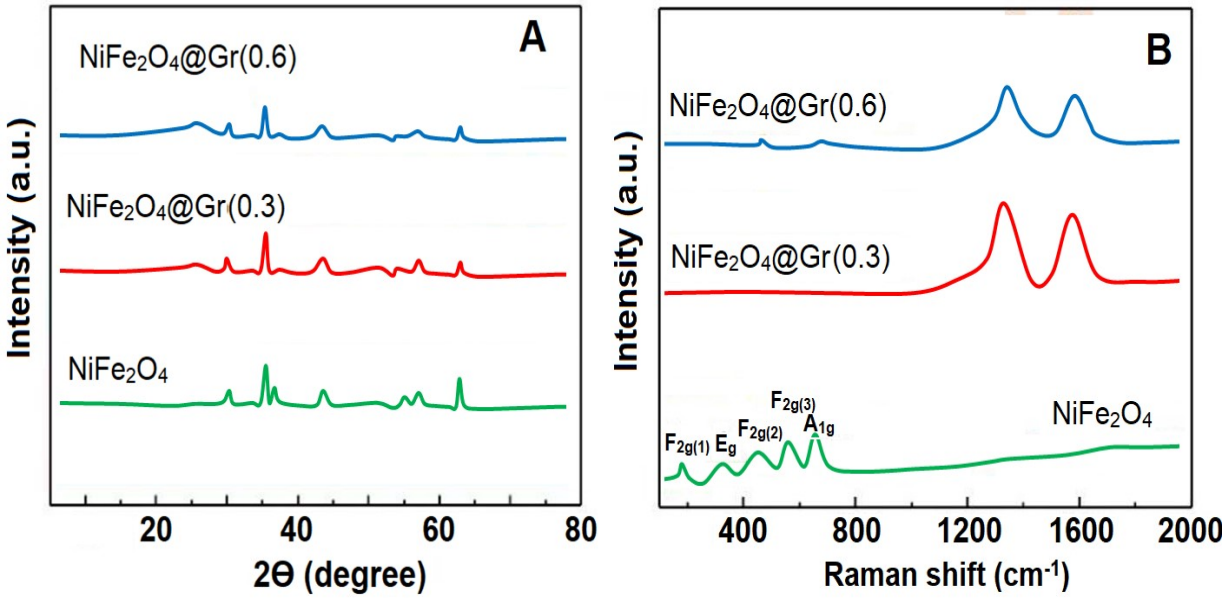

Fig. S2. (A) XRD patterns and (B) Raman spectra of $NiFe_2O_4$, $NiFe_2O_4$@Gr(0.3) and $NiFe_2O_4$@Gr(0.6)

