Supplementary Information (SI) for Analytical Methods.
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Supporting Information

Innovative multispectral sensor for rapid wine adulteration detection using wavelength selection algorithms

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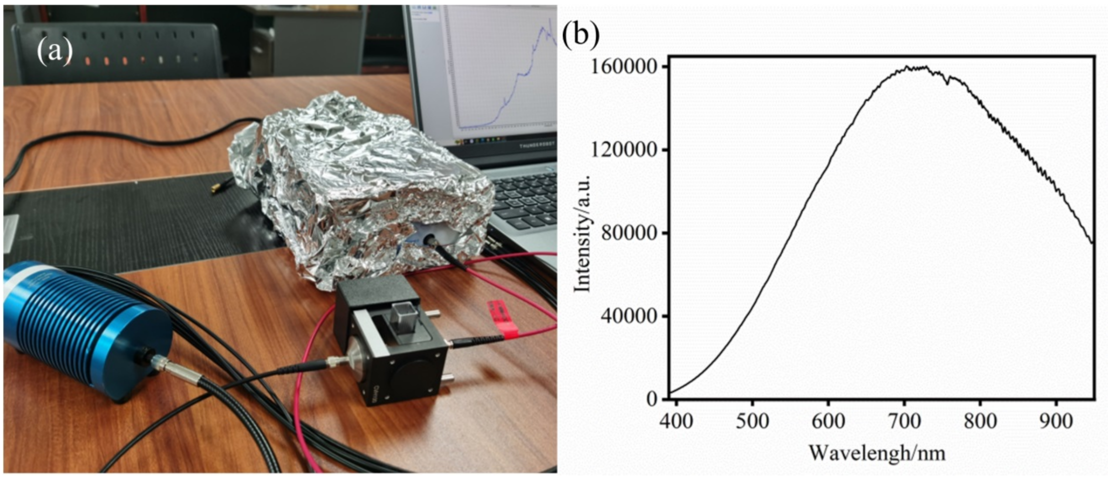

Figure S1 The wine spectrum acquisition system. (a) Halogen lamp transmission (absorption) spectrum acquisition system; (b) spectra of halogen lamp.

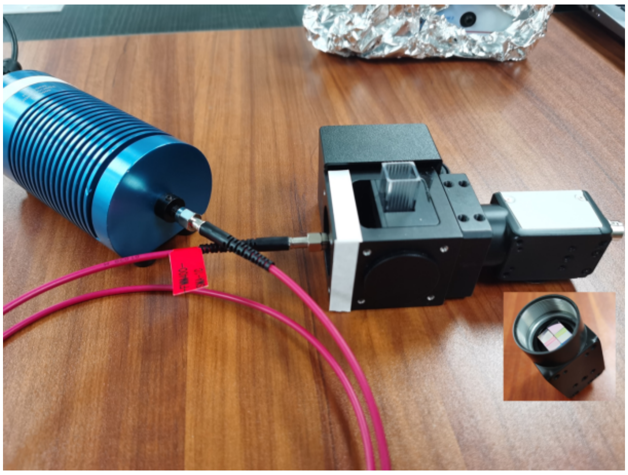

Figure S2 The four-channel spectral sensor acquisition system for detecting wine adulteration.

