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Micropatterned poly(D,L-lactide-co-caprolactone) films entrapped with gelatin promote alignment and directional migration of Schwann cells

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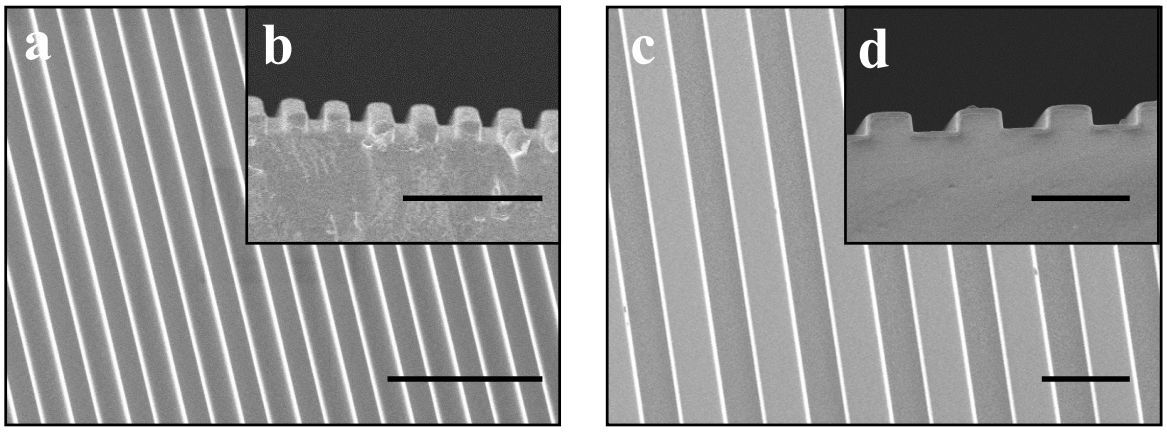

Figure S1 SEM images of PDMS templates with features of (a,b) 3/3 μm and (c,d) 10/10 μm, respectively. Insets (b,d) are cross section views, respectively. Scale bar, 20 μm.

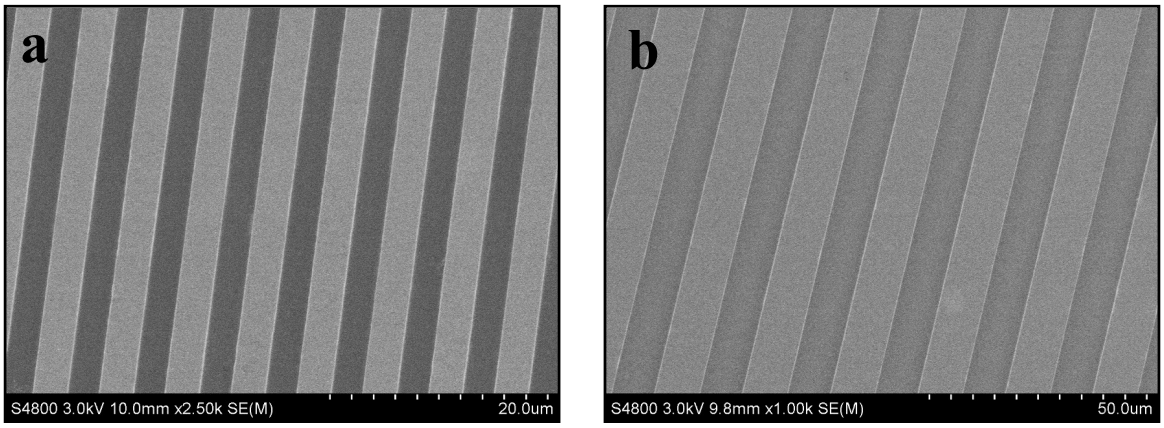

Figure S2 SEM images of PLCL films obtained by thermally pressing with PDMS stamps with features of (a) 3/3 μm and (b) 10/10 μm, respectively.

