ARTICLE

Supporting information

Directed self-organization of block copolymer micelles on topographic patterns

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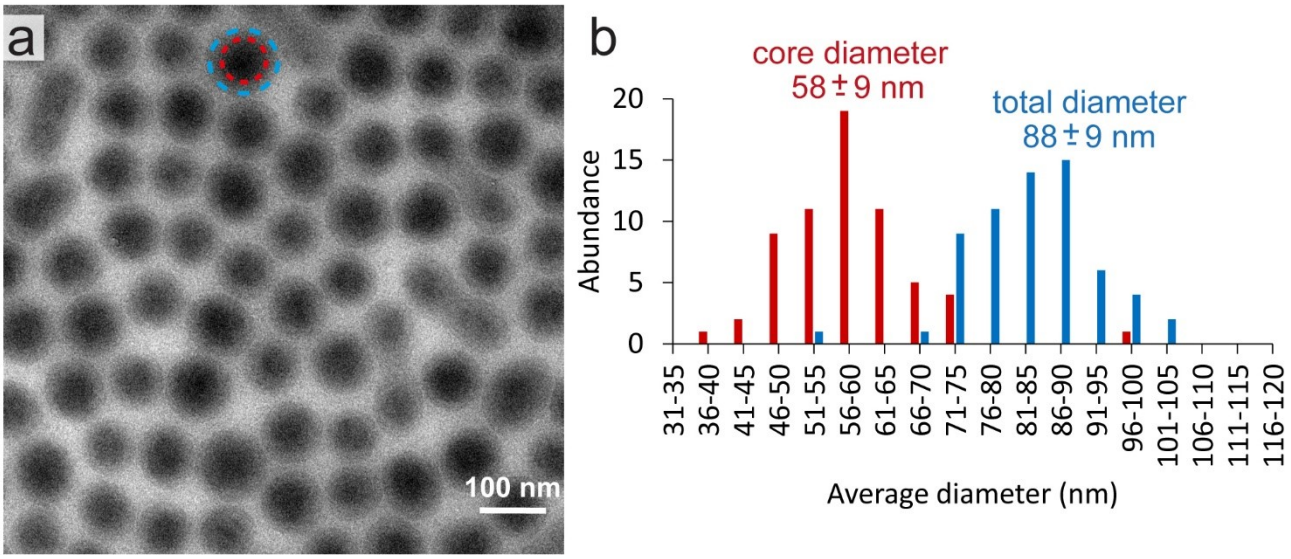

Fig. S1 (a) Cryogenic transmission electron microscopy image of crew-cut PS_{89}-*b*-$P2VP_{181}$ micelles deposited from 0.5 wt% toluene solutions. (b) Size distribution analysis of the micelles.

Fig. S2 The library of patterns utilized in this study. The left section showcases the designed near-symmetric patterns, featuring lateral plateau and trench widths that range between 160 to 640 nm in increments of 40 nm. The bottom right section presents highly asymmetric patterns, characterized by wide trenches with spacing of 1000, 1500, and 2000 nm between the plateaus. The values above each pattern display the designed feature widths; the actual values slightly differed from these values and were noted in the text wherever applicable.