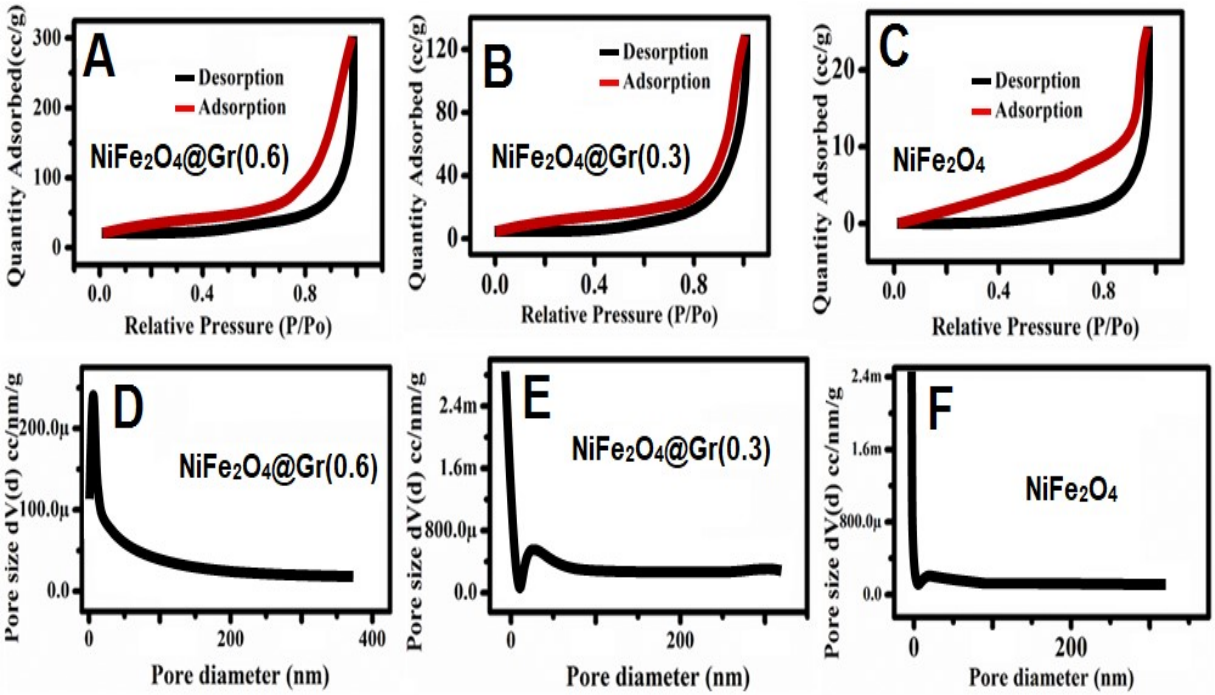

Fig. S3. (A), (B), (C) N_2 adsorption-desorption isotherms of $NiFe_2O_4$, $NiFe_2O_4$@Gr(0.3) and $NiFe_2O_4$@Gr(0.6), and (D), (E), (F) pore size distribution isotherms