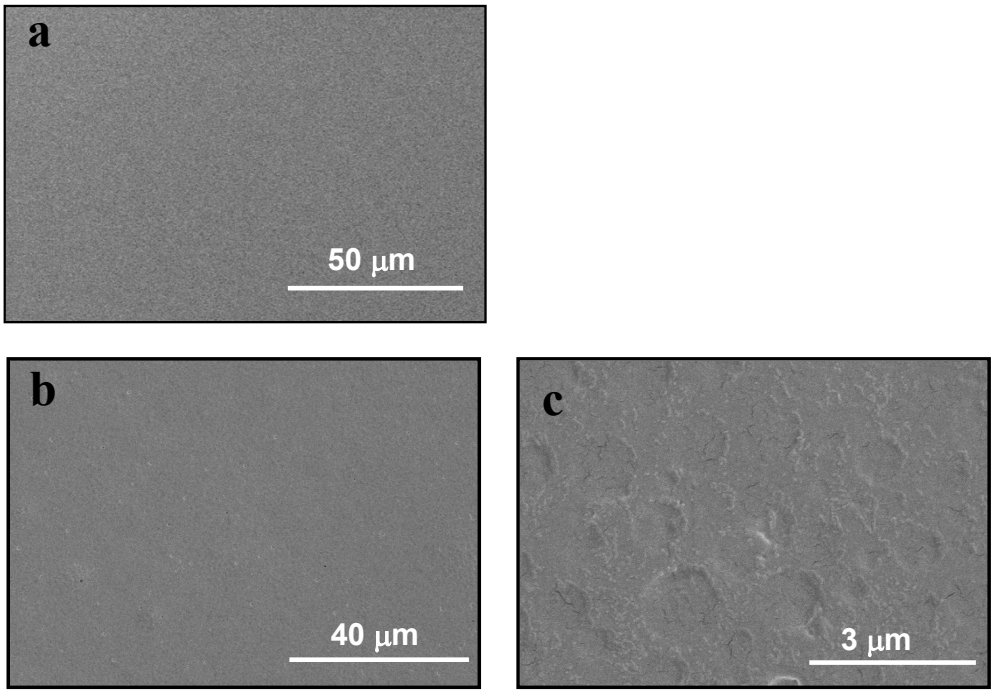

Figure S3 SEM images of flat PLCL film before (a) and (b,c) after being swollen in a mixture of acetone/water with a volume ratio of 7/3 and quenched in water for 2 h. (c) is a higher magnification image of (b).

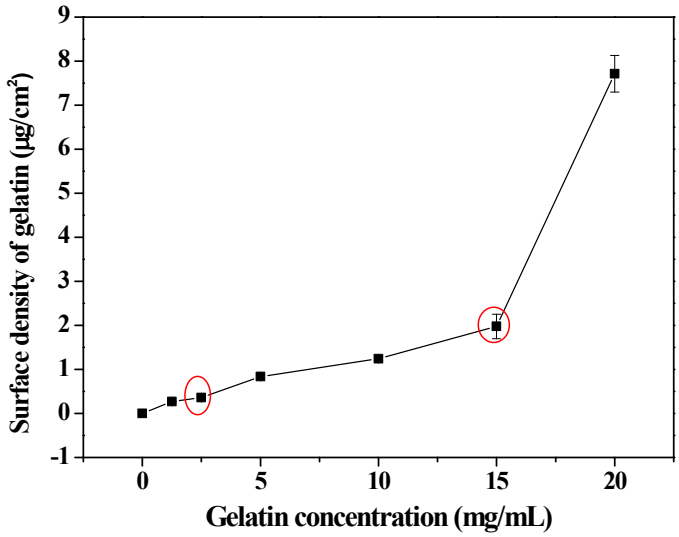

Figure S4 The surface density of gelatin being entrapped on the flat PLCL films after they were incubated in different concentrations of gelatin solutions for 2 h. The circles point out the concentrations of gelatin used for preparation of the gelatin-entrapped and micropatterned PLCL films.

