

Supporting information for

**ZnO/ZnFe₂O₄ nanocomposites-based electrochemical nanosensors for
detection of furazolidone in pork and shrimp samples: Exploring the role
of crystallinity, phase ratio and heterojunction formation**

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Table S1 Experimental and obtained parameters for ZnO/ZnFe₂O₄-1, ZnO/ZnFe₂O₄-2, and ZnO/ZnFe₂O₄-3 samples

Samples	Preparation conditions			Phase ratios (%)		Crystallite size (nm)	
	Temperature (°C)	Time (h)	Annealing treatment	R_{ZnO}	$R_{ZnFe_2O_4}$	ZnO	ZnFe ₂ O ₄
ZnO/ZFO-1	180	6	-	-	-	-	-
ZnO/ZFO-2	160	6	500 °C / 5h	11.6	88.4	37.6	17
ZnO/ZFO-3	180	6	500 °C / 5h	7.7	92.3	16.8	14.9

Table S2 Comparison of the characteristic parameters of FZD electrochemical sensors using ZnO/ZFO/SPE

Modified electrodes	EASA (cm ²)		R_{ct} (Ω)	Sensitivity (μA μM ⁻¹)	Linear range (μM)	LOD (μM)
	Oxidation	Reduction				
ZnO/ZFO-1	0.111	0.111	768.3	0.073	5 – 100	2.38
ZnO/ZFO-2	0.158	0.162	588.6	0.123	1 – 100	0.65
ZnO/ZFO-3	0.118	0.119	745.3	0.099	2.5 – 75	1.08

Table S3 Determination of FZD in shrimp and pork samples using ZnO/ZFO-1, ZnO/ZFO-2 and ZnO/ZFO-3 modified electrodes as electrochemical sensors (n = 3).

Electrodes	Sample	Spiked (μM)	Found (μM)	Recovery (%)	RSD (%) ⁿ
ZnO/ZFO-1	Shrimp	5	5.3	106.4	1.8
		25	23.4	93.8	2.8
		50	48	96	3.1
	Pork	5	5.3	106.7	3.4
		25	22.3	89.2	1
		50	49.1	98.3	1.4
ZnO/ZFO-2	Shrimp	5	4.8	96.4	1.8
		25	23.7	94.8	1.3
		50	47.1	94.2	1.4
	Pork	5	4.8	96.3	1.3
		25	23.7	94.5	1.8
		50	48	96.1	1.8
ZnO/ZFO-3	Shrimp	5	5.1	102.2	2
		25	24.9	99.5	1.7
		50	46	92	2
	Pork	5	5.3	105.1	1.5
		25	26.2	104.8	1.4
		50	49	98	2.1

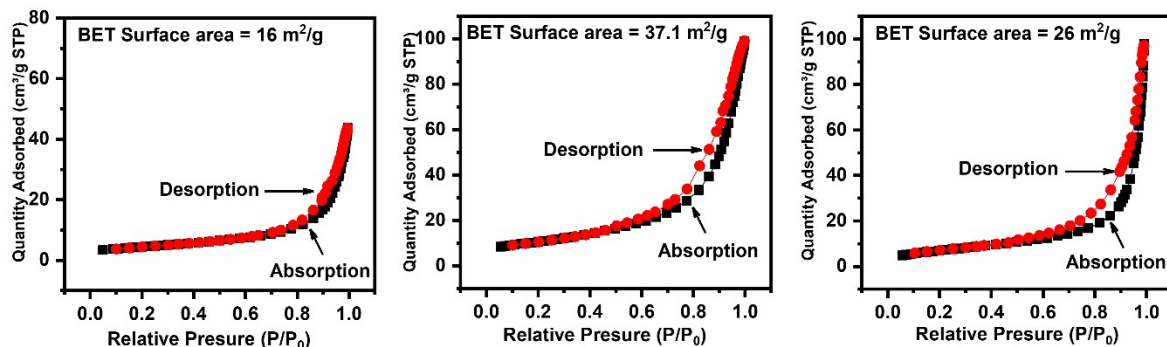


Fig. S1 N_2 adsorption/desorption isotherms of ZnO/ZFO-1, ZnO/ZFO-2, and ZnO/ZFO-3 samples.