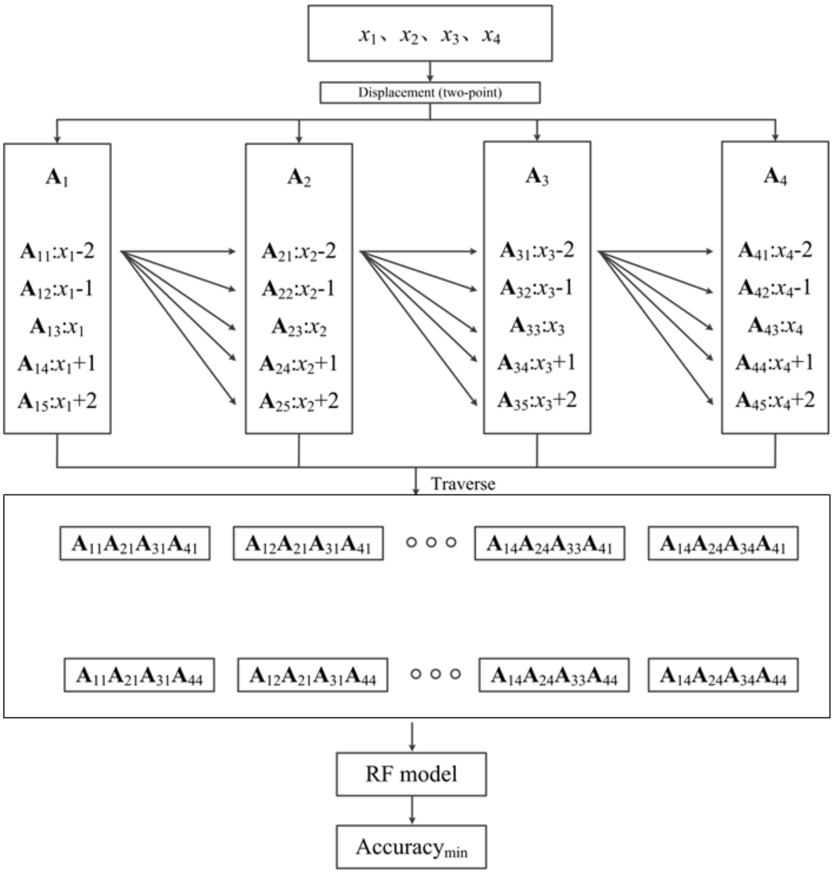

Figure S3 Traverse method based on two-point displacement.

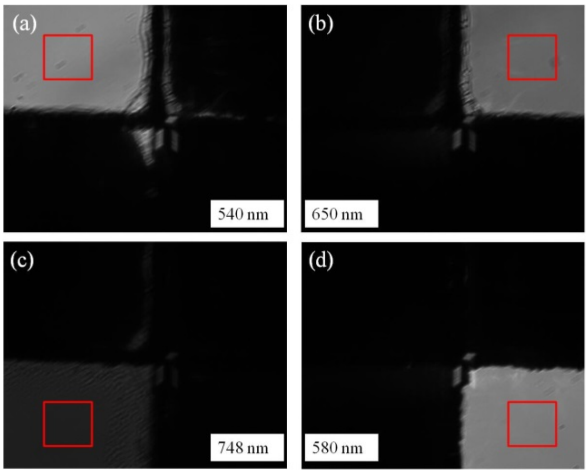

Figure S4 Response of four-channel sensors to different wavelengths of light. (a) 540 nm; (b) 650 nm; (c) 748 nm; (d) 580 nm.

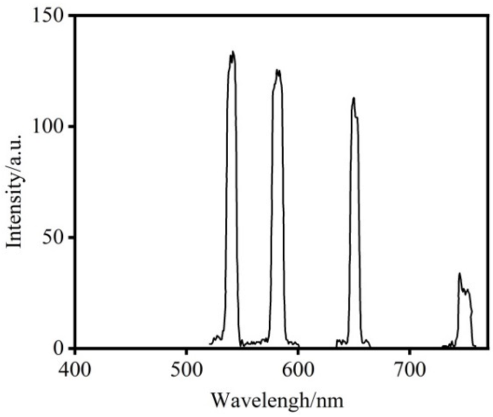

Figure S5 Spectral response of a four-channel spectral sensor.

Table S1 Preparation table for commercial wine doping samples (mL)

No.	Commercial 1	Commercial 2	Commercial 3	Commercial 4	Commercial 5	Commercial 6
1	0.1	0.9				
2	0.1		0.9			
3	0.1			0.9		
4	0.1				0.9	
5	0.1					0.9
6	0.2	0.8				
7	0.2		0.8			
8	0.2			0.8		
9	0.2				0.8	

