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Nanoscale patterning of surfaces via DNA directed spider silk assembly

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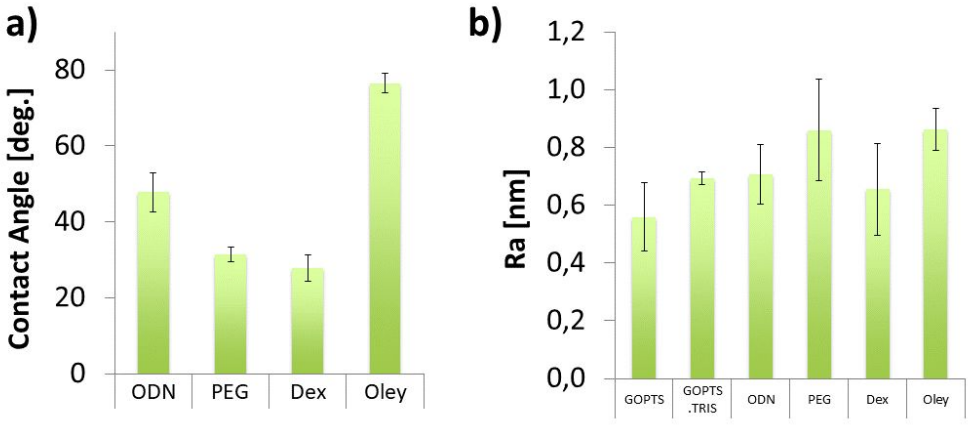
SUPPORTING METHODS

Quantification of fibril density and length

Binarized images of AFM results were prepared using the built-in function of the Mathematica software package. Each image was binarized with a threshold of 0.4, then partitioned into 100 different panels (partitions with obvious noise were discarded, e.g. the streaks seen in Figure 2c) and the number of black pixels was counted, representing the background surface. The results for the 100 partitions wereaveraged to produce an error measure.

Average fibril length was calculated using the free draw tool in imageJ software on approximately 40 fibrils per image.

SUPPORTING FIGURES



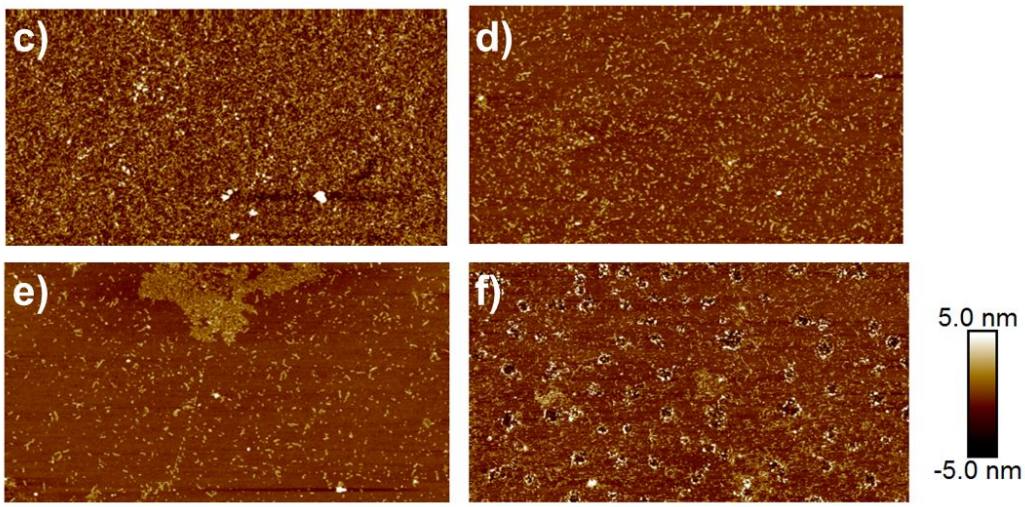


Figure S1. Evaluation of surface modification with passivation reagents. Surfaces were modified with 2 mM of the specified reagent except for cap-ODN, which was used at 350 μM for 72 h. (a) contact angles of surfaces after treatment with the passivation agents. (b) Roughness of the passivated surfaces after treatment with 0.1 mg/ mL protein for 24 h. AFM characterization of protein adsorption on surfaces modified with (c) cap-ODN, (d) PEG, (e) dextran and (f) oleylamine. All scans are 10 μm wide and the color bar represents heights from – 5.0 nm (dark) to 5.0 nm (white).