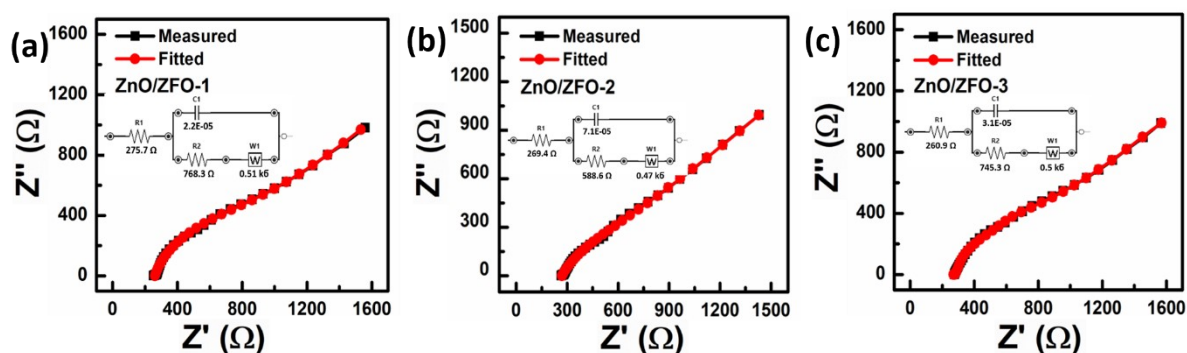


Fig. S2 Experimental and fitted Nyquist plots of impedance spectra in the frequency range from 0.01 kHz to 100 kHz. Inset shows the Randles equivalent circuit used for fitting the data.

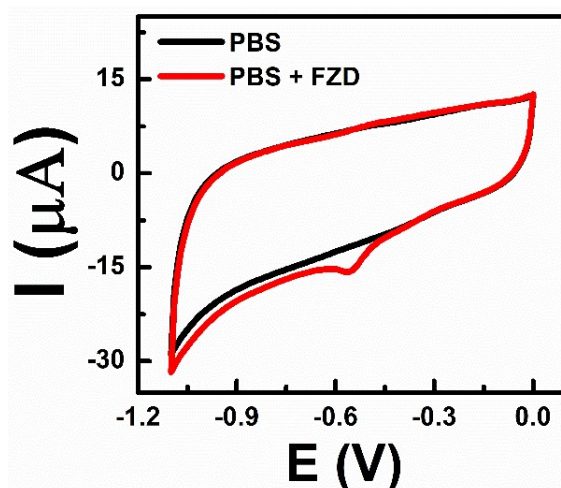


Fig. S3 CV curves recorded on SPE in 0.1 M PBS (pH 7.0) within the absence and presence of 100 μ M FZD.

