Supporting Information

3D Paper-Based Microfluidic Device: A Novel Dual-Detection Platform of Bisphenol A

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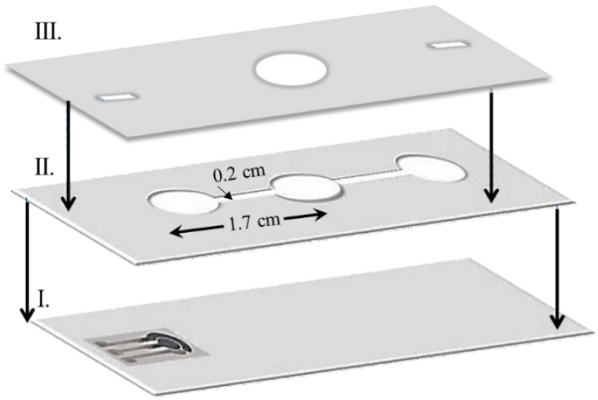

Figure S1. Illustration of the stacked layer of μPADs, fabricated from i.) planar surface (paper), ii) lateral-flow channel (plastic tape) and iii.) cover (plastic tape).

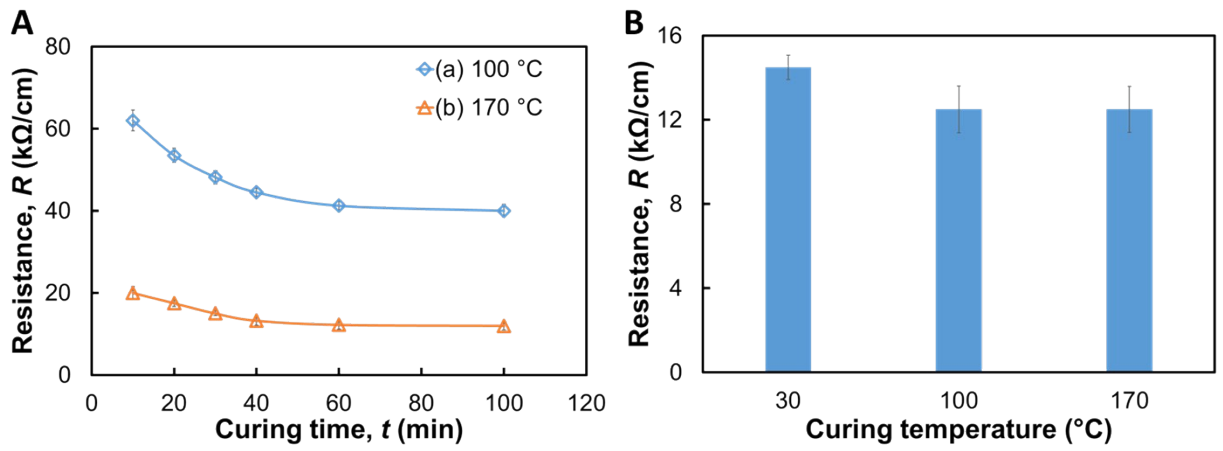

Figure S2. The temperature dependence of the resistivity for electrode printing with AgNPs line (A) and MWCNTs line (B).

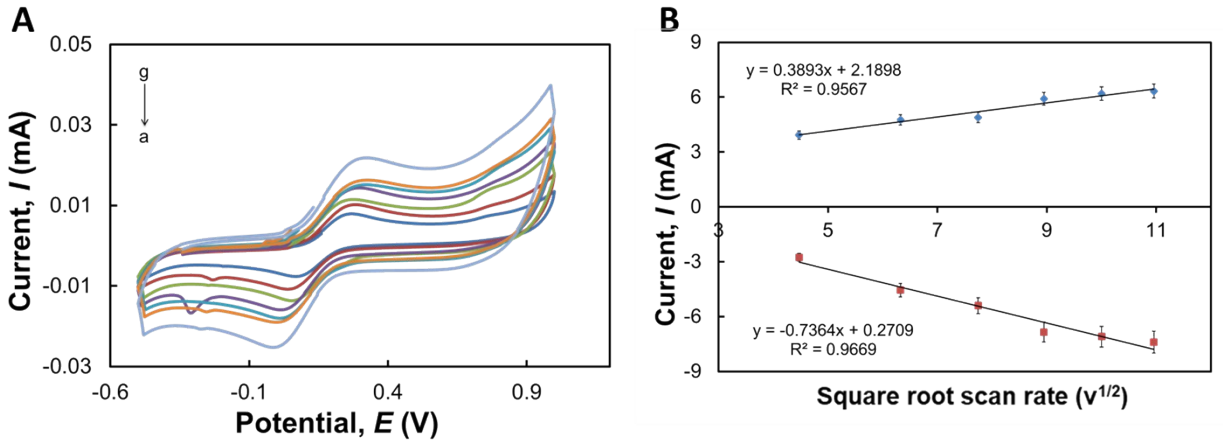

Figure S3. Cyclic voltammograms of 1.0 mM $[Fe(CN)_6]^{3-/4-}$ measured on MWCNTs electrode in KCl solution at different scan rates (0.2–1.5 V/s).

