

Colorimetric sensor array based on CoOOH nanoflakes for rapid discrimination of antioxidants in food

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Table S1. Gradient elution conditions for the separation of the antioxidants

Time (min)	Mobile phase A (%)	Mobile phase B (%)
0	50	50
5	50	50
15	20	80
20	20	80
25	10	90
27	50	50
35	50	50

Table S2. Euclidean distance between different samples

Centroid functions	Factor 1	Factor 2	Factor 3	Euclidean distances (EDs)
BHT-100 nM	-20.152	4.765	-0.276	8.159
BHA/TBHQ=9:1	-18.789	-2.92	2.102	28.80
TBHQ-100 nM	8.871	3.952	-2.051	6.008
TBHQ-50 nM	-7.358	-7.398	-2.759	7.289
Bis-100	-12.446	-8.235	0.324	2.066
TBHQ-500 nM	24.462	-11.271	3.495	12.89
Bis-20	24.462	-5.479	-0.929	
BHA-50 nM	-26.703	-0.837	-1.498	
Sau-100	-28.226	-1.125	-0.132	
BHA-700 nM	2.984	13.411	5.297	
Sau-20	1.02	7.771	-6.125	

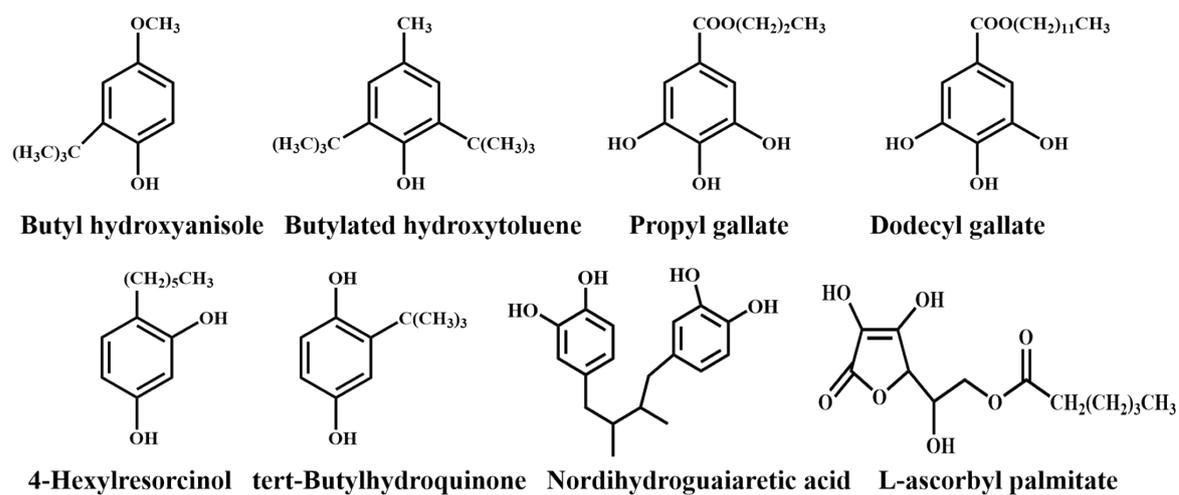


Figure S1. Chemical structures of the eight phenolic antioxidants.

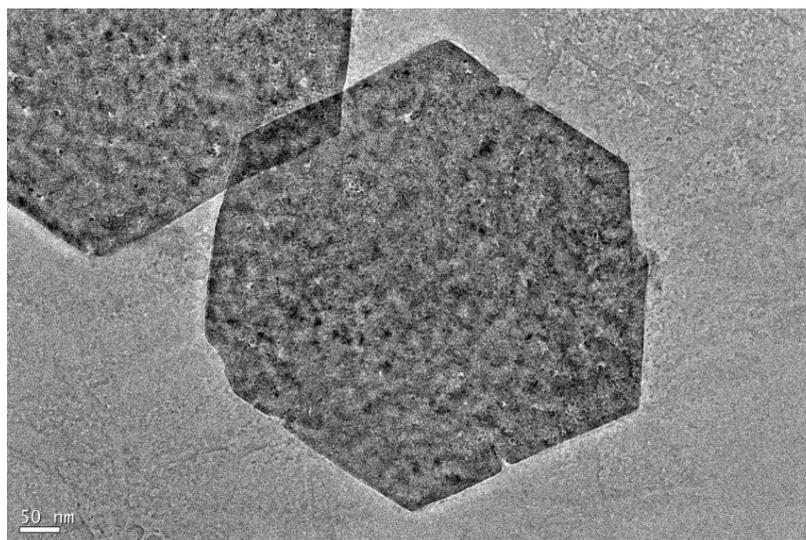


Figure S2. The high-resolution transmission electron microscope image of the CoOOH nanoflakes.

