Table S1 Performance description of ten metal oxide sensors in PEN3 electronic nose.

No.	Sensor code	Performance description	Reference (mL/m^3)
1	W1C	Aromatic and benzene compounds	C_7H_8, 10
2	W5S	Broad range sensitivity, sensitive to nitrogen oxides	NO_2, 1
3	W3C	Ammonia, sensitive to aromatic compounds	C_6H_6, 10
4	W6S	Mainly hydrogen, selectively	H_2, 100
5	W5C	Alkane, aromatic compounds	C_3H_8, 1
6	W1S	Sensitive to methane	CH_4, 100
7	W1W	Sensitive to many organic compounds	H_2S, 1
8	W2S	Alcohol, sensitive to aromatic compounds with broad range	CO, 100
9	W2W	Aromatic and sulfur organic compounds	H_2S, 1
10	W3S	Reacts on high concentrations, sensitive to several compounds	CH_4, 100

Table S2 Quantified data of volatile flavor collected from the control mackerel during 0–100 days of frozen storage.

Sensor code	0 day	20 day	40 day	60 day	80 day	100 day
W1C	1.3 ± 0.1a	2.9 ± 0.2b	2.9 ± 0.2b	4.5 ± 0.1c	6.0 ± 0.3d	8.0 ± 0.4e
W5S	8.7 ± 0.1c	9.7 ± 0.2d	9.1 ± 0.2c	8.4 ± 0.2c	6.5 ± 0.2b	5.0 ± 0.1a
W3C	1.3 ± 0.1a	2.7 ± 0.2b	3.0 ± 0.1b	4.3 ± 0.2c	6.5 ± 0.2d	8.2 ± 0.3e
W6S	0.6 ± 0.1a	2.1 ± 0.1b	2.2 ± 0.2b	3.5 ± 0.2c	7.1 ± 0.3d	8.7 ± 0.3e
W5C	1.0 ± 0.1a	2.6 ± 0.2b	3.0 ± 0.3b	4.0 ± 0.2c	6.8 ± 0.4d	8.5 ± 0.3e
W1S	1.0 ± 0.1a	2.7 ± 0.1b	3.0 ± 0.2b	4.1 ± 0.1c	4.3 ± 0.2c	4.3 ± 0.2c
W1W	0.9 ± 0.1a	3.0 ± 0.2b	3.2 ± 0.1b	4.7 ± 0.2c	7.8 ± 0.3d	9.2 ± 0.3e
W2S	0.7 ± 0.1a	2.1 ± 0.2b	2.8 ± 0.3b	3.8 ± 0.2c	8.5 ± 0.4d	9.3 ± 0.4d
W2W	0.9 ± 0.1a	2.8 ± 0.2b	3.2 ± 0.3b	4.7 ± 0.1c	9.0 ± 0.3d	10.0 ± 0.4d
W3S	0.8 ± 0.1a	2.4 ± 0.1b	3.0 ± 0.2c	4.0 ± 0.1d	8.5 ± 0.3e	9.8 ± 0.2f

Data represent the means ± standard deviation of 3 replicates. The means with different uppercase letters in the same row were significantly different at $P < 0.05$.

Table S3 Quantified data of volatile flavor collected from the control, 1.5% CO soaked-, 3.0% CO soaked-, and 4.5% CO soaked-samples (B) after 100 days of frozen storage.

Sensor code	control	1.5% CO	3.0% CO	4.5% CO
W1C	8.0 ± 0.2c	7.3 ± 0.2b	6.1 ± 0.2a	5.9 ± 0.2a
W5S	5.0 ± 0.1a	5.7 ± 0.2a	7.6 ± 0.3b	7.0 ± 0.3b
W3C	8.2 ± 0.3d	7.2 ± 0.1c	5.2 ± 0.1b	4.5 ± 0.1a
W6S	8.7 ± 0.3b	8.5 ± 0.3b	4.6 ± 0.2a	5.2 ± 0.2a
W5C	8.5 ± 0.2c	7.0 ± 0.2b	5.3 ± 0.2a	5.0 ± 0.2a
W1S	4.3 ± 0.2a	4.5 ± 0.1a	4.0 ± 0.1a	4.2 ± 0.1a
W1W	9.2 ± 0.2c	7.8 ± 0.3b	6.2 ± 0.1a	6.8 ± 0.3a
W2S	9.3 ± 0.2c	8.6 ± 0.2b	5.8 ± 0.2a	5.4 ± 0.1a
W2W	10.0 ± 0.3c	8.5 ± 0.2b	6.6 ± 0.2a	6.0 ± 0.2a
W3S	9.8 ± 0.2c	8.0 ± 0.1b	5.0 ± 0.3a	5.1 ± 0.2a

Data represent the means ± standard deviation of 3 replicates. The means with different uppercase letters in the same row were significantly different at $P < 0.05$.