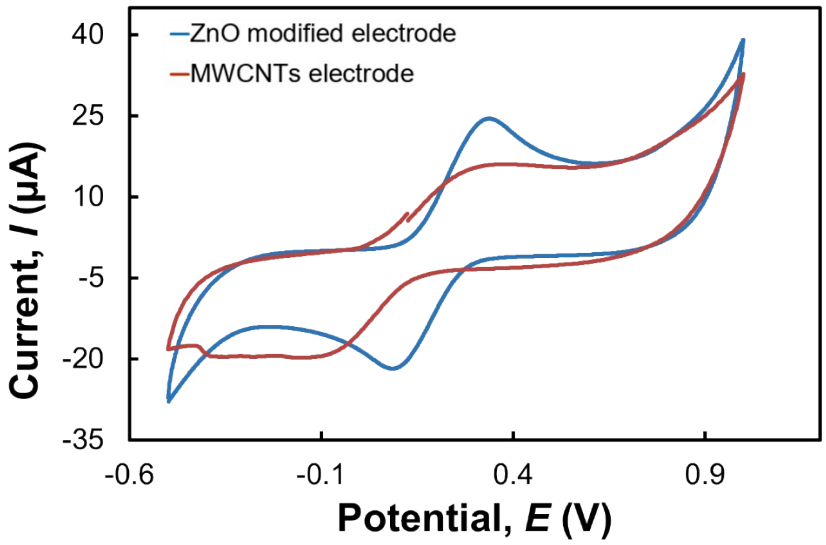

Figure S4. Cyclic voltammograms of 1.0 mM $[Fe(CN)6]^{3-/4-}$ measured on an unmodified electrode (red line) and ZnO/MWCNTs electrode (blue line).

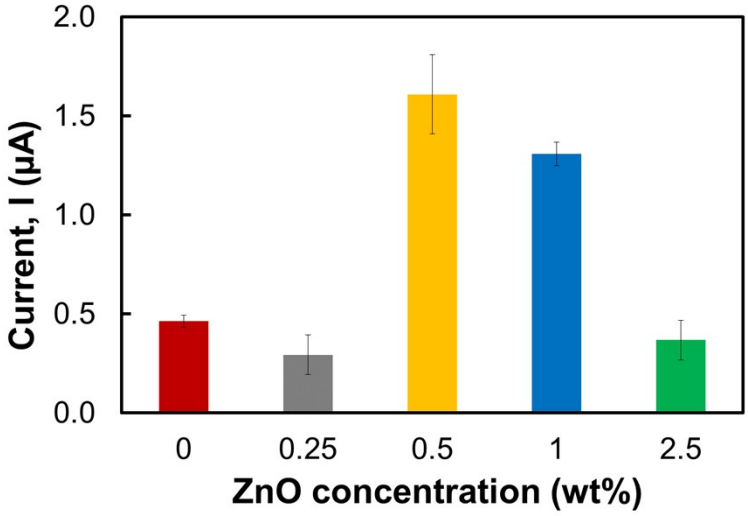

Figure S5. The oxidation peak currents of 0.5 mM BPA obtained from differential pulse voltammetry (DPV) with different ZnO concentrations modified electrode.

Table 1 Comparison of the analytical performances for BPA determination by using different modified electrodes.

Modified electrode	Reaction	Diameter of WE	Method	Linear range	Detection limit	Ref.
Graphene modified glassy carbon electrode	Non-enzymatic	-	DPV	0.5 nM to 1.0 μM	0.47 μM	[1]
Reduce graphene oxide/melamine nanoparticle-modified glassy carbon electrode	Non-enzymatic	3.0 mm	DPV	0.1 nM to 20 mM	4.0 nM	[2]
CTAB micellar medium on a screen-printed carbon electrode	Non-enzymatic	2.0 mm	SWV	1.0 to 10 μM	0.51 μM	[3]
Single-walled carbon nanotubes/poly{3-butyl-1-[3-(N-pyrrolyl)propyl] imidazolium ionic liquid composite film modified glassy carbon electrode	Non-enzymatic	3.0 mm	DPV	5.0 to 0.3 μM	1.0 nM	[4]
Stacked graphene nanofibers/gold nanoparticles composite modified glassy carbon electrode	Non-enzymatic	3.0 mm	LSV	0.08 to 250 μM	0.35 μM	[5]
f-SWCNT and carboxylic group functionalized PEDOT modified GCE	Non-enzymatic	3.0 mm	CV	0.099 to 5.79 μM	0.32 μM	[6]
PEDOT-modified glassy carbon electrodes	Non-enzymatic	3.0 mm	Ampero-metry	40.0–410 μM	22 μM	[7]
Molecularly imprinted polymers and gold nanoparticles modified GCE	Non-enzymatic	3.0 mm	Ampero-metry	8.0 μM–0.6 mM	0.38 μM	[8]
Nitrogen-doped carbon nanofiber	Non-	-	DPV	0.1 – 60 μM	0.50 μM	[9]

modified carbon paste electrode	enzymatic					
ZnO/NPs carbon ionic liquid paste electrode	Non-enzymatic	-	SWV	0.002 – 700 μM	9.0 nM	[10]
CuO−ZnO/GO modified glassy carbon electrodes	Non-enzymatic	-	SWV	3.0 nM − 0.1 μM	0.88 nM	[11]
MWCNTs electrode	Non-enzymatic	2.0 mm	DPV	0.1 - 0.5 mM	6.0 μM	This work
1.0 wt% ZnO modified MWCNTs electrode	Non-enzymatic	2.0 mm	DPV	10 μM – 5 mM	0.35 μM	This work

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