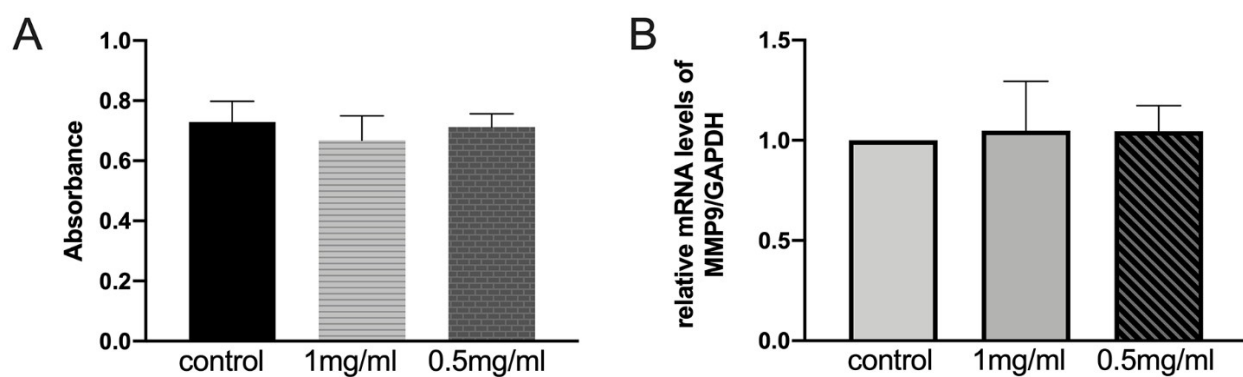
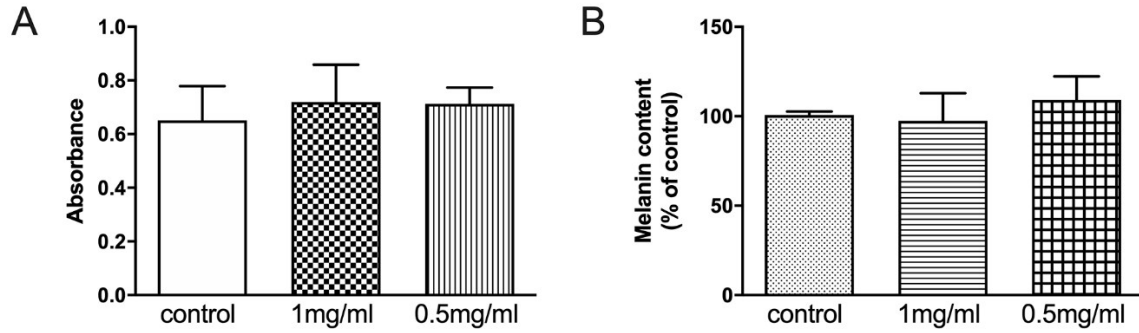


Supplementary Figure 1. Proportions of residual mass of the 3D-GF-PADM after 1, 2, 4 and 7 days of enzymatic digestion. Triplicate samples were used.

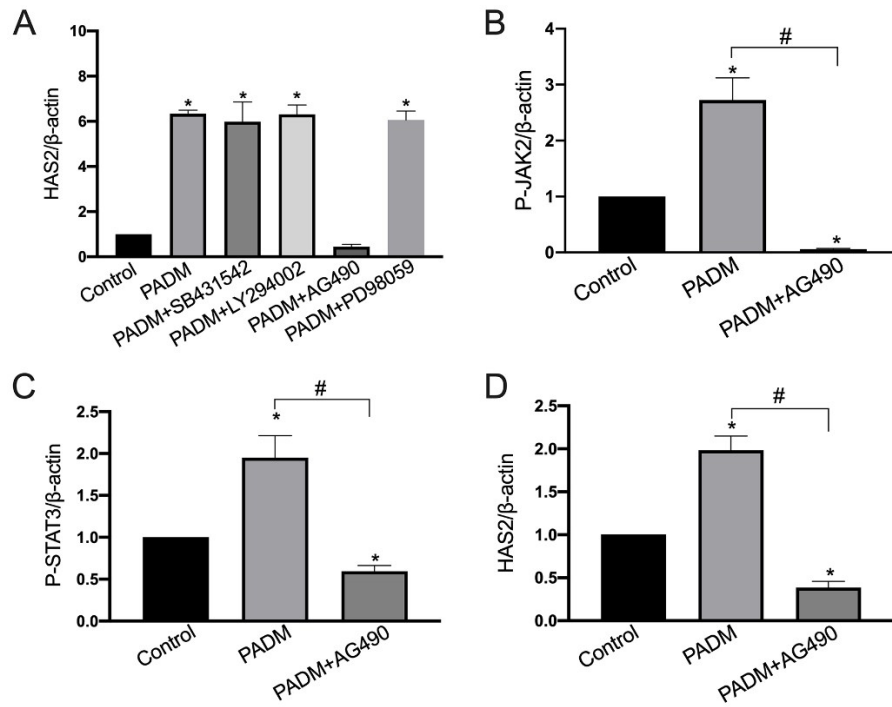


Supplementary Figure 2. (A) HaCaT cells were treated with various concentrations of 3D-GF-PADM. MTT results showed that there was no significant difference between the 3D-GF-PADM group and the control group. (B) The relative MMP-9 mRNA expression after treatment with 3D-

