Electronic Supplementary Material (ESI) for Soft Matter.

Supplementary Information for

Role of heat treatment in improving replication quality of PDMS double-casting

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1. Contact angle measurement

To measure the water/glycerol contact angle of PDMS, 6 μL of water (or glycerol) droplets were placed on the surface of each sample. After 1 min, the image of each droplet was captured, and the contact angle was measured using the ImageJ software. All measurements were performed in triplicate to minimize surface heterogeneity effects.

Table S1 Glycerol contact angle of untreated and heat-treated PDMS

	Glycerol contact angle (°)
Untreated PDMS	85.2±1.8
Heat-treated PDMS 100 °C, 24 h	89.5±1.6
Heat-treated PDMS 100 °C, 48 h	88±1.1
Heat-treated PDMS 100 °C, 72 h	86±1.2
Heat-treated PDMS 150 °C, 24 h	91.6±1.5
Heat-treated PDMS 150 °C, 48 h	88.5±1.2
Heat-treated PDMS 150 °C, 72 h	85±1.5

2. Calculation of surface energy by the Owen–Wendt method

In the Owen–Wendt method, at least two liquids with known polar and dispersive surface tension are used to calculate the solid surface energy.[1] We used water and glycerol as two tested liquids with known surface tension[2] (Table S2). Based on these values, the polar, dispersive, and total surface energies of neat and heat-treated PDMS were calculated (Table S3).

Table S2 Polar, dispersive, and total surface tensions of water and glycerol

	Polar surface tension (mJ/m^2)	Dispersive surface tension (mJ/m^2)	Total surface tension (mJ/m^2)
Water	51.0	21.8	72.8
Glycerol	30.0	34.0	64.0

Table S3 Polar, dispersive, and total surface energies of neat and heat-treated PDMS

	Polar surface energy (mJ/m^2)	Dispersive surface energy (mJ/m^2)	Total surface energy (mJ/m^2)
PDMS	3.94	16.70	20.64
Heat-treated PDMS 100 °C, 24 h	18.63	2.21	20.81
Heat-treated PDMS 100 °C, 48 h	20.55	2.03	22.58
Heat-treated PDMS 100 °C, 72 h	23.76	1.68	25.44
Heat-treated PDMS 150 °C, 24 h	19.39	1.45	20.84
Heat-treated PDMS 150 °C, 48 h	23.24	1.22	24.46
Heat-treated PDMS 150 °C, 72 h	31.62	0.47	32.09

3. AFM image of untreated PDMS master after hexane-immersing experiment

The presence of ULMW chains in the untreated PDMS master may interact with the AFM tip, which may lead to an unreliable measurement of surface roughness by AFM. To check this effect, the untreated PDMS master was used in the AFM measurement after 3 days of the hexane-immersing. As shown in Fig. S1, the surface roughness of the PDMS surface immersed in hexane was 3.7 nm, which was similar to that of the untreated PDMS master. It implied that the change in the surface roughness was mainly caused by the heat treatment, rather than ULMW chains.

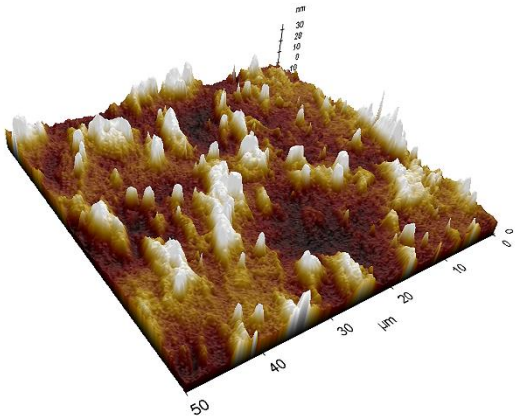

Figure S1. AFM image of the untreated PDMS master after hexane-immersing experiment, R_a=3.7.

References

1 M. Annamalai, K. Gopinadhan, S. A. Han, S. Saha, H. J. Park, E. B. Cho, B. Kumar, A. Patra, S. W. Kim, and T. Venkatesan, *Nanoscale*, 2016, **8**, 5764–5770.

2 W. Wu and G. H. Nancollas, *Adv. Dent. Res*, 1997, **11**, 566–575.