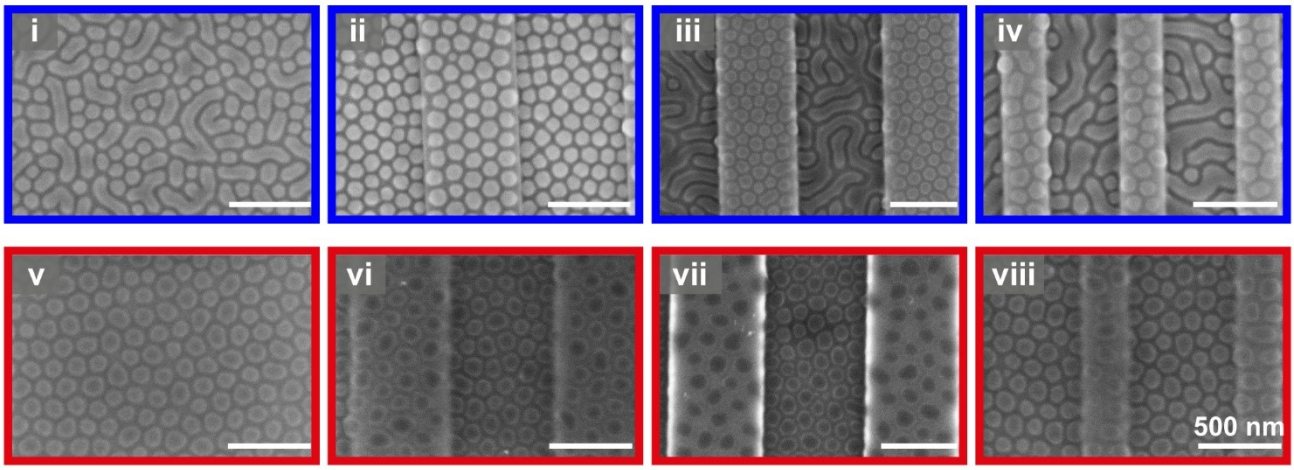

Fig. S3 Enlarged versions of the SEM images shown in Fig. 1c of crewcut PS_{89}-*b*-$P2VP_{181}$ micelles deposited from 1.0 wt% (i)-(iv) and 0.5 wt% (v)-(viii) toluene solutions. All scale bars represent 500 nm.

