

**Supplementary Table S1. nanoparticles employed for the detection of foodborne pathogens**

Nanoparticles	Pathogens	Detection limit	Ref
Magnetic bead/quantum dot	<i>E. coli</i> O157:H7	10 <sup>3</sup> CFU/mL	232
Magnetic nanoparticle	<i>E. coli</i> O157:H7, <i>S. aureus</i> , <i>S. epidermidis</i>	10 <sup>4</sup> CFU/mL, 8 CFU/mL, 10 <sup>3</sup> CFU/mL	233
Immunomagnetic liposome nanoparticle	<i>Cronobacter sakazakii</i>	10 <sup>3</sup> CFU/mL	234
RuBpy doped silica	<i>E. coli</i> O157:H7	1 cell/mL	232,235
Liposome nanoparticles	<i>Salmonella typhimurium</i>	10 <sup>2</sup> CFU/mL	236
Aptamer conjugated gold nanoparticles	<i>S. typhimurium</i>	10 <sup>4</sup> CFU/mL	237,238
Quantum dot	<i>Salmonella enterica</i> serotype Typhi, <i>E. coli</i> O157:H7, <i>Listeria monocytogenes</i>	103–106 cells/ml	239-242
Single walled carbon nanotube	<i>E. coli</i>	NA	233
Gold/silicon nanorod	<i>Salmonella enterica</i> serotype Typhi; Respiratory syncytial virus	Not reported	243
Gold nanorod	<i>E. coli</i> O157:H7	1-10 CFU/mL	244
Gold nanoparticle	<i>Salmonella enterica</i> serotype Typhi	98.9 CFU/mL	245

**Supplementary Table S2. Nanomaterial-based biosensors applied in food science and food nanotechnology**

Sensor type	Nanomaterial	Sample	Analyte	Function	Ref.
Electrochemical	CuO nanostructure	Cabbage and spinach extract	Residual pesticides (chlorpyrifos, fenthion and methyl parathion)	Surface area enhancement	246
	AuNPs label	Skimmed milk	Pathogens ( <i>Salmonella</i> )	Electrochemical signal generation	247
	AuNPs electrodeposited on GCE	Edible oils	Antioxidants ((BHA), (BHT) and (TBHQ))	Improved conductivity due to surface area enlargement and increase of active sites	248
	Cd QDs encapsulated in ZIF-8 metal organic framework	Milk	Pathogens ( <i>E. coli</i> O157:H7)	Electrochemical signal generation due to Cd etching to Cd(II)	249
	TiO <sub>2</sub> /CeO <sub>2</sub> NPs	<i>In vivo</i> rat brain	Adulterants (dopamine)	Enhanced sensitivity	250
	Graphene nano ribbons (GNR)	Fruit juice	Antioxidants (ascorbic acid)	Enhanced surface area and electrochemical properties	251
	Graphene-Cu NPs	Banana and bovine milk	Mannitol, sucrose, lactose, glucose, and fructose	Oxidation of carbohydrate	252
		—	Mannitol, sucrose, glucose, and fructose	CNTS provided high surface area. Cu NPs enabled oxidation of carbohydrate	253
	PtNPs	Soil and water	Residual pesticides (paraoxon)	Surface area, conductivity and enzyme loading enhancement	254

	AuNPs loaded on MWCNT	Milk	Toxins (BPA)	Enhanced surface area and conductivity	255
	MWCNT	Baby feeding bottles	Toxins (BPA)	Conductive and functionalizable layer	256
	-GNRs/GO-Pd/Au core-shell nanocrystallines (Pd/Au CSNs)  -CdSe@CdS QDs	Tomato sauce	Adulterants, Sudan I	GO provided a matrix for antibody immobilization. GNRs/ GO enhanced the surface area thus enhanced the signal generation	257
		Chili sauce			
		Chili powder		Pd/Au CSNs provides catalytic activity and high surface area	
	GODs-AuNPs	—	Heavy metals ( $\text{Hg}^{2+}$ , $\text{Cu}^{2+}$ )	Preconcentration	258
	GSH@Fe <sub>3</sub> O <sub>4</sub>	Water	Heavy metals ( $\text{Pb}^{2+}$ , $\text{Cd}^{2+}$ )	Preconcentration	259
Optical	SWCNTs gold	Water	Heavy metals ( $\text{Hg}^{2+}$ )	Provides a high surface area of thiophenol- modified SWCNTs gold electrode	260
	CeO <sub>2</sub> NPs	Tea and medicinal mushroom	Antioxidants (ascorbic acid, gallic acid, vanillic acid, quercetin, caffeic acid, and epigallocatechin gallate)	Catalytic activity	261
	CeO <sub>2</sub> NPs	Aqueous media and serum	Adulterants (dopamine)	Colorimetric signal	262, 263

	CeO <sub>2</sub> NPs	Milk	Mycotoxin (ochratoxinA)	Catalytic activity	264
	AuNPs	Milk powder	Adulterants (melamine)	SPR optical properties	265
	Au nanocolloid	Tomato sauce and chili powder	Adulterants, Sudan I	Visible colorimetric signal on nitrocellulose strip	266
	Au nanocage	Green tea	Antioxidants (gallic acid)	Morphological change induces LSPR change upon seed-mediated growth of Ag	267
	MnO <sub>2</sub> nanosheets	Orange and orange juice	Antioxidants (ascorbic acid)	Catalytic activity	268
	Nitrogen-doped carbon dots	—	Heavy metals (Hg <sup>2+</sup> , Cu <sup>2+</sup> , Fe <sup>3+</sup> )	Fluorescent response	269
	DNA–AuNPs	—	Heavy metals (Hg <sup>2+</sup> )	Colorimetric response due to aggregation	270
	AuNPs	Cucumber and hamburger extracts	Pathogens ( <i>E. coli</i> and <i>Salmonella</i> sp.)	SPR optical properties	271
	Au@AgNPs	Milk	Antibiotics (kanamycin)	SERS activity	272
	AuNR MnFe <sub>2</sub> O <sub>4</sub> @Au	—	Pathogens ( <i>S. aureus</i> )	SERS activity Separation	273
	AuNPs	Honey	Antibiotics (26 sulfonamides)	—	274

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