

Supplementary data:

Table S1

The color parameters (*L*, *a*, *b* and ΔE) of starch-BBE I film exposed to hydrogen chloride gas for different times.

Time	<i>L</i>	<i>a</i>	<i>b</i>	ΔE
5	76.89 ± 0.27 ^a	9.63 ± 0.06 ^e	−3.31 ± 0.18 ^a	1.97 ± 0.14 ^d
10	75.88 ± 0.05 ^b	10.96 ± 0.06 ^d	−3.63 ± 0.10 ^{ab}	3.49 ± 0.06 ^c
15	76.19 ± 0.13 ^{ab}	11.58 ± 0.18 ^d	−4.12 ± 0.03 ^c	3.80 ± 0.10 ^c
20	75.43 ± 0.07 ^{bc}	12.72 ± 0.20 ^c	−4.30 ± 0.09 ^c	5.17 ± 0.03 ^b
25	74.51 ± 0.62 ^c	12.82 ± 0.05 ^c	−4.14 ± 0.05 ^c	5.79 ± 0.34 ^b
30	74.69 ± 0.36 ^c	13.31 ± 0.14 ^{bc}	−4.18 ± 0.09 ^c	6.06 ± 0.32 ^b
35	72.19 ± 0.56 ^d	13.77 ± 0.72 ^{bc}	−4.09 ± 0.25 ^c	8.05 ± 0.90 ^a
40	71.52 ± 0.08 ^d	14.16 ± 0.54 ^{ab}	−4.28 ± 0.18 ^c	8.82 ± 0.30 ^a
45	72.43 ± 0.07 ^d	14.39 ± 0.32 ^{ab}	−3.97 ± 0.25 ^{bc}	8.32 ± 0.27 ^a
50	72.00 ± 0.20 ^d	14.97 ± 0.23 ^a	−3.91 ± 0.05 ^{bc}	9.04 ± 0.03 ^a
55	72.36 ± 0.26 ^d	15.10 ± 0.27 ^a	−4.17 ± 0.06 ^c	8.89 ± 0.37 ^a
60	72.28 ± 0.08 ^d	15.03 ± 0.40 ^a	−4.13 ± 0.15 ^c	8.90 ± 0.25 ^a

Values are given as mean ± SD (n = 3). Different letters in the same column indicate significantly different ($p < 0.05$).

Table S2

The color parameters (L , a , b and ΔE) of starch-BBE I film exposed to ammonia gas for different times.

Time	L	a	b	ΔE
5	54.41 ± 0.49^f	-1.61 ± 0.10^i	-13.35 ± 0.04^k	27.29 ± 0.45^a
10	54.79 ± 0.33^f	-1.04 ± 0.06^h	-11.88 ± 0.05^j	26.28 ± 0.29^{ab}
15	54.42 ± 0.36^f	-0.65 ± 0.05^g	-9.37 ± 0.04^i	25.85 ± 0.31^{ab}
20	54.67 ± 0.20^f	-0.15 ± 0.07^f	-7.68 ± 0.02^h	25.15 ± 0.17^b
25	56.66 ± 1.20^e	0.23 ± 0.10^e	-4.78 ± 0.18^g	22.91 ± 1.09^c
30	58.68 ± 0.50^d	0.32 ± 0.01^{de}	-3.76 ± 0.36^g	20.98 ± 0.46^d
35	58.90 ± 0.21^d	0.39 ± 0.13^{de}	-1.06 ± 0.65^f	20.97 ± 0.15^d
40	60.32 ± 0.36^{cd}	0.48 ± 0.03^{cde}	1.88 ± 0.18^e	20.30 ± 0.26^d
45	60.98 ± 0.77^c	0.60 ± 0.03^c	4.66 ± 0.29^d	20.69 ± 0.71^d
50	61.20 ± 0.46^c	0.68 ± 0.13^{bc}	9.37 ± 0.08^c	22.87 ± 0.25^c
55	64.94 ± 0.34^b	0.87 ± 0.09^b	10.70 ± 0.02^b	21.11 ± 0.22^d
60	68.21 ± 0.19^a	1.69 ± 0.07^a	12.71 ± 0.68^a	20.55 ± 0.62^d

Values are given as mean $\pm$ SD (n = 3). Different letters in the same column indicate significantly different ($p < 0.05$).

Table S3

The color parameters (*L*, *a*, *b* and ΔE) of starch-BBE I film used to monitor the freshness of pork at different storage times.

Time (h)	<i>L</i>	<i>a</i>	<i>b</i>	ΔE
0	70.09 ± 0.83 ^b	14.69 ± 0.66 ^a	−7.43 ± 0.21 ^g	28.09 ± 1.08 ^a
8	66.30 ± 0.48 ^d	6.76 ± 0.16 ^d	−1.81 ± 0.08 ^f	16.58 ± 0.31 ^f
16	72.64 ± 0.21 ^a	7.93 ± 0.05 ^c	−0.07 ± 0.03 ^e	18.95 ± 0.10 ^e
24	68.32 ± 0.08 ^c	9.67 ± 0.06 ^b	0.87 ± 0.28 ^d	15.57 ± 0.12 ^g
32	57.83 ± 0.12 ^g	4.95 ± 0.30 ^e	4.39 ± 0.41 ^c	20.56 ± 0.39 ^d
40	65.54 ± 0.27 ^e	5.13 ± 0.01 ^e	7.12 ± 0.51 ^b	21.38 ± 0.22 ^c
48	63.82 ± 0.62 ^f	4.99 ± 0.01 ^e	12.39 ± 0.31 ^a	24.61 ± 0.15 ^b

Values are given as mean ± SD (n = 3). Different letters in the same column indicate significantly different ($p < 0.05$).