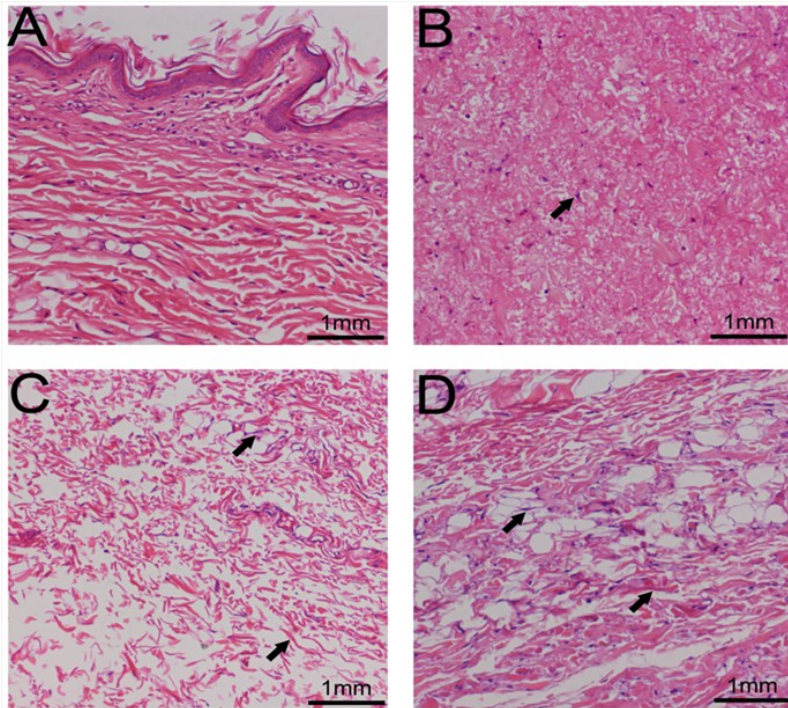
GF-PADM. There was no significant change in MMP-9 mRNA expression between the 3D-GF-PADM group and the control group.



Supplementary Figure 3. (A) MTT assay of melanocytes after treatment with 3D-GF-PADM for 24 h. (B) Melanin content of melanocytes 48 h after the treatment with 3D-GF-PADM. Melanin content is presented as percentage of the control.



Supplementary Figure 4. Densitometric analysis of western blotting was performed for quantification of the protein bands. Data are presented as mean \pm standard deviation from three independent experiments. * $P < 0.05$ compared with the control group. # $P < 0.05$.



Supplementary Figure 5. Epidermal features of the 3D-GF-PADM after different implantation times, illustrating cellularity, new collagen production and low inflammatory response. (A) Normal rabbit ear. (B) One week after implantation. Arrow indicates mononuclear cells. (C) One month after implantation. Arrow indicates fibroblast and deposited collagen. (D) Three months after implantation. Arrow indicates fibroblast and deposited collagen.

Supplementary Table 1. · Scoring system of the skin irritation test.

Reaction	Score
Erythema and eschar formation	
No erythema	0
Very slight erythema	1
Well-defined erythema	2
Moderate erythema	3
Severe erythema (beet-redness) to eschar formation preventing grading of erythema	4
Oedema formation	
No oedema	0
Very slight oedema (barely perceptible)	1
Well-defined oedema (edges of area well-define by definite raising)	2
Moderate oedema (raised approximately 1mm)	3
Severe oedema (raised more than 1mm and extending beyond exposure area)	4

Supplementary Table 2. Individual results of dermal scoring for skin irritation study

		Scoring interval (Hours)											
		24			48			72					
		oedema			erythema			oedema			erythma		
3D-GF-PADM		1	2	3	1	2	3	1	2	3	1	2	3
0.5ml	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0	0
1ml	6	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0	0	0	0	0
	9	0	0	0	0	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0	0	0	0
0.9%NaCl	11	0	0	0	0	0	0	0	0	0	0	0	0
	12	0	0	0	0	0	0	0	0	0	0	0	0
	13	0	0	0	0	0	0	0	0	0	0	0	0
	14	0	0	0	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0	0	0	0

Supplementary Table 3. · · Skin sensitisation grading scale.

Reaction	Grade
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No visible change in the patch test reaction	0
Discrete or patchy erythema in the patch test reaction	1
Moderate and confluent erythema	2
Intense erythema and swelling	3

Supplementary Table 4. Results for skin sensitization

Time	Hours following patch removal	
	24h	48h
0.5ml 3D-GF-PADM	0	0
1 ml 3D-GF-PADM	0	0
0.9% NaCl	0	0

Data were presented as grading scale. Grade 0 means no visible change.

Supplementary Table 5. Individual results of dermal scoring for skin irritation study of 3D-GF-PADM with or without lidocaine

	Scoring interval (Hours)

3D-GF-PADM(lidocaine)		24			48			72					
		oedema			erythema			oedema			erythma		
		1	2	3	1	2	3	1	2	3	1	2	3
1ml(0%)	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0	0
1ml (1%)	6	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0	0	0	0	0
	9	0	0	0	0	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0	0	0	0
1ml (2%)	11	0	0	0	0	0	0	0	0	0	0	0	0
	12	0	0	0	0	0	0	0	0	0	0	0	0
	13	0	0	0	0	0	0	0	0	0	0	0	0
	14	0	0	0	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0	0	0	0
0.9%NaCl	16	0	0	0	0	0	0	0	0	0	0	0	0
	17	0	0	0	0	0	0	0	0	0	0	0	0
	18	0	0	0	0	0	0	0	0	0	0	0	0
	19	0	0	0	0	0	0	0	0	0	0	0	0
	20	0	0	0	0	0	0	0	0	0	0	0	0

Supplementary Table 6. Results for skin sensitization of 3D-GF-PADM with or without lidocaine

Time	Hours following patch removal	
	24h	48h
1ml 3D-GF-PADM	0	0
1ml 3D-GF-PADM with 1% lidocaine	0	0
1ml 3D-GF-PADM with 2% lidocaine	0	0

0.9% NaCl	0	0
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Data were presented as grading scale. Grade 0 means no visible change.