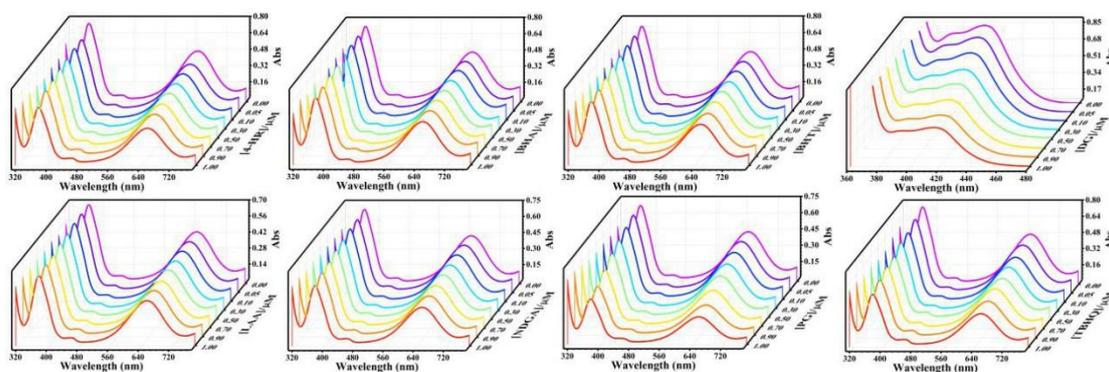


Figure S3. Typical absorption spectra for monitoring the catalytic oxidation of TMB in the presence of CoOOH nanozymes with various concentrations of 4-HR, BHA, BHT, DG, L-AA, NDGA, PG and TBHQ.

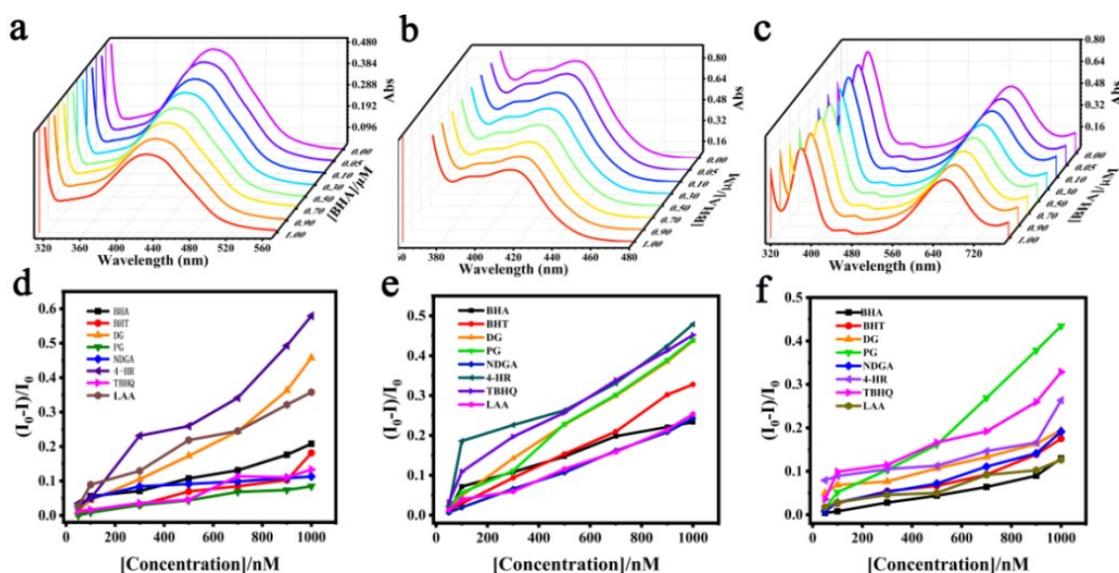


Figure S4. Typical absorption spectra for monitoring the catalytic oxidation of OPD (a), ABTs (b), and TMB (c) in the presence of CoOOH nanozymes with various concentrations of BHA. Chromogenic activity of OPD (d), ABTsc(e), and TMB (f) after incubation with different concentrations of the eight antioxidants.

