1	Electronic Supplementary Material
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3	Multicolor enzyme-linked immunoassay method for visual readout
4	of carbendazim
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- Fig. S1. (A) UV-vis absorption spectra of original AuNRs. (B) TEM image of original
 AuNRs.
- 22 Fig. S2. (A) UV-vis absorption spectra of (a) TMB, (b) HRP + TMB + H_2O_2 , (c) HRP

+ TMB +H₂O₂ + H⁺. (B) UV-vis absorption spectra of (a) TMB + AuNRs, (b) HRP +
TMB + H₂O₂ + AuNRs, (c) HRP + TMB +H₂O₂ + H⁺ + AuNRs. The inset picture
shows the colors of the corresponding solutions.

Fig. S3. (A) UV-vis absorption spectra of (a) CBD + HRP + H₂O₂ + TMB + H⁺ +
AuNRs, (b) CBD-BSA + HRP + H₂O₂ + TMB + H⁺ + AuNRs, (c) mAb + HRP + H₂O₂
+ TMB + H⁺ + AuNRs, (d) IgG + HRP + H₂O₂ + TMB + H⁺ + AuNRs. The inset
picture shows the colors of the corresponding solutions.

30 Fig. S4. The change in absorbance of enzyme-linked immunosorbent assay with31 different contents of organic solvents.

Fig. S5. CBD detection in the presence of 10% cabbage substrate (A) 32 Photographs of the sensing system as CBD concentrations increased from 0 33 ng/mL to 33.3 ng/mL (from left to right). (B) UV-vis absorption spectra of 34 solutions characterized by different CBD concentrations. (C) Calibration curve 35 of the LSPR peak observed as the concentration of CBD increases from 0.24 36 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3). 37 Fig. S6. CBD detection in the presence of 10% citrus substrate (A) Photographs 38 of the sensing system as CBD concentrations increased from 0 ng/mL to 33.3 39 40 ng/mL (from left to right). (B) UV-vis absorption spectra of solutions

41 characterized by different CBD concentrations. (C) Calibration curve of the 42 LSPR peak observed as the concentration of CBD increases from 0.24 ng/mL to 43 20 ng/mL. Note that error bars represent standard deviations (n = 3).

44 Fig. S7. CBD detection in the presence of 10% canned citrus substrate (A) 45 Photographs of the sensing system as CBD concentrations increased from 0 46 ng/mL to 33.3 ng/mL (from left to right). (B) UV–vis absorption spectra of 47 solutions characterized by different CBD concentrations. (C) Calibration curve 48 of the LSPR peak observed as the concentration of CBD increases from 0.24 49 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3).

Fig. S8. CBD detection in the presence of 10% canned chives substrate (A) Photographs of the sensing system as CBD concentrations increased from 0 ng/mL to 33.3 ng/mL (from left to right). (B) UV–vis absorption spectra of solutions characterized by different CBD concentrations. (C) Calibration curve of the LSPR peak observed as the concentration of CBD increases from 0.24 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3).

56 Table S1. Changes in the aspect ratio of AuNRs with different etching levels. (A1~A5

show the aspect ratio of AuNRs from $A \sim E$ in Figure 1, respectively.)

58 Table S2. Definitions and MRLs of CBD residues in different countries and regions.

59 Table S3. Relative standard deviation (RSD) of the longitudinal LSPR peaks obtained60 from different CBD concentrations.



63 Fig. S1. (A) UV-vis absorption spectra of original AuNRs. (B) TEM image of

original AuNRs.



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67 Fig. S2. (A) UV-vis absorption spectra of (a) TMB, (b) HRP + TMB + H_2O_2 , (c) HRP

68 + TMB + H_2O_2 + H^+ . (B) UV-vis absorption spectra of (a) TMB + AuNRs, (b) HRP +

69 TMB + H_2O_2 + AuNRs, (c) HRP + TMB + H_2O_2 + H⁺ + AuNRs. The inset picture

- 70 shows the colors of the corresponding solutions.
- 71



Fig. S3. (A) UV-vis absorption spectra of (a) CBD + HRP + H₂O₂ + TMB + H⁺ +
AuNRs, (b) CBD-BSA + HRP + H₂O₂ + TMB + H⁺ + AuNRs, (c) mAb + HRP + H₂O₂
+ TMB + H⁺ + AuNRs, (d) IgG + HRP + H₂O₂ + TMB + H⁺ + AuNRs. The inset
picture shows the colors of the corresponding solutions.



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Fig. S4. The change in absorbance of enzyme-linked immunosorbent assay withdifferent contents of organic solvents.





Fig. S5. CBD detection in the presence of 10% cabbage substrate (A) Photographs of the sensing system as CBD concentrations increased from 0 ng/mL to 33.3 ng/mL (from left to right). (B) UV–vis absorption spectra of solutions characterized by different CBD concentrations. (C) Calibration curve of the LSPR peak observed as the concentration of CBD increases from 0.24 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3).



