

Supplementary materials

Preparation of nanoliposomes loaded with anthocyanins from grape skin extracts: Stability, gastric absorption and antiproliferative properties

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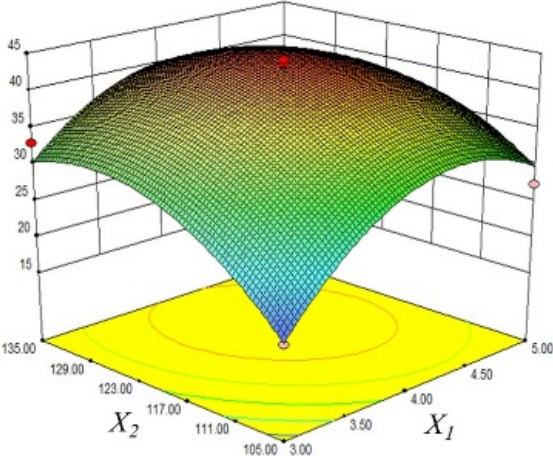
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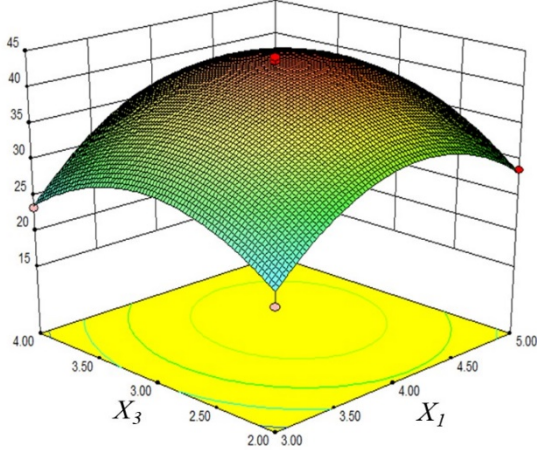
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Figures

a)



b)



c)

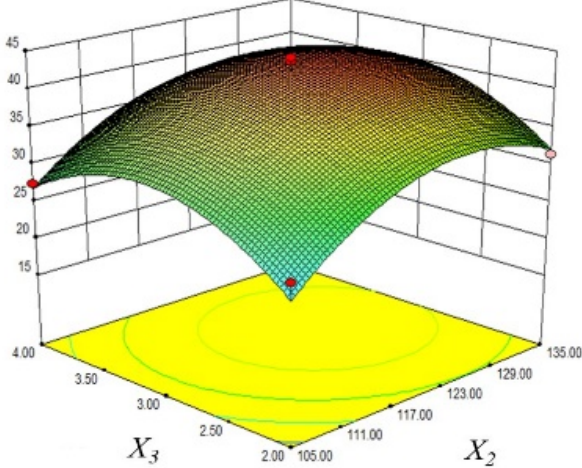


Fig. S1. Response surface plots of the effects of interaction terms (X_1 : soy lecithin/cholesterol, X_2 : ultrasonic power, X_3 : ultrasonic time) on encapsulation efficiency (EE) of the anthocyanins nanoliposomes (ANLs): X_1 and X_2 (a); X_1 and X_3 (b); X_2 and X_3 (c).

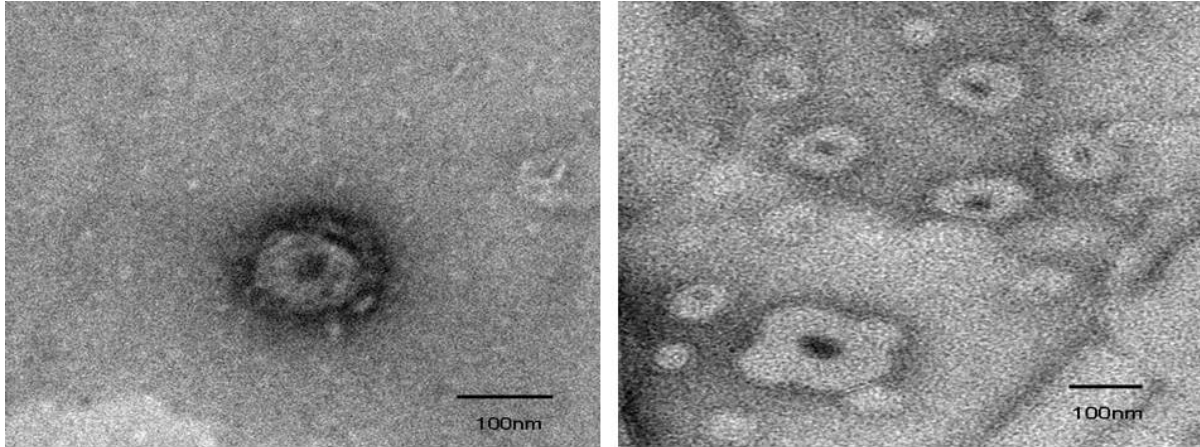


Fig. S2. Transmission electron microscope (TEM) images of anthocyanins nanoliposomes (ANLs).