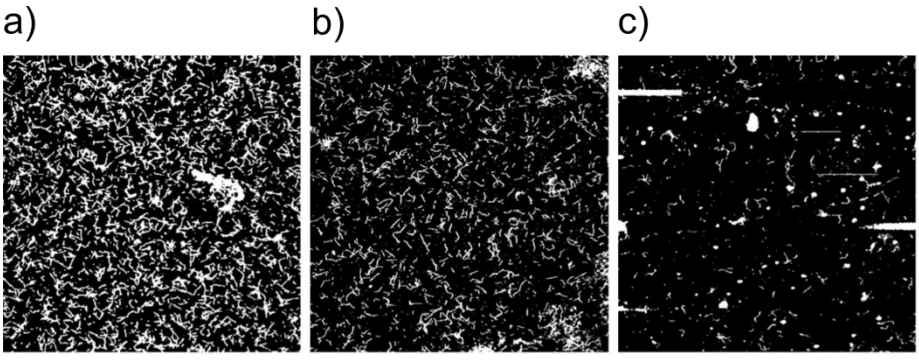


Figure S2. Representation of binarized images obtained after processing of the AFM height images in Figure 2a-c, respectively. The binarized images were used to calculate area fraction covered by fibrils in Figure 2e.

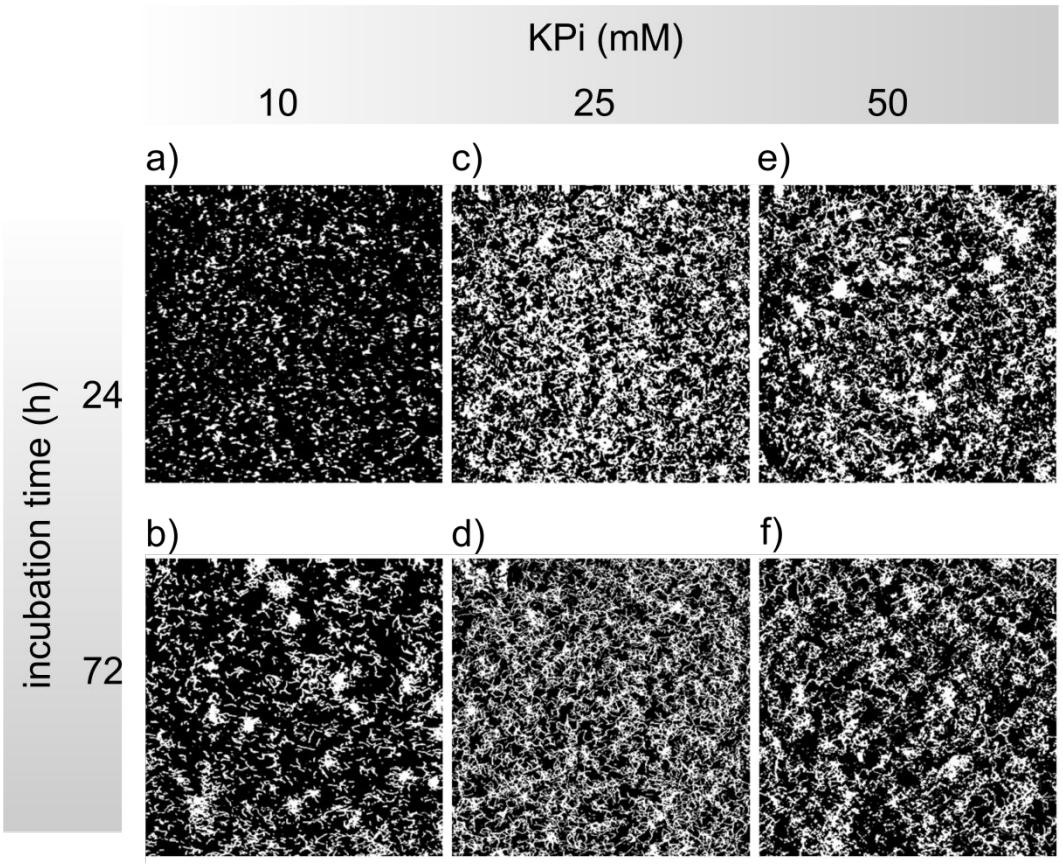


Figure S3. Representation of binarized images obtained after processing of the AFM height images in Figure 3a-f, respectively. The binarized images were used to calculate area fraction covered by fibrils in Figure 3h.