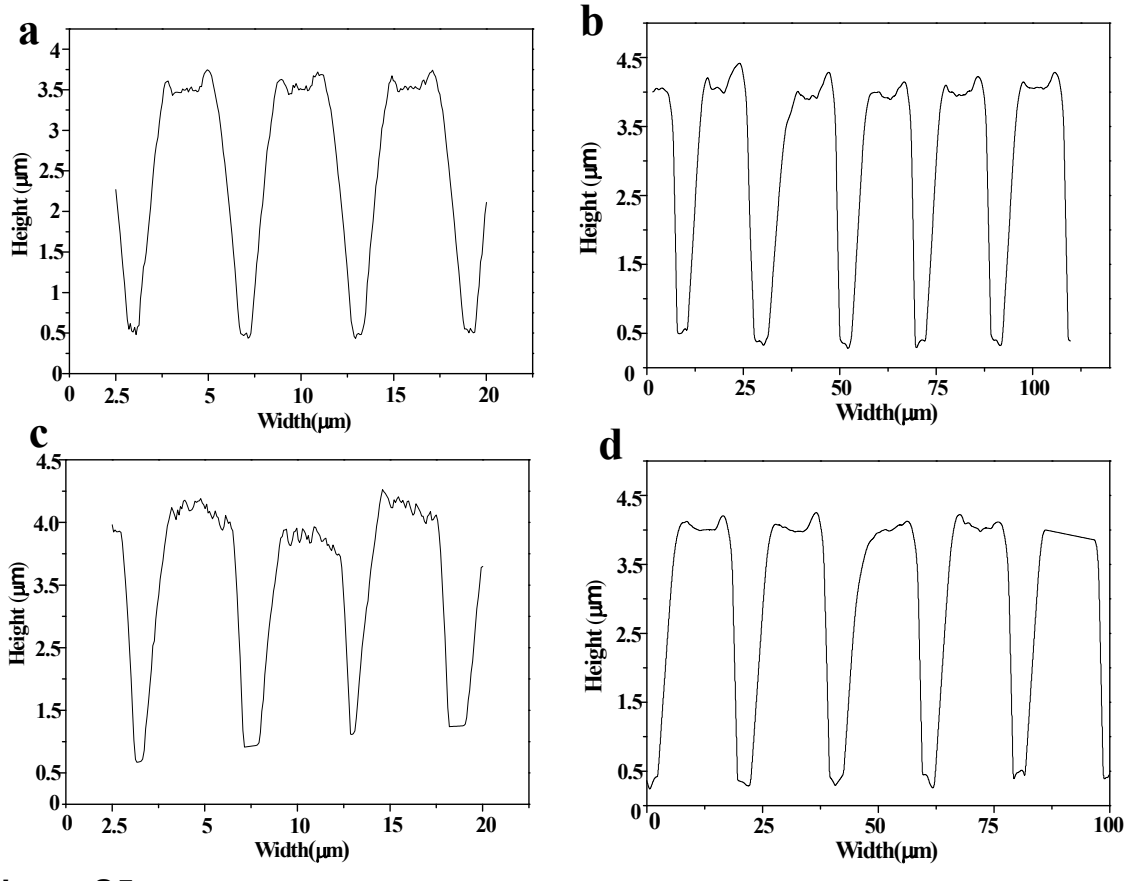

Figure S5 The profilometer images (obtained from Dektak 150, Veeco, USA) of micropatterned PLCL films obtained by incubation in (a,b) 2.5 mg/mL and (c,d) 15 mg/mL gelatin solutions for 2 h, respectively. (a,c) 3/3 μm film, and (b,d) 10/10 μm film.

Table S1. The percentage of N content on the surfaces of various PLCL films

Samples	N content %	
	2.5 mg/mL	15 mg/mL
Flat films	1.63	1.78
3/3 μm films	1.93	2.25
10/10 μm films	1.89	2.12

The affiliated EDS (Energy Dispersive Spectrometer) of SEM was employed to characterize the surface elements of the films.