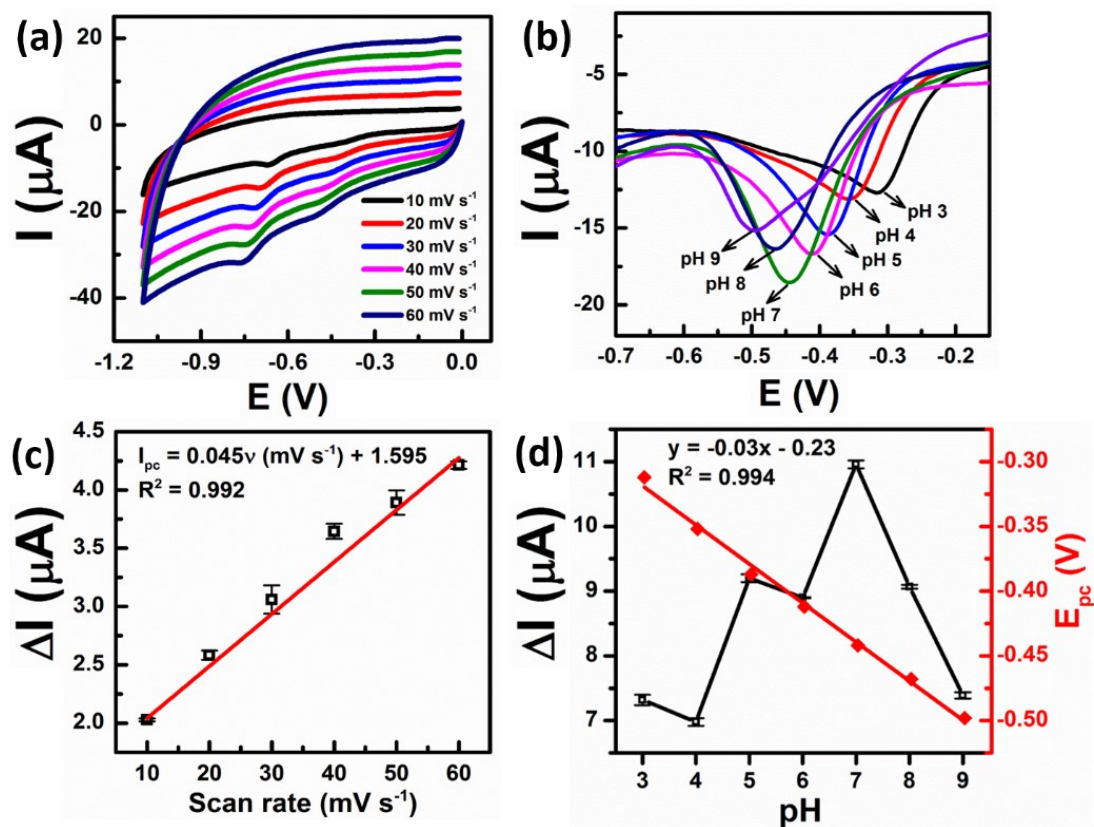


Fig. S4 (a) CV curves recorded of 100 μM FZD in 0.1 M PBS (pH 7.0) with various scan rates from 10 to 60 mV s⁻¹ on ZnO/ZnFe₂O₄-2/SPE; (b) DPV curves of ZnO/ZnFe₂O₄-2/SPE in 100 μM FZD at various pH values (3.0 - 9.0) and the corresponding calibration plots of peak current response vs. scan rate (c) and the plots of peak current vs. pH value (d) with error bars.

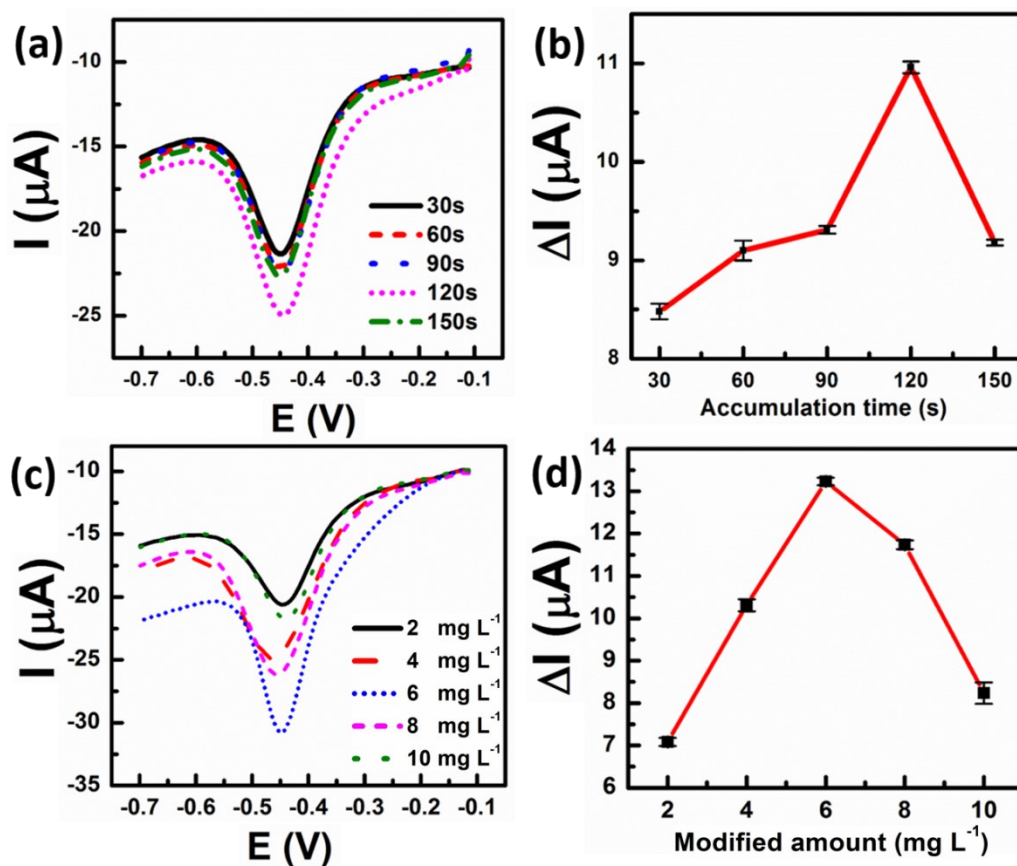


Fig. S5 Effect of accumulation time (a,b) and modified amount (c,d) on FZD reduction of ZnO/ZnFe₂O₄-2/SPE.

