

Electrochemical detection of pathogenic *Escherichia coli* specific DNA sequence based on graphene oxide- chitosan composite decorated with nickel ferrite nanoparticles

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Supplementary information

Figure S1 Raman spectra of (A) GO (B) GO/NiF/ch nanocomposite

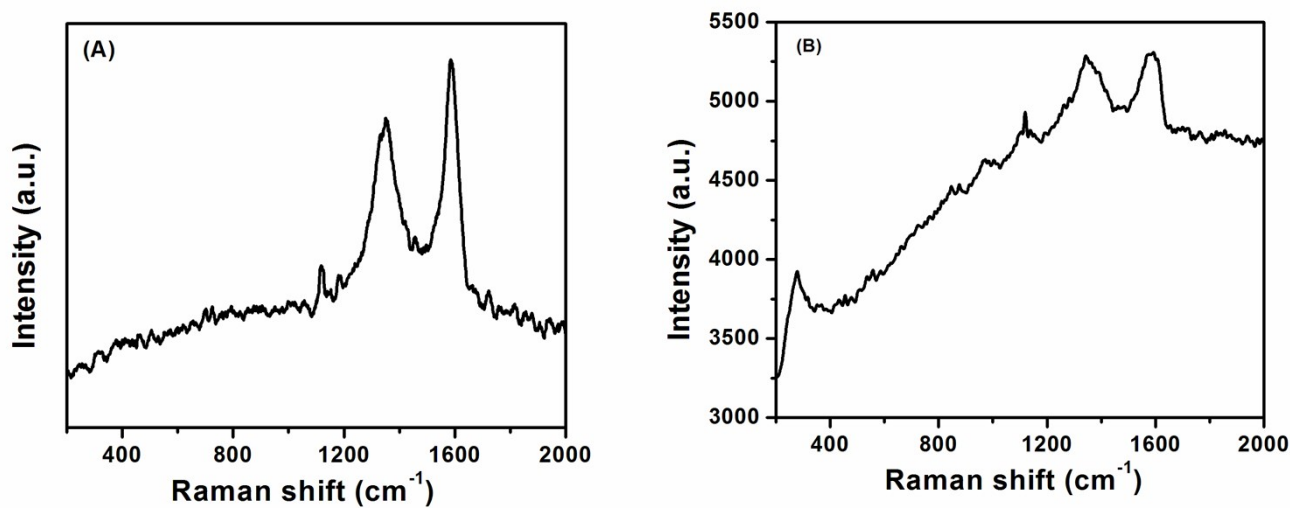


Figure S2 TGA spectra of (i) GO (ii) GO/NiF/ch nanocomposite

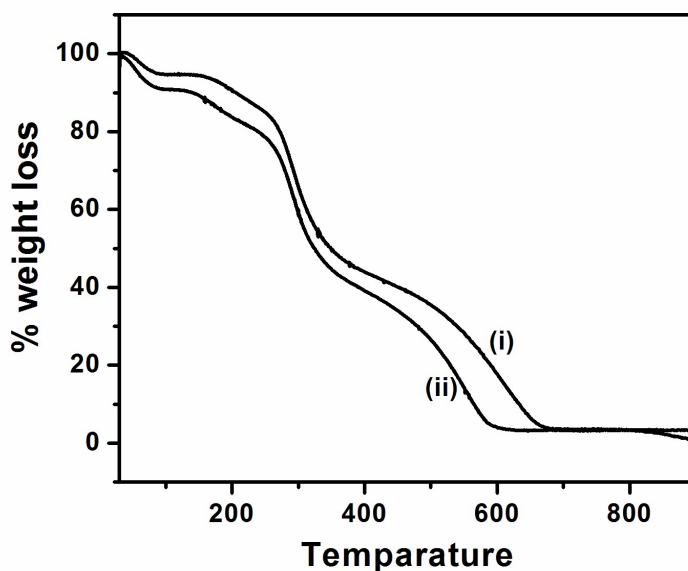


Figure S3 Comparison of cyclic voltamogram of (i) GO/NiF/ch/ITO electrode and (ii) pDNA/ GO/NiF/ch/ITO electrode in PBS (100 mM, pH 7.4, 0.9% NaCl) solution containing 5 mM $[\text{Fe}(\text{CN})_6]$