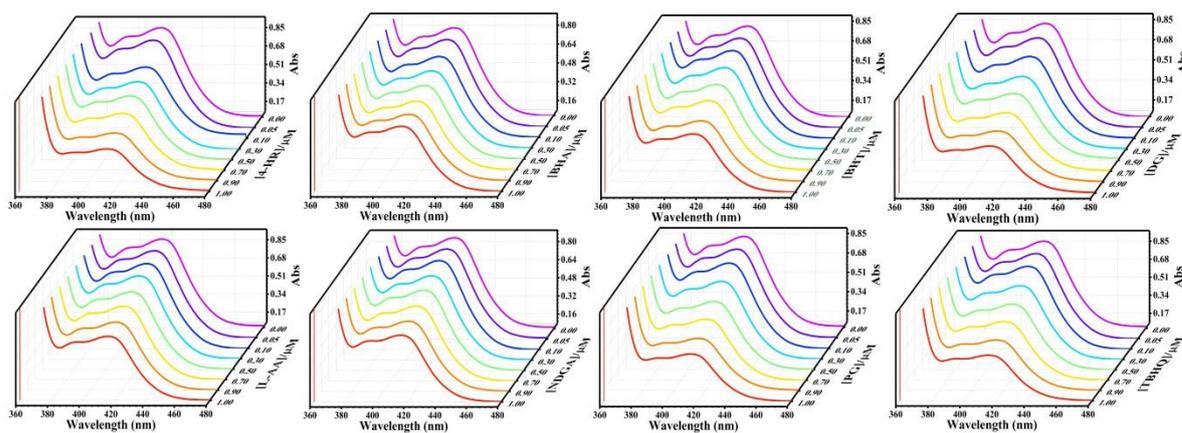


Figure S5. Typical absorption spectra for monitoring the catalytic oxidation of ABTs in the presence of CoOOH nanozymes with various concentrations of 4-HR, BHA, BHT, DG, L-AA, NDGA, PG and TBHQ.

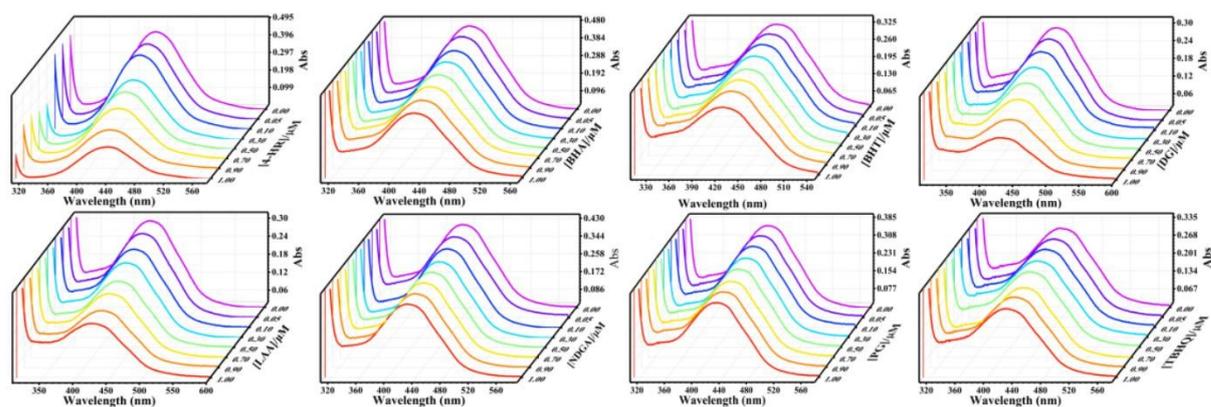


Figure S6. Typical absorption spectra for monitoring the catalytic oxidation of OPD in the presence of CoOOH nanozymes with various concentrations of 4-HR, BHA, BHT, DG, L-AA, NDGA, PG and TBHQ.