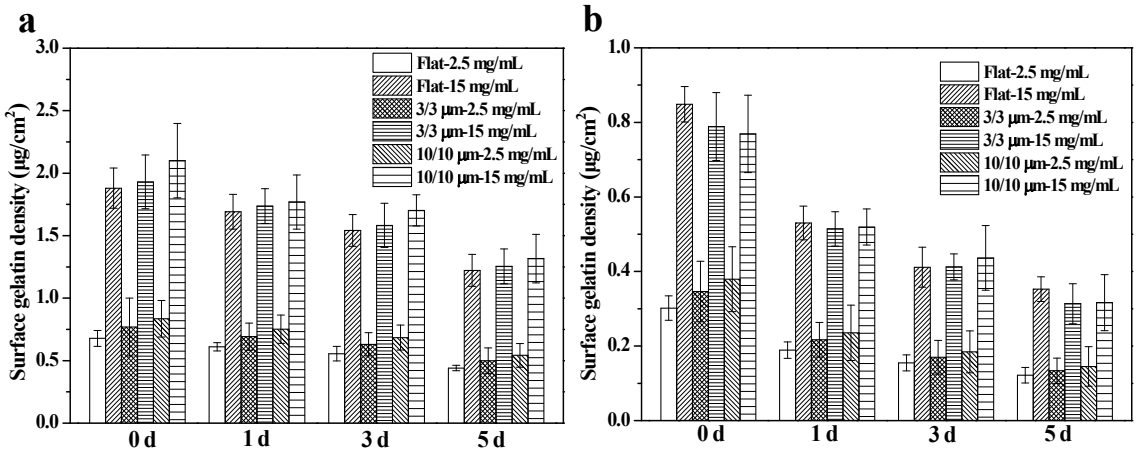

Figure S6 The retained gelatin density on various surfaces by (a) entrapment (b) physical adsorption after being immersed in PBS and shaken for 1, 3, 5 days at 37 °C, respectively.

To prepare the samples with physically adsorbed gelatin on the surfaces, various PLCL films were immersed in 2.5 mg/mL and 15 mg/mL for 2 h, and then washed with water for 3 times at 37 °C.

Figure S7 Optical image of 2 μL 0.1% rhodamine B water solution lying on 3/3 μm PLCL film obtained by incubation in 2.5 mg/mL gelatin solution for 2 h. The direction of the microgrooves is shown by the black arrow.