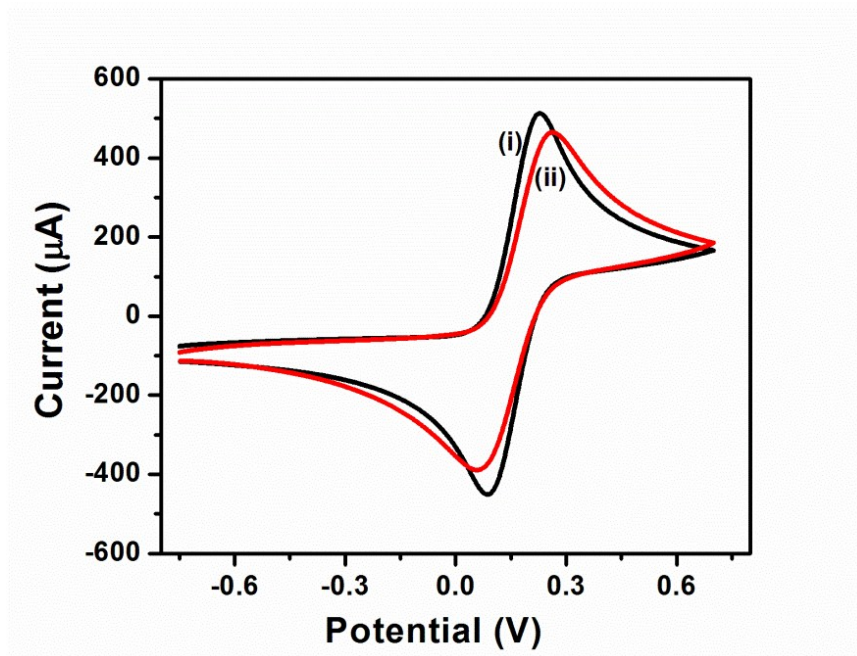


Figure S4 DPV response of pDNA/ GO/NiF/ch/ITO bioelectrode incubated with (i) non complementary, (ii) pDNA (iii) one base mismatch sequence (iv) complementary

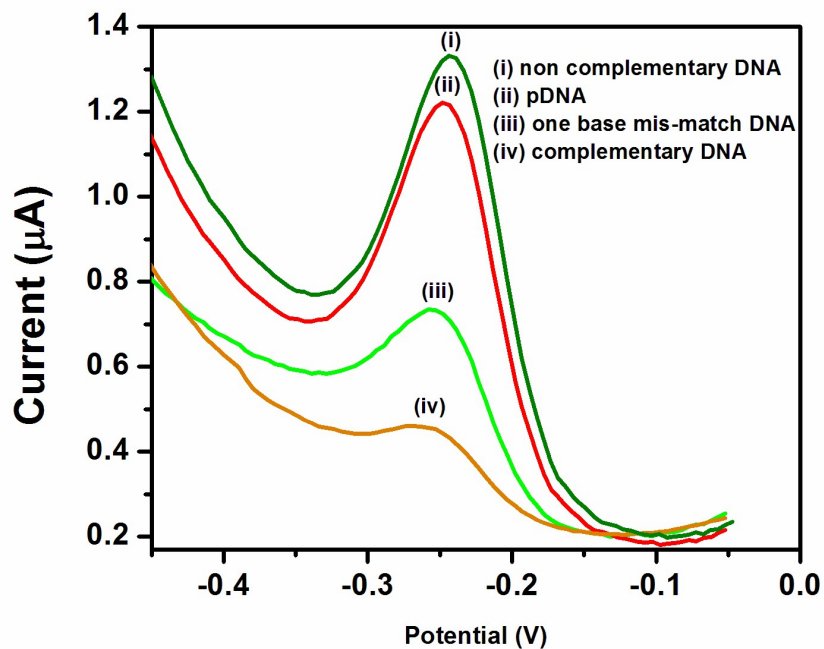


Figure S5 Bar diagram showing DPV response of pDNA/ GO/NiF/ch/ITO bioelectrode incubated with the culture samples of water borne pathogens

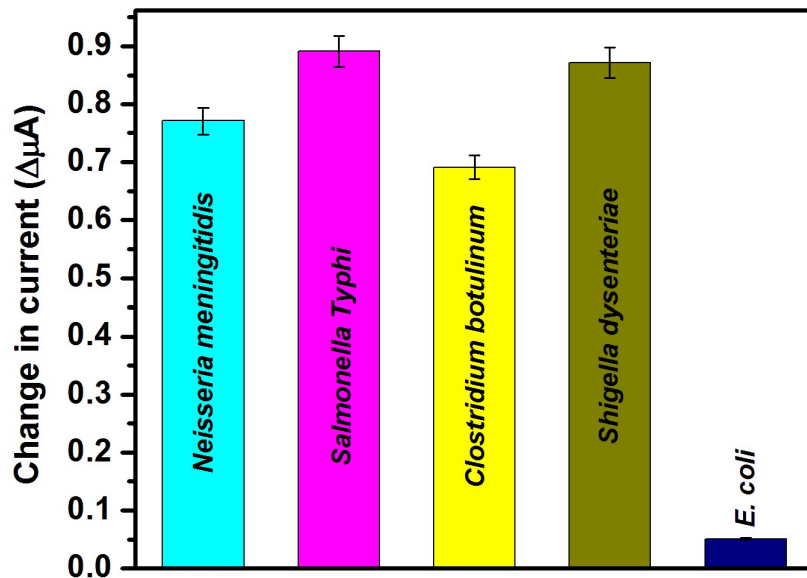


Figure S6 (A) Percentage change in peak current of the fabricated pDNA/ GO/NiF/ch/ITO bioelectrode towards *E. coli* O157:H7 detection every five days (B) Bar diagram showing the stability of the fabricated pDNA/ GO/NiF/ch/ITO bioelectrode