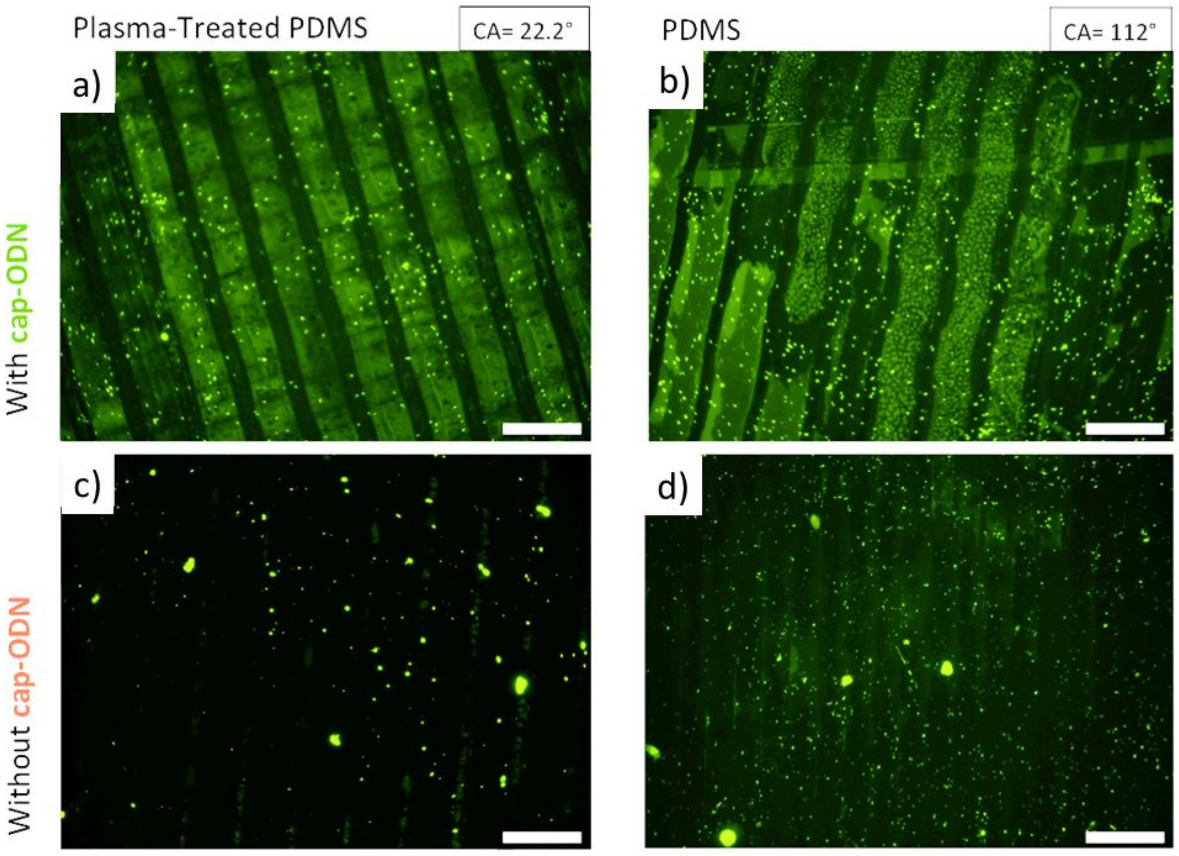


Figure S4. Evaluation of stamp surface chemistry and cap-ODN for effective patterning. Fluorescence microscopy of surface patterns produced using either hydrophilic, plasma-treated PDMS or hydrophobic, untreated PDMS on cap-ODN modified surfaces, (a) and (b), or on a dextran-only surface, (c) and (d). Experimental contact angles are presented in the figure for PDMS surface. Scale bars correspond to 75 μm for (a) and (b) and 100 μm for (c) and (d).

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SUPPORTING TABLES

Table S1. Surface fraction (SF) covered by fibrils depending on concentration of mobilized capture ODN

cap-ODN (μM)	**SF**	**SD**
1.0	0.229	0.054
0.1	0.106	0.055
0.0	0.0379	0.029

Table S2. Fibril lengths depending on concentration of phosphate ions and incubation time

KPi (mM)	**Fibril lengths (nm)**			
	24h	**SD**	**72h**	**SD**
10	184	39.2	242	108
25	298	115	521	138
50	511	188	756	234

Table S3: Surface fraction (SF) covered by fibrils depending on concentration of phosphate ions and incubation time

KPi (mM)	**SF**			
	24h	**SD**	**72h**	**SD**
10	0.124	0.035	0.221	0.083
25	0.392	0.065	0.351	0.056
50	0.343	0.086	0.293	0.069