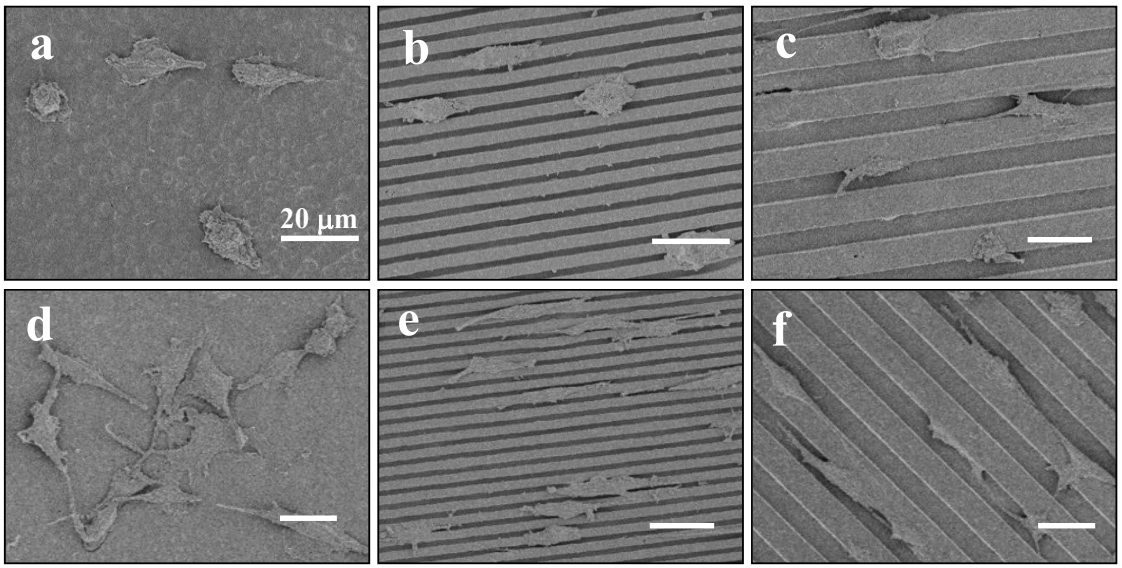

Figure S8 SEM images of SCs being cultured for 12 h on PLCL films obtained by incubation in (a-c) 2.5 mg/mL, and (d-f) 15 mg/mL gelatin solutions, respectively. (a,d) Flat film, (b,e) 3/3 μm film, and (c,f) 10/10 μm film.

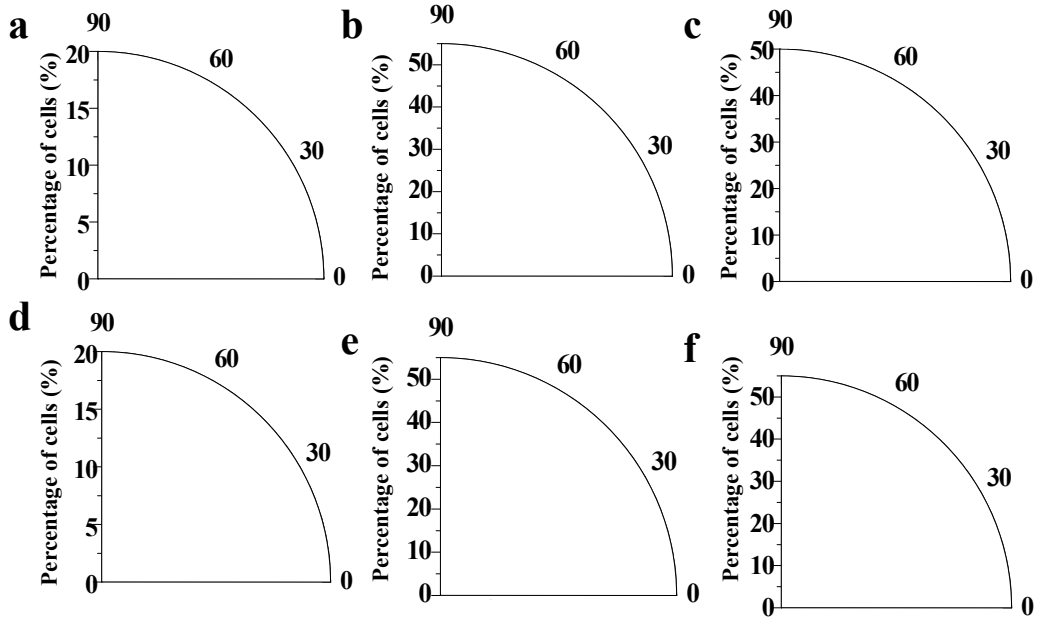

Figure S9 Distribution of SCs orientation angle to the stripe direction after being cultured for 12 h on various PLCL films obtained by incubation in (a-c) 2.5 mg/mL and (d-f) 15 mg/mL gelatin solutions respectively. (a,d) Flat film, (b,e) 3/3 μm film, and (c,f) 10/10 μm film.