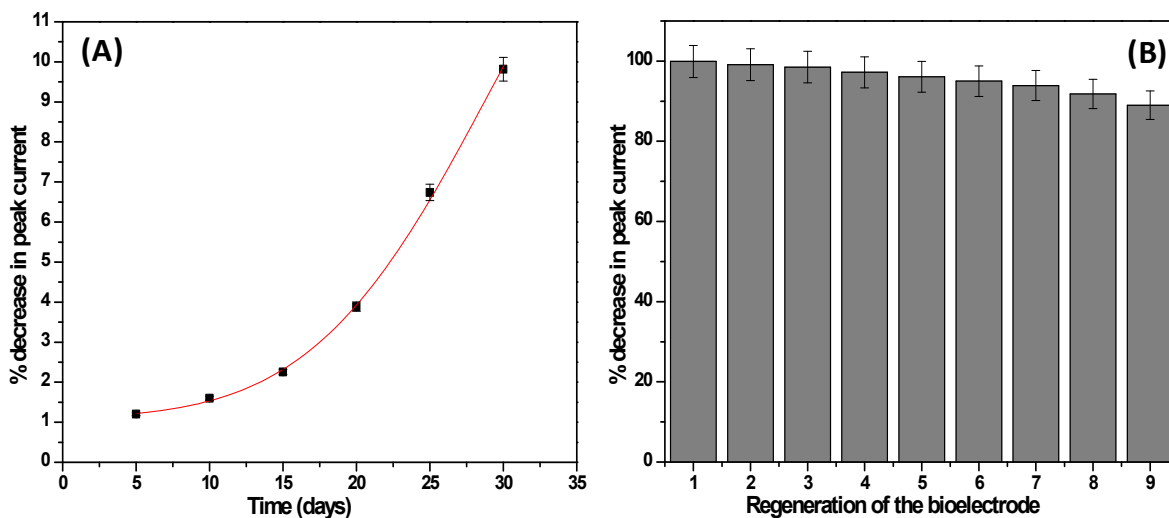


Table ST1 Comparison of response characteristics of pDNA/GIOCh/ITO bioelectrode with other DNA sensors

S. No	Modified electrode	Detection techniques	Detection limit	Detection range	Response time	Reference
1.	chitosan/Fe ₃ O ₄ /graphene/ carbon ionic liquid electrode	EIS	3.59×10 ⁻¹³ M	1.0×10 ⁻¹² to 1.0 × 10 ⁻⁶ M	-	1
2.	Label-free DNA/reduced graphene oxide	FS	5 × 10 ⁻⁸ M	0.31–2.5 x 10 ⁻⁶ M	-	2
3.	Graphene/IONPs/chit	EIS	1 × 10 ⁻¹⁴ M	1.0 x 10 ⁻¹⁴ to 1.0 x 10 ⁻⁶ M	-	3
4.	Ph-NH ₂ /GO/GCE	EIS	0.11 x 10 ⁻¹² M	0.001–10 ⁻⁷ M	-	4
5.	CeO ₂ /Chit/GCE	DPV	10 x 10 ⁻¹² M	0.0159–0.116 × 10 ⁻⁹ M	25 min	5
6.	4-ATP/AuNPs/Au	DPV	9.5 x 10 ⁻¹² M	0.014 x 10 ⁻⁹ M	-	6
7.	PPy–PANi–GA/GE	DPV	5.0×10 ⁻¹⁴ M	1.0 × 10 ⁻¹³ to 1.0 × 10 ⁻⁹ M	-	7
8.	Au NRs–rGO/GCE	DPV	3.5×10 ⁻¹⁵ M	1.0 × 10 ⁻¹⁴ to 1.0 × 10 ⁻⁹ M	50 min	8
9.	GO-CHI/ITO	EIS	1.0 x 10 ⁻¹⁵ M	1.0 x 10 ⁻¹⁵ M to 5.0 x 10 ⁻⁸ M	60 s	9
10.	Carboxyl functionalized graphene	DPV	1.69×10 ⁻¹³ M	1.0×10 ⁻¹² –1.0 × 10 ⁻⁶ M	4 hr	10
11.	GO/NiF/ch	DPV	1 × 10 ⁻¹⁶ M	1 x 10 ⁻⁶ to 1 x 10 ⁻¹⁶ M	60 s	Present work

Table ST2 Comparison of response characteristics of pDNA/GIOCh/ITO bioelectrode with other *E.coli* DNA sensors

S.No	Modified electrode	Detection technique	Detection limit	Detection range	Reference
1.	octadecanethiol (ODT)/ITO	DPV	5×10^{-19} M	0.5×10^{-18} to 1×10^{-6} M.	11
3.	GOx–Thi–Au@SiO ₂	Amperometry	1×10^{-11} M	2×10^{-11} to 50.0×10^{-7} M	12
4.	SH-DNA/MCH	DPV	1×10^{-12} M	1×10^{-12} to 1×10^{-7} M	13
5.	GO/NiF/ch	DPV		1×10^{-6} to 1×10^{-16} M	Present work

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