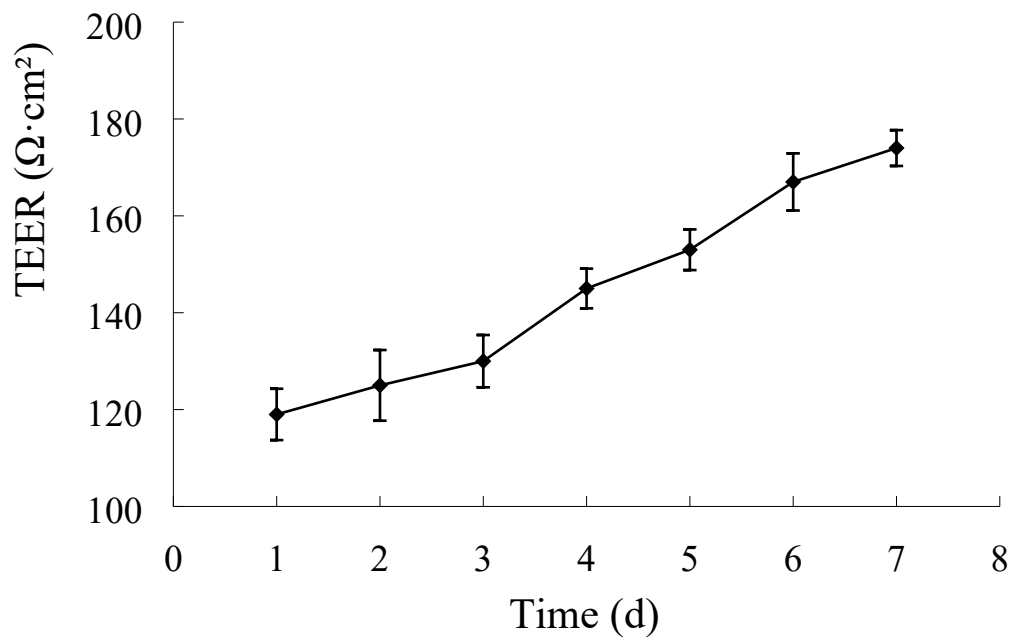


Fig. S3. TEER measurements of the MKN-28 cell monolayer during 7 days of culture time.

Tables

Table S1

Variables of Box-Behnken design.

Independent Variables	Code Levels			
	Symbol	-1	0	1
Soy lecithin/Cholesterol (w/w)	X_1	3	4	5
Ultrasonic power (W)	X_2	105	120	135
Ultrasonic time (min)	X_3	2	3	4

Table S2

Experimental data under different operation conditions for the formation of anthocyanins nolioposomes (ANLs) based on Box-Behnken design for response surface analysis.

No.	Variable levels			Responses
	X_1	X_2	X_3	Y, EE (%)
1	0	0	0	43.6
2	0	1	-1	31.5
3	-1	0	1	23.3
4	0	-1	-1	25.7
5	-1	0	-1	21.5
6	-1	-1	0	17.5
7	1	-1	0	27.3
8	-1	1	0	33.0
9	1	0	1	35.8
10	1	0	-1	28.7
11	0	1	1	32.3
12	0	0	0	41.6
13	0	-1	1	27.5
14	0	0	0	40.9
15	0	0	0	44.1
16	1	1	0	33.7
17	0	0	0	41.9

X_1 , X_2 , X_3 represent soy lecithin/cholesterol (w/w), ultrasonic power (W), and ultrasonic time (min), respectively; Y represents anthocyanins encapsulation efficiency (%).

Table S3

Analysis of variance and second-order polynomial equation obtained from the responses.

Variable	SS	DF	MS	F-value	P-value*
Model	1017.11	9	113.01	20.30	0.0003**
X_1	114.01	1	114.01	20.48	0.0027**
X_2	132.03	1	132.03	23.72	0.0018**
X_3	16.53	1	16.53	2.97	0.1285
$X_1 X_2$	20.70	1	20.70	3.72	0.0951
$X_1 X_3$	7.02	1	7.02	1.26	0.2984
$X_2 X_3$	0.25	1	0.25	0.045	0.8382
X_1^2	285.54	1	285.54	51.29	0.0002**
X_2^2	167.65	1	167.65	30.11	0.0009**
X_3^2	198.15	1	198.15	35.59	0.0006**
Residual	38.97	7	5.57		
Lack of fit	31.50	3	10.50	5.62	0.0643
Pure error	7.47	4	1.87		
Cor Total	1056.08	16			
	R^2			0.9631	
	Adjusted R^2			0.9300	
	C.V.%			7.29	

X_1 : soy lecithin/cholesterol (w/w), X_2 : ultrasonic power (W), X_3 : ultrasonic time (min); SS: sum of squares; DF: degree of freedom; MS: mean square; C.V.%: coefficient of variation.

(**) highly significant, $P \leq 0.01$; (*) significant, $P \leq 0.05$; not significant, $P > 0.05$.