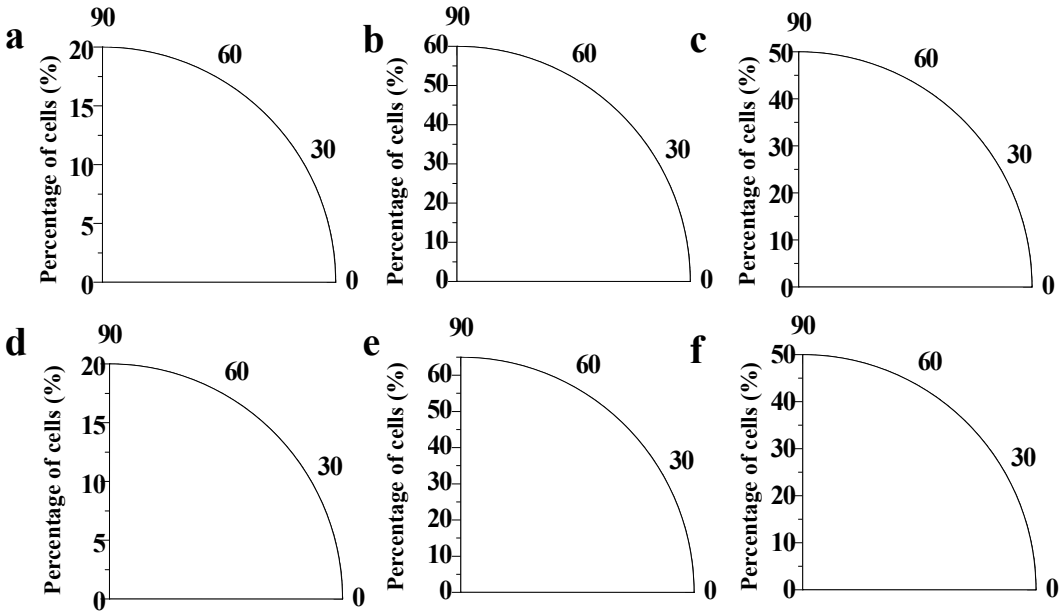

Figure S10 Distribution of SCs orientation angle to the stripe direction after migrating for 12 h on various PLCL films obtained by incubation in (a-c) 2.5 mg/mL and (d-f) 15 mg/mL gelatin solutions respectively. (a,d) Flat film, (b,e) 3/3 μm film, and (c,f) 10/10 μm film.

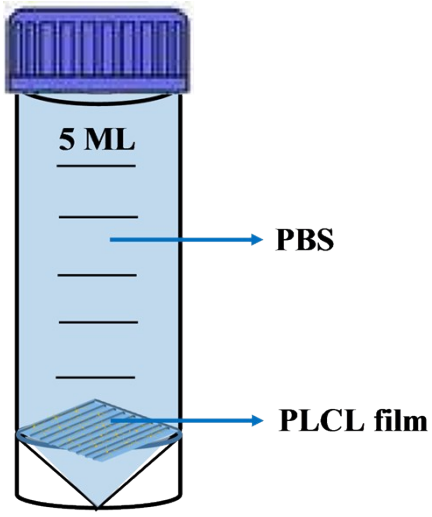

Figure S11 The illustration to show the measurement of cell adhesion force. The microppterned side of PLCL film was placed down to the bottom of the centrifuge tube on the horizontal direction. The sample size was 1 cm × 1 cm. The tube was filled with PBS solution.

The method to detect the adhesion force between cell and substrates is described below. Before and after centrifugation at 500 and 1000 rpm/min for 3 min, the attached cell numbers were counted.

$$f = (\rho_{cell} - \rho_{PBS}) \times V_{cell} \times \omega^2 \times r \qquad (1)$$

where ρ_{cell} and ρ_{PBS} refer to the density of SCs (1.07 g/cm^3) and PBS (1.00 g/cm^3), respectively, V_{cell} is the volume of SCs which is 10^3 μm^3, ω is the centrifugal angular velocity, and *r* is the distance from the center of centrifuge to the sample.

Assuming that the values of force are subjected to normal distribution:

$$f \sim N(\mu, \sigma^2) \qquad (2)$$

where μ is the average adhesion force, σ is the standard deviation.

Hence, the formula (2) can be normalized to the standard normal distribution via mathematical transformation:

$$F=(f-\mu)/\sigma \sim N(0,1) \qquad (3)$$

The percentage of detached cells (p) could be calculated by the two centrifugations, accordign to which the value of F could be obtained by referring to normal distribution chart. The average adhesion force μ was then calculated from formula (1) and formula (3).