10	0.2					0.8
11	0.3	0.7				
12	0.3		0.7			
13	0.3			0.7		
14	0.3				0.7	
15	0.3					0.7
16	0.4	0.6				
17	0.4		0.6			
18	0.4			0.6		
19	0.4				0.6	
20	0.4					0.6
21	0.5	0.5				
22	0.5		0.5			
23	0.5			0.5		
24	0.5				0.5	
25	0.5					0.5
26	0.6	0.4				
27	0.6		0.4			
28	0.6			0.4		
29	0.6				0.4	
30	0.6					0.4
31	0.7	0.3				
32	0.7		0.3			
33	0.7			0.3		
34	0.7				0.3	
35	0.7					0.3
36	0.8	0.2				
37	0.8		0.2			
38	0.8			0.2		
39	0.8				0.2	
40	0.8					0.2
41	0.9	0.1				
42	0.9		0.1			
43	0.9			0.1		
44	0.9				0.1	
45	0.9					0.1
46		0.1	0.9			
47		0.1		0.9		
48		0.1			0.9	
49		0.1				0.9
50		0.2	0.8			
51		0.2		0.8		
52		0.2			0.8	
53		0.2				0.8

54	0.3	0.7			
55	0.3		0.7		
56	0.3			0.7	
57	0.3				0.7
58	0.4	0.6			
59	0.4		0.6		
60	0.4			0.6	
61	0.4				0.6
62	0.5	0.5			
63	0.5		0.5		
64	0.5			0.5	
65	0.5				0.5
66	0.6	0.4			
67	0.6		0.4		
68	0.6			0.4	
69	0.6				0.4
70	0.7	0.3			
71	0.7		0.3		
72	0.7			0.3	
73	0.7				0.3
74	0.8	0.2			
75	0.8		0.2		
76	0.8			0.2	
77	0.8				0.2
78	0.9	0.1			
79	0.9		0.1		
80	0.9			0.1	
81	0.9				0.1
82		0.1	0.9		
83		0.1		0.9	
84		0.1			0.9
85		0.2	0.8		
86		0.2		0.8	
87		0.2			0.8
88		0.3	0.7		
89		0.3		0.7	
90		0.3			0.7
91		0.4	0.6		
92		0.4		0.6	
93		0.4			0.6
94		0.5	0.5		
95		0.5		0.5	
96		0.5			0.5
97		0.6	0.4		

98			0.6		0.4	
99			0.6			0.4
100			0.7	0.3		
101			0.7		0.3	
102			0.7			0.3
103			0.8	0.2		
104			0.8		0.2	
105			0.8			0.2
106			0.9	0.1		
107			0.9		0.1	
108			0.9			0.1
109				0.1	0.9	
110				0.1		0.9
111				0.2	0.8	
112				0.2		0.8
113				0.3	0.7	
114				0.3		0.7
115				0.4	0.6	
116				0.4		0.6
117				0.5	0.5	
118				0.5		0.5
119				0.6	0.4	
120				0.6		0.4
121				0.7	0.3	
122				0.7		0.3
123				0.8	0.2	
124				0.8		0.2
125				0.9	0.1	
126				0.9		0.1
127					0.1	0.9
128					0.2	0.8
129					0.3	0.7
130					0.4	0.6
131					0.5	0.5
132					0.6	0.4
133					0.7	0.3
134					0.8	0.2
135					0.9	0.1

Table S2 Preparation table for adulterated wine doping samples (mL)

	No.	Commercial	homemade 1	homemade 2	homemade 3	homemade 4	homemade 5	homemade 6
Comme	1	0.5	0.5					

rcial 1	2	0.5		0.5				
	3	0.5			0.5			
	4	0.5				0.5		
	5	0.5					0.5	
	6	0.5						0.5
	7	0.6	0.4					
	8	0.6		0.4				
	9	0.6			0.4			
	10	0.6				0.4		
	11	0.6					0.4	
	12	0.6						0.4
	13	0.7	0.3					
	14	0.7		0.3				
	15	0.7			0.3			
	16	0.7				0.3		
	17	0.7					0.3	
	18	0.7						0.3
	19	0.8	0.2					
	20	0.8		0.2				
	21	0.8			0.2			
	22	0.8				0.2		
	23	0.8					0.2	
	24	0.8						0.2
	25	0.9	0.1					
	26	0.9		0.1				
	27	0.9			0.1			
	28	0.9				0.1		
	29	0.9					0.1	
	30	0.9						0.1
Commercial 2	31	0.5	0.5					
	32	0.5		0.5				
	33	0.5			0.5			
	34	0.5				0.5		
	35	0.5					0.5	
	36	0.5						0.5
	37	0.6	0.4					
	38	0.6		0.4				
	39	0.6			0.4			
	40	0.6				0.4		
	41	0.6					0.4	
	42	0.6						0.4
	43	0.7	0.3					
	44	0.7		0.3				
	45	0.7			0.3			