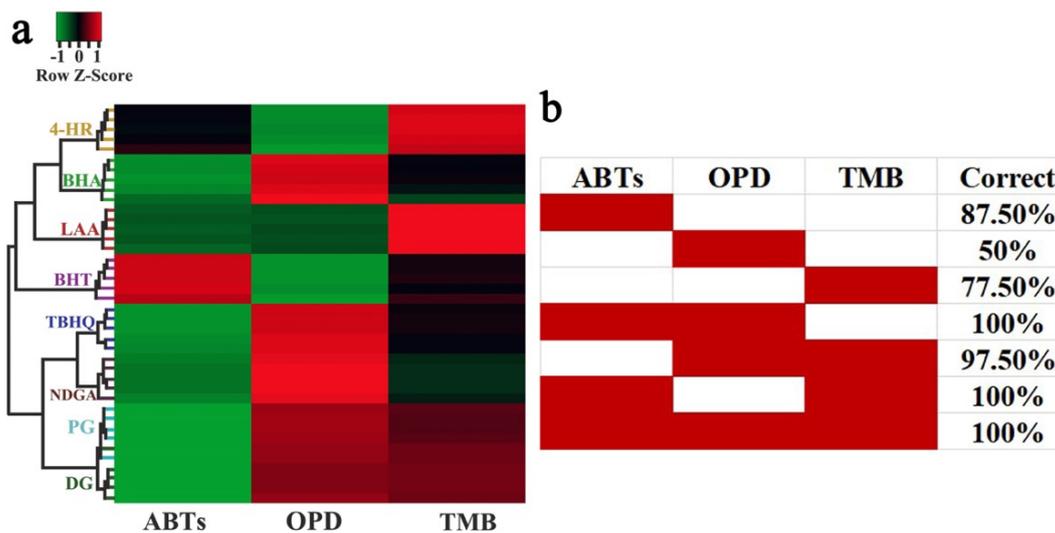


Figure S7. Heat plot of the absorption signatures of 50 nM antioxidants. Five replicates are shown per antioxidant(a) and The classification accuracy for identifying antioxidants (each at 50 nM) using an individual Chromogenic substrate (ABTs, OPD, or TMB) and the combination of three substrates.

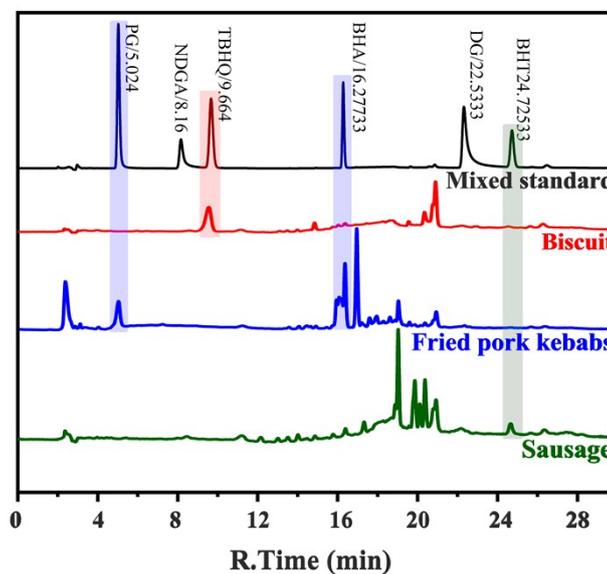


Figure S8. Determination of the antioxidants in biscuits, sausages and fried meat kebabs by high-performance liquid chromatography.

Table S3. Result of unknown samples detection using a LDA algorithm.

Sample	Concentration (nM)	Number of samples	Correctly identified	Accuracy (%)
TBHQ	50	5	5	100
	100	5	5	100
	300	5	5	100
	500	5	5	100
	700	5	5	100
	900	5	5	100
	1000	5	5	100
	BHT	50	5	5
100		5	5	100
300		5	5	100
500		5	5	100
700		5	5	100
900		5	5	100
1000		5	5	100
Biscuits	100	5	4	80
(dilution)	20	5	5	100
Sausage	100	5	4	80
(dilution)	20	5	5	100
PG	50	5	4	80
	100	5	5	100
	300	5	5	100
	500	5	5	100
	700	5	5	100
	900	5	5	100
	1000	5	5	100

	50	5	5	100
	100	5	5	100
	300	5	5	100
BHA	500	5	5	100
	700	5	5	100
	900	5	5	100
	1000	5	5	100
fried pork	200	5	5	100
kebabs	100	5	5	100
(dilution)	20	5	5	100
	Total	175	172	98.3

Reference

[1] Compilation of National Food Safety Standards, 2014.