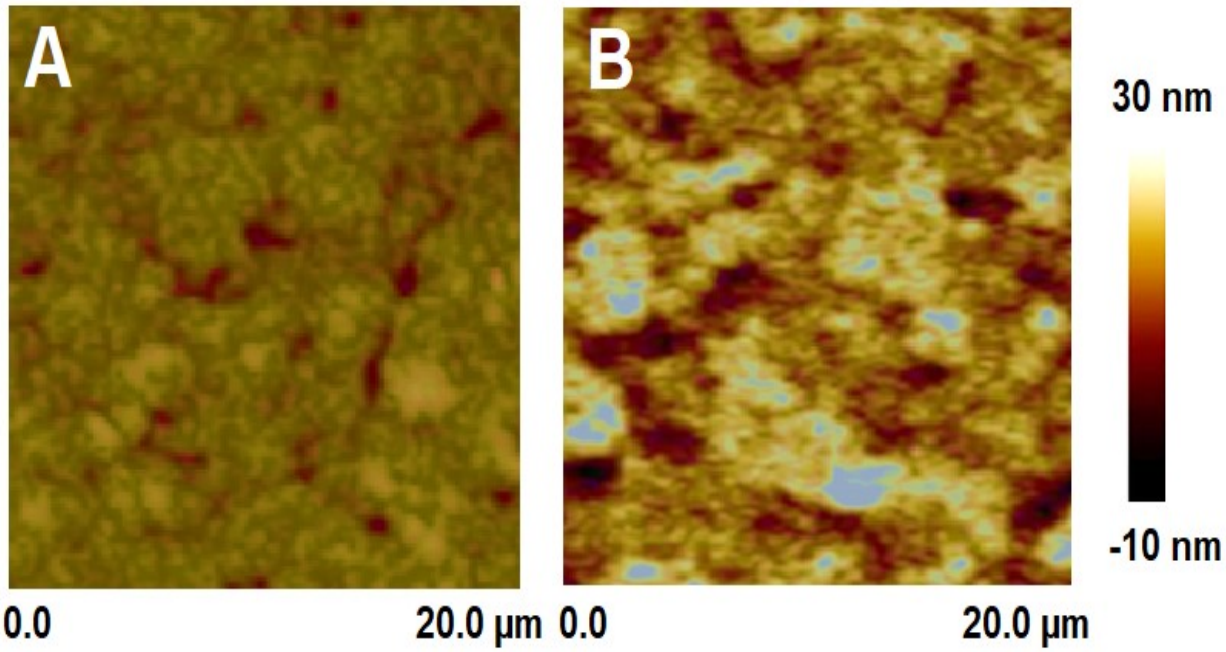

Fig. S4. AFM images of (A) bare GCE and (B) $NiFe_2O_4$@Gr(0.6)/GCE

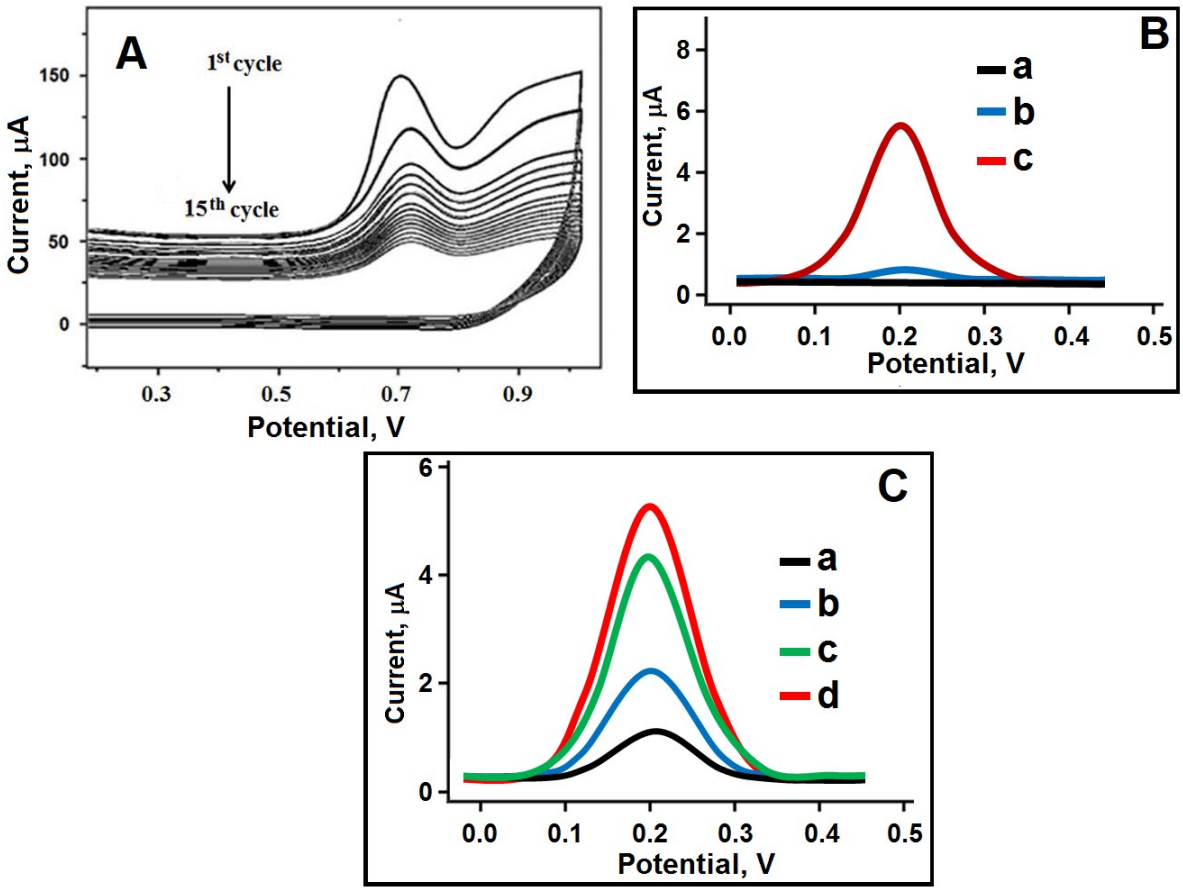

Fig. S5. (A) 100.0 mM Py polymerization containing 25.0 mM BHA on $NiFe_2O_4$@Gr(0.6)/GCE (Scan rate: 100 mV s^{-1}), (B) DPVs of the prepared electrodes in this study: (a) MIP/$NiFe_2O_4$@Gr(0.6) in blank buffer solution (pH 7.0), (b) NIP/$NiFe_2O_4$@Gr(0.6) after rebinding of 0.5 nM BHA in 0.1 M PBS (pH 7.0), (c) MIP/$NiFe_2O_4$@Gr(0.6) after rebinding of 0.5 nM BHA in 0.1 M PBS (pH 7.0), (C) DPVs of different molecularly imprinting electrodes after rebinding of 0.5 nM BHA in 0.1 M PBS (a) MIP/bare GCE, (b) MIP/$NiFe_2O_4$/GCE, (c) MIP/$NiFe_2O_4$@Gr(0.3)/GCE and (d) MIP/$NiFe_2O_4$@Gr(0.6)/GCE