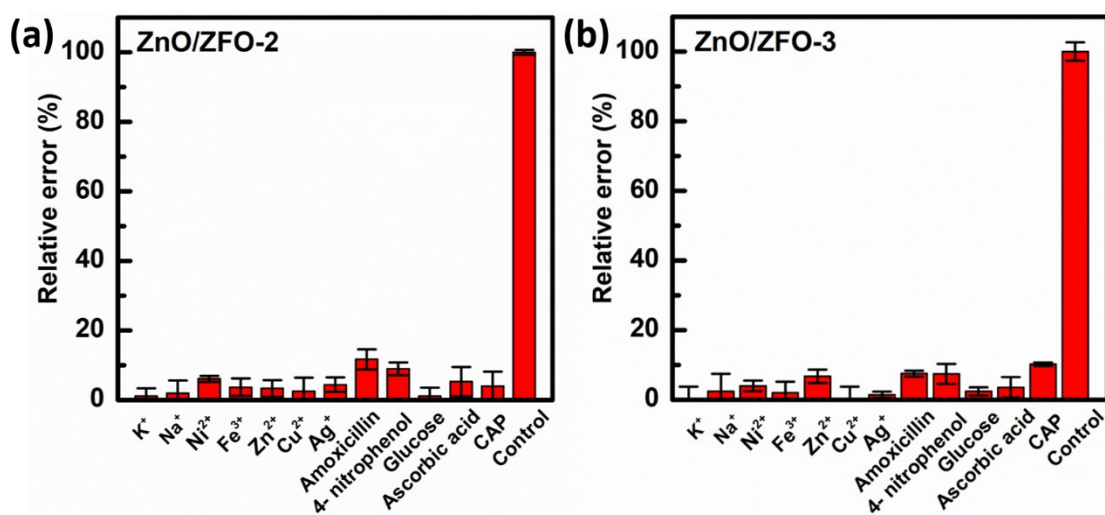


Fig. S6 Interference investigation of ZnO/ZnFe₂O₄-2 and ZnO/ZnFe₂O₄-3 modified electrodes in 0.1 M PBS (pH 7.0) containing 100 μM FZD with 10-fold concentration of interference substances.

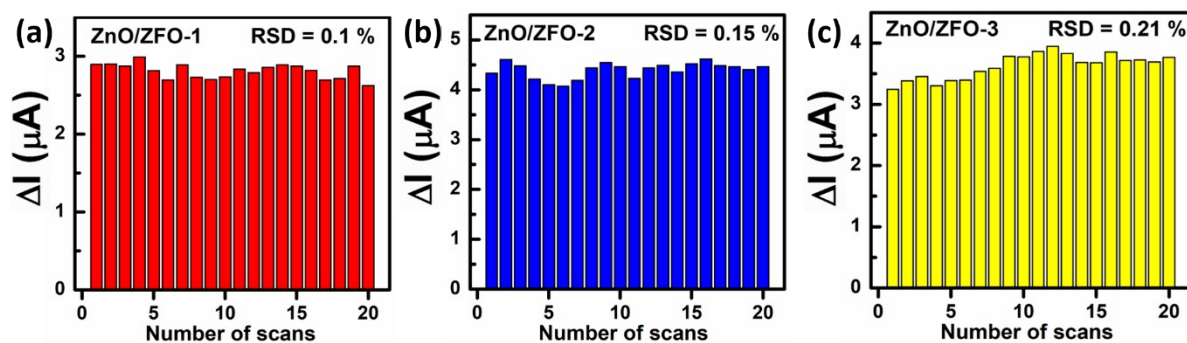


Fig. S7 Repeatability of ZnO/ZnFe₂O₄-1, ZnO/ZnFe₂O₄-2 and ZnO/ZnFe₂O₄-3 modified electrodes in 50 μM FZD.

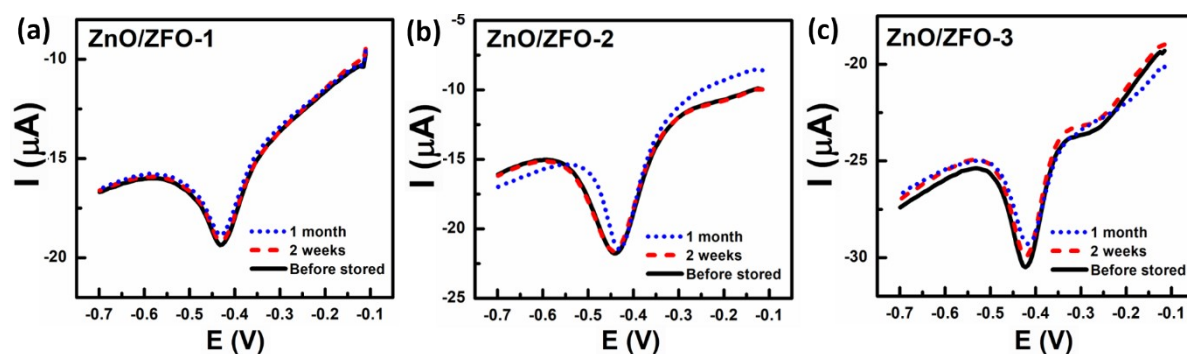


Fig. S8 Long-term stability of ZnO/ZnFe₂O₄-1, ZnO/ZnFe₂O₄-2 and ZnO/ZnFe₂O₄-3 modified electrodes in 50 μM FZD.