Fig. S6. CBD detection in the presence of 10% citrus substrate (A) Photographs of the sensing system as CBD concentrations increased from 0 ng/mL to 33.3 ng/mL (from left to right). (B) UV–vis absorption spectra of solutions characterized by different CBD concentrations. (C) Calibration curve of the LSPR peak observed as the concentration of CBD increases from 0.24 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3).



99 Fig. S7. CBD detection in the presence of 10% canned citrus substrate (A) 100 Photographs of the sensing system as CBD concentrations increased from 0 101 ng/mL to 33.3 ng/mL (from left to right). (B) UV–vis absorption spectra of 102 solutions characterized by different CBD concentrations. (C) Calibration curve 103 of the LSPR peak observed as the concentration of CBD increases from 0.24 104 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3). 105



Fig. S8. CBD detection in the presence of 10% canned chives substrate (A) Photographs of the sensing system as CBD concentrations increased from 0 ng/mL to 33.3 ng/mL (from left to right). (B) UV–vis absorption spectra of solutions characterized by different CBD concentrations. (C) Calibration curve of the LSPR peak observed as the concentration of CBD increases from 0.24 ng/mL to 20 ng/mL. Note that error bars represent standard deviations (n = 3).

114	Table S1.	Changes	in the	aspect	ratio	of	AuNRs	with	different	etching	levels.

Serial number	Length	Width	Aspect ratio
A1	0.12	0.14	0.82
A2	0.79	0.46	1.7
A3	0.84	0.43	1.9
A4	0.99	0.45	2.2
A5	1.05	0.40	2.7
Original AuNRs	1.3	0.41	3.1

115 (A1~A5 show the aspect ratio of AuNRs from A ~ E in Fig. 1, respectively.)

Country or region	Residual definition	Food	MRLs(mg/kg)	
		Rice	2	
		Soybeans	0.2	
		Chives	2	
China	CBD	Podded peas	0.02	
		Carrot	0.2	
		Citrus	5	
		Lemon or pomelo	0.5	
		Avocados	0.5	
		Beans	2	
		Cereal grains	0.2	
	Sum of: benomyl, CBD,	Citrus fruits	5	
New Zealand	and thiophanate methyl	Fruiting vegetables	0.5	
	Expressed as: CBD (except tomatoes)		0.5	
		Lettuce	2	
		Pome fruits	2	
		Tomatoes	2	
		Chives	2	
		Grape	3	
	Sum of: benomyl, CBD,	Citrus	5	
China Hong Kong	and thiophanate methyl	Sweet oranges or limes	1	
	Expressed as: CBD	Grapefruit or lemon	0.5	
		Plum	0.5	
		Brussels sprouts	0.5	
	Sum of: benomyl and	Broccoli	0.1	
European Union	CBD	Cabbages	0.1	

117 Table S2. Definitions and MRLs of CBD residues in different countries and

118 regions.

	Expressed as: CBD	Lemons or limes	0.7
		Oranges	0.2
		Leafy vegetables	0.1
		Corn grain	0.01
		Cabbages	1.0
		Onions	0.05
V	Sum of: benomyl, CBD,	Potatoes	0.03
Korea	and thiophanate methyl	Lemons or oranges	1.0
	Expressed as: CBD	Plums	0.5
		Wheat grain	0.05
		Garlic	0.01
	Come of how and CDD	Grapefruit	0.2
A	Sum of: benomyl, CBD,	Lemons or limes	0.7
Australia	Expressed as: CBD	Oranges	0.2
		Apples	0.2
		Strawberries	1.0
		Banana	0.2
		Berries and other small fruits	1.0
	Sum of: benomyl, CBD, and thiophanate methyl Expressed as: CBD	Oranges, sweet, sour	
Codex Alimentarius		(including Orange-like	1.0
Commission (CAC)		hybrids) (subgroup)	
		Peanut	0.1
		Cucumber	0.05
		Mango	5.0
		Cherries	10.0

Concentration RSD (%) Mean (nm) SD (n=3) (ng/mL) 0.082 577 2.4 3.0 0.25 583.7 6.0 7.3 0.49 588.7 4.9 6.1 0.74 604.3 7.3 8.9 619 7.9 1.1 6.5 2.2 644.3 6.8 8.3 4.4 664 2.8 3.4 6.7 667.3 6.0 7.3 10 679.3 1.9 2.3 20 681 4.3 3.6 100 686.3 2.9 3.5 The average RSD is 5.6%

120 Table S3. Relative standard deviation (RSD) of the longitudinal LSPR peaks

121 obtained from different CBD concentrations.