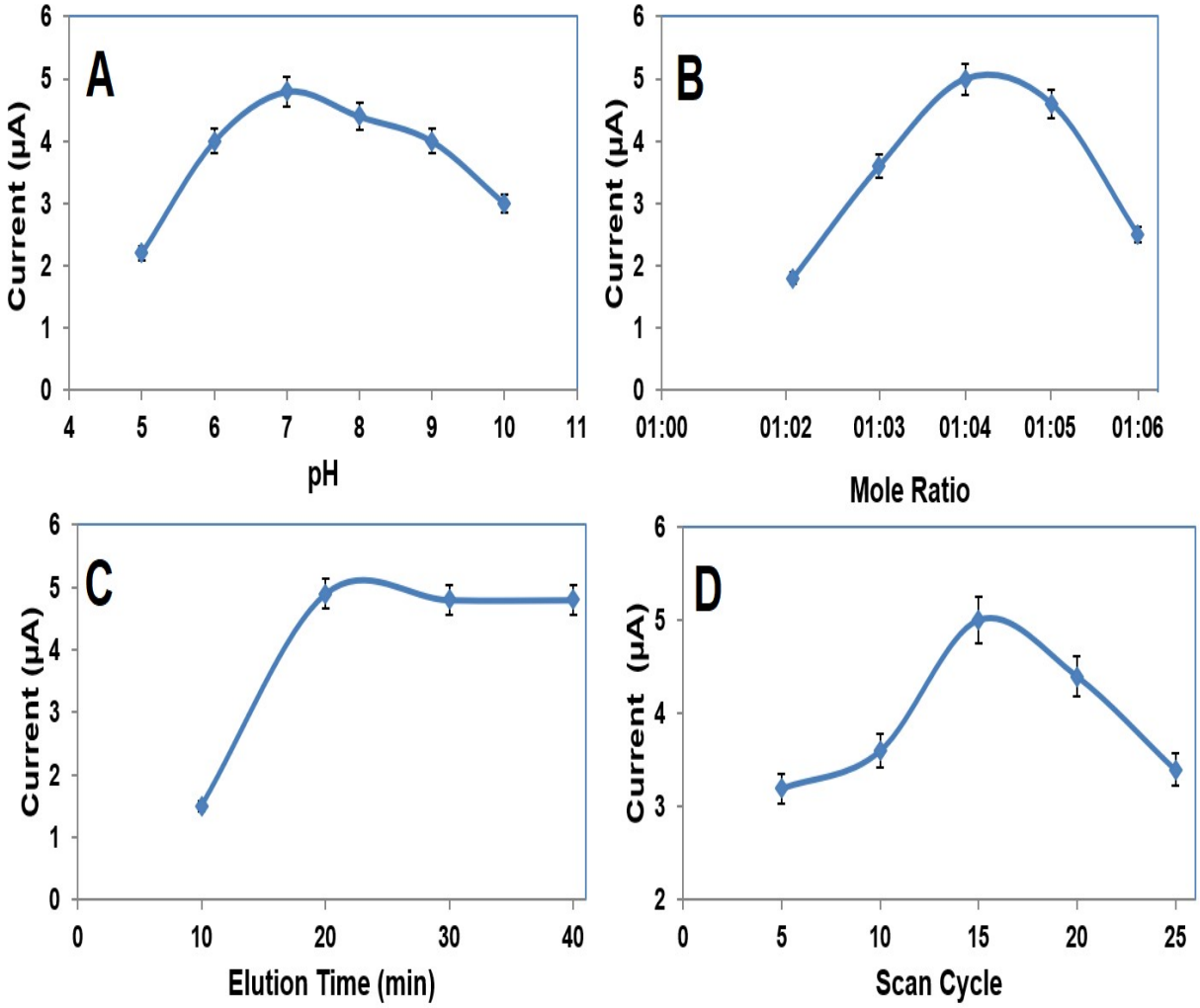

Fig. S6. Effect of (A) pH, (B) mole ratio, (C) desorption time, (D) scan cycle on signals of DPVs (in presence of 0.5 nM BHA) (n = 6)

Table S1. Recovery results of BHA in flour (n=6)

Sample	Added BHA (nM)	Found BHA (nM)	*Recovery (%)
Flour	-	0.273 ± 0.002	-
	0.100	0.374 ± 0.002	100.27 ± 0.01
	0.300	0.572 ± 0.005	99.83 ± 0.06
	0.500	0.772 ± 0.003	99.87 ± 0.04

*Recovery = Found BHA, nM / Real BHA, nM

Table S2. k and k′ values of BHA imprinted electrodes (MIP/$NiFe_2O_4$@Gr(0.6)/GCE and NIP/$NiFe_2O_4$@Gr(0.6)/GCE)

	MIP		NIP		
	ΔI (μA)	**k**	**ΔI (μA)**	**k**	**k′**
BHA	5.20	-	0.50	-	-
BHT	0.50	10.40	0.30	1.67	6.23
PHE	0.40	13.00	0.20	2.50	5.20
AA	0.30	17.33	0.10	5.00	3.47
CA	0.20	26.00	0.05	10.00	2.60

Analyte concentrations: 0.5 nM BHA, 100.0 nM BHT, 100.0 nM PHE, 100.0 nM AA, 100.0 nM CA