	46	0.7				0.3		
	47	0.7					0.3	
	48	0.7						0.3
	49	0.8	0.2					
	50	0.8		0.2				
	51	0.8			0.2			
	52	0.8				0.2		
	53	0.8					0.2	
	54	0.8						0.2
	55	0.9	0.1					
	56	0.9		0.1				
	57	0.9			0.1			
	58	0.9				0.1		
	59	0.9					0.1	
	60	0.9						0.1
	61	0.5	0.5					
	62	0.5		0.5				
	63	0.5			0.5			
	64	0.5				0.5		
	65	0.5					0.5	
	66	0.5						0.5
	67	0.6	0.4					
	68	0.6		0.4				
	69	0.6			0.4			
	70	0.6				0.4		
	71	0.6					0.4	
	72	0.6						0.4
	73	0.7	0.3					
Commercial 3	74	0.7		0.3				
	75	0.7			0.3			
	76	0.7				0.3		
	77	0.7					0.3	
	78	0.7						0.3
	79	0.8	0.2					
	80	0.8		0.2				
	81	0.8			0.2			
	82	0.8				0.2		
	83	0.8					0.2	
	84	0.8						0.2
	85	0.9	0.1					
	86	0.9		0.1				
	87	0.9			0.1			
	88	0.9				0.1		
	89	0.9					0.1	

	90	0.9					0.1
	91	0.5	0.5				
	92	0.5		0.5			
	93	0.5			0.5		
	94	0.5				0.5	
	95	0.5					0.5	
	96	0.5						0.5
	97	0.6	0.4					
	98	0.6		0.4				
	99	0.6			0.4			
	100	0.6				0.4		
	101	0.6					0.4	
	102	0.6						0.4
	103	0.7	0.3					
	104	0.7		0.3				
Commercial 4	105	0.7			0.3			
	106	0.7				0.3		
	107	0.7					0.3	
	108	0.7						0.3
	109	0.8	0.2					
	110	0.8		0.2				
	111	0.8			0.2			
	112	0.8				0.2		
	113	0.8					0.2	
	114	0.8						0.2
	115	0.9	0.1					
	116	0.9		0.1				
	117	0.9			0.1			
	118	0.9				0.1		
	119	0.9					0.1	
	120	0.9						0.1
	121	0.5	0.5					
	122	0.5		0.5				
	123	0.5			0.5			
	124	0.5				0.5		
	125	0.5					0.5	
	126	0.5						0.5
Commercial 5	127	0.6	0.4					
	128	0.6		0.4				
	129	0.6			0.4			
	130	0.6				0.4		
	131	0.6					0.4	
	132	0.6						0.4
	133	0.7	0.3					

	134	0.7		0.3				
	135	0.7			0.3			
	136	0.7				0.3		
	137	0.7					0.3	
	138	0.7						0.3
	139	0.8	0.2					
	140	0.8		0.2				
	141	0.8			0.2			
	142	0.8				0.2		
	143	0.8					0.2	
	144	0.8						0.2
	145	0.9	0.1					
	146	0.9		0.1				
	147	0.9			0.1			
	148	0.9				0.1		
	149	0.9					0.1	
	150	0.9						0.1
	151	0.5	0.5					
	152	0.5		0.5				
	153	0.5			0.5			
	154	0.5				0.5		
	155	0.5					0.5	
	156	0.5						0.5
	157	0.6	0.4					
	158	0.6		0.4				
	159	0.6			0.4			
	160	0.6				0.4		
	161	0.6					0.4	
	162	0.6						0.4
	163	0.7	0.3					
Commercial 6	164	0.7		0.3				
	165	0.7			0.3			
	166	0.7				0.3		
	167	0.7					0.3	
	168	0.7						0.3
	169	0.8	0.2					
	170	0.8		0.2				
	171	0.8			0.2			
	172	0.8				0.2		
	173	0.8					0.2	
	174	0.8						0.2
	175	0.9	0.1					
	176	0.9		0.1				
	177	0.9			0.1			

	178	0.9				0.1		
	179	0.9					0.1	
	180	0.9						0.1