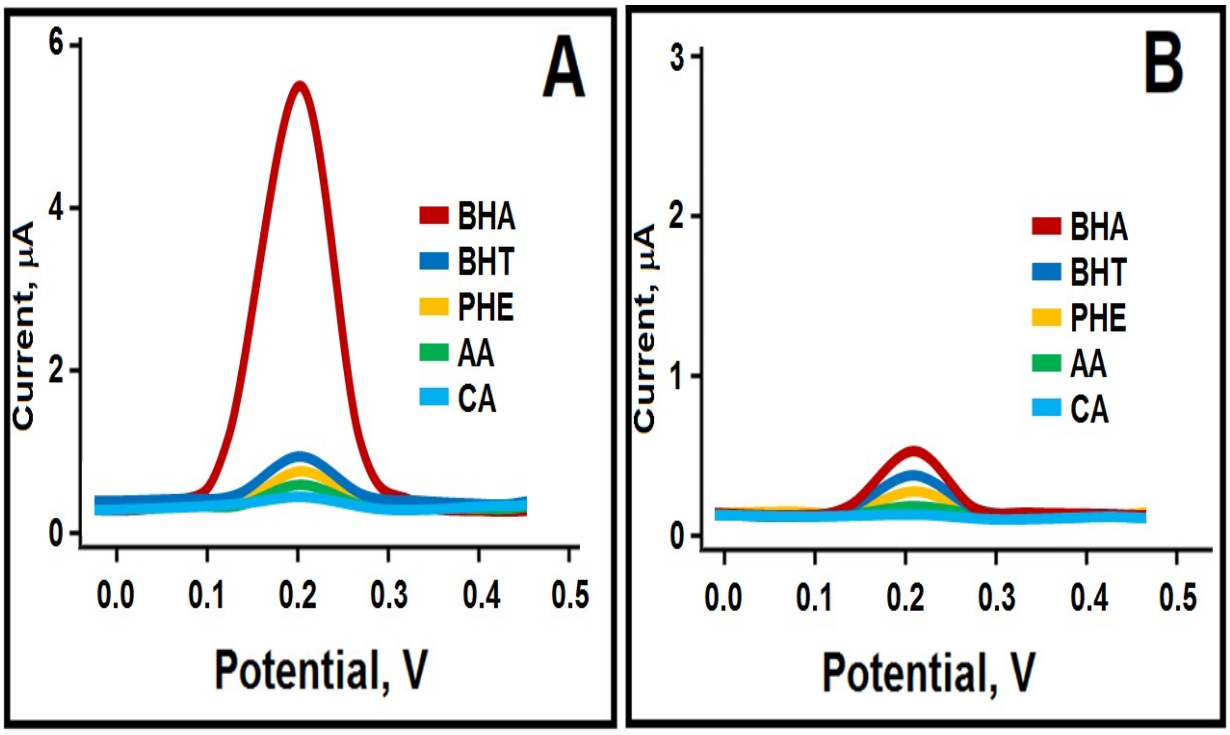

Fig. S7. DPVs of (A) MIP/$NiFe_2O_4$@Gr(0.6)/GCE and (B) NIP/$NiFe_2O_4$@Gr(0.6)/GCE in 0.5 nM BHA, 100.0 nM BHT, 100.0 nM PHE, 100.0 nM AA, 100.0 nM CA

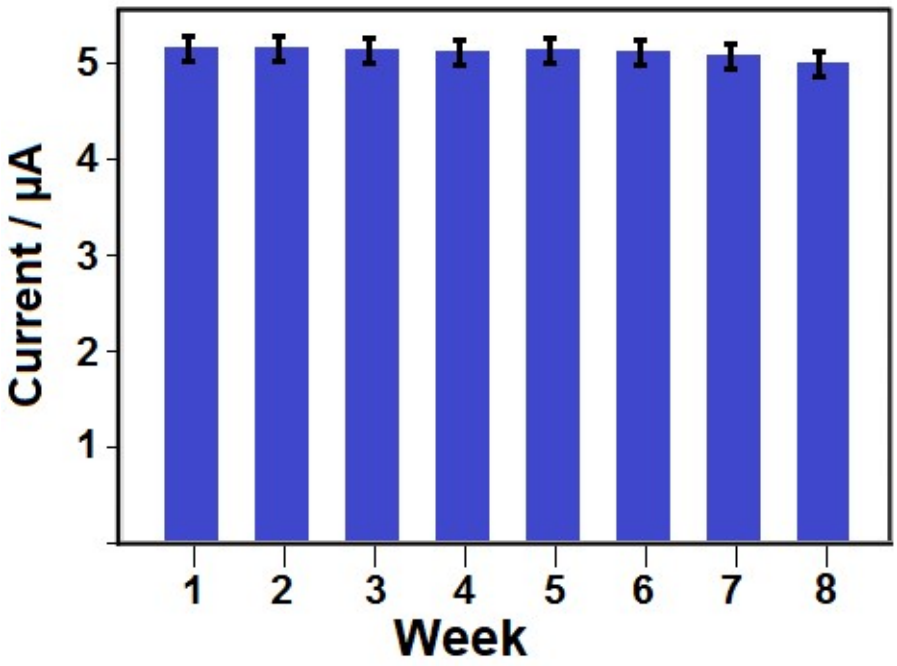

Fig. S8. Stability test of MIP/$NiFe_2O_4$@Gr(0.6)/GCE including 0.5 nM BHA (n = 6)