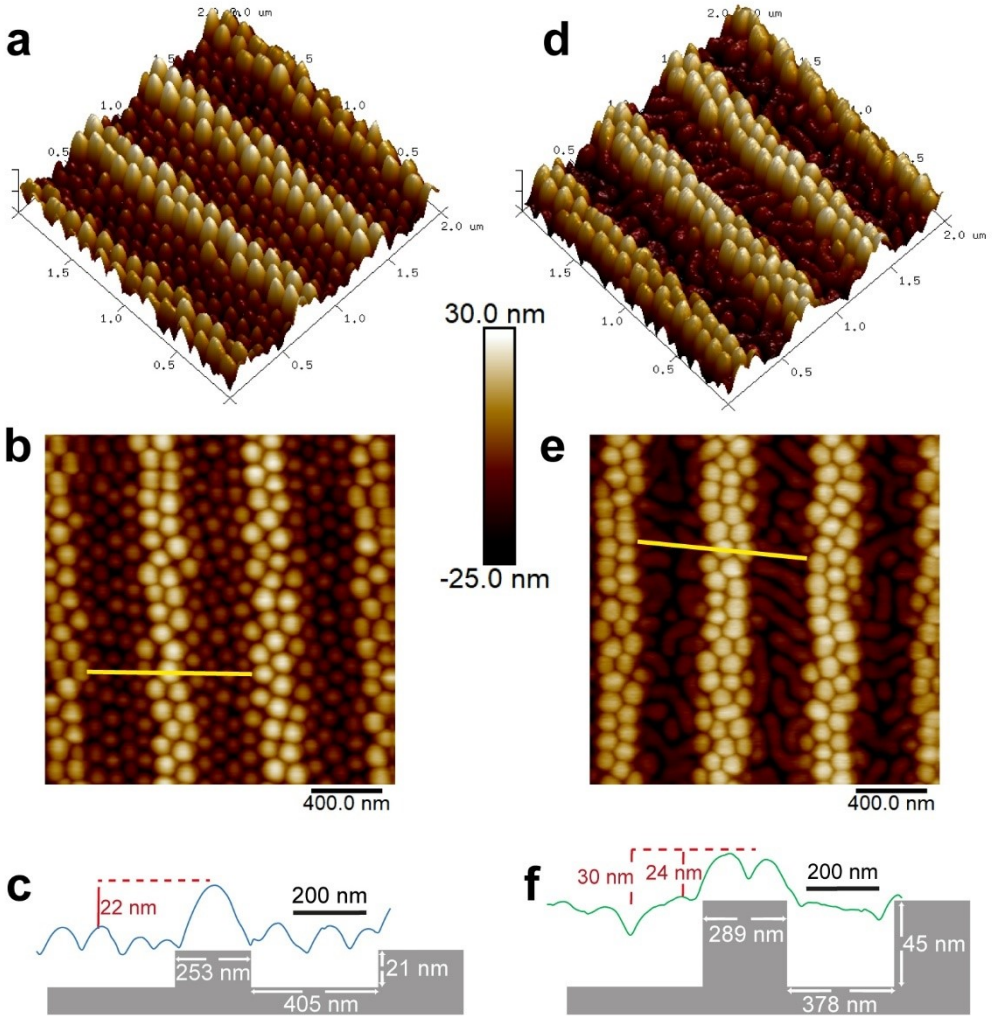

Fig. S4 AFM images and cross-sections of micelles deposited from 1.0 wt% toluene solution on topographically patterned substrates featuring shallow (21 nm-deep, (a)-(c)) and deep (45 nm-deep, (d)-(f)) trenches. (a) and (d) Three-dimensional renditions, (b) and (e) top view height images, (c) and (f) cross-sectional height profiles corresponding to the yellow lines in (b) and (e) with overlaid illustrations of the substrates depicting the corresponding topographic features and their dimensions.

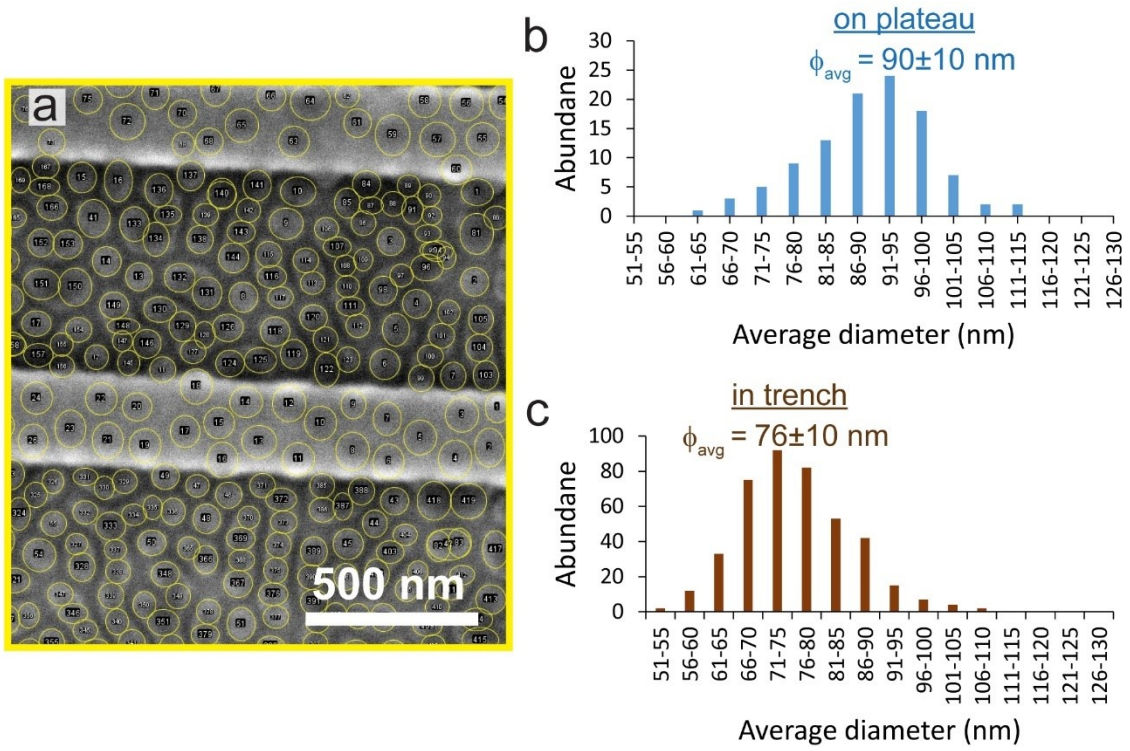

Fig. S5 A representative example of the image processing performed on SEM images for determining the local micelle densities and the average micelle diameters on the plateaus and in the trenches. (a) SEM image of micelles cast from 1.0 wt% micellar solution on 45 nm-deep trenches showing micelles measured using ImageJ software. The number of micelles deposited on each feature (plateau/trench) and the corresponding total area of the feature that these micelles occupy were used to determine the local micelle density. (b) and (c) The histograms of the average diameters of the micelles deposited on the plateaus and in the trenches calculated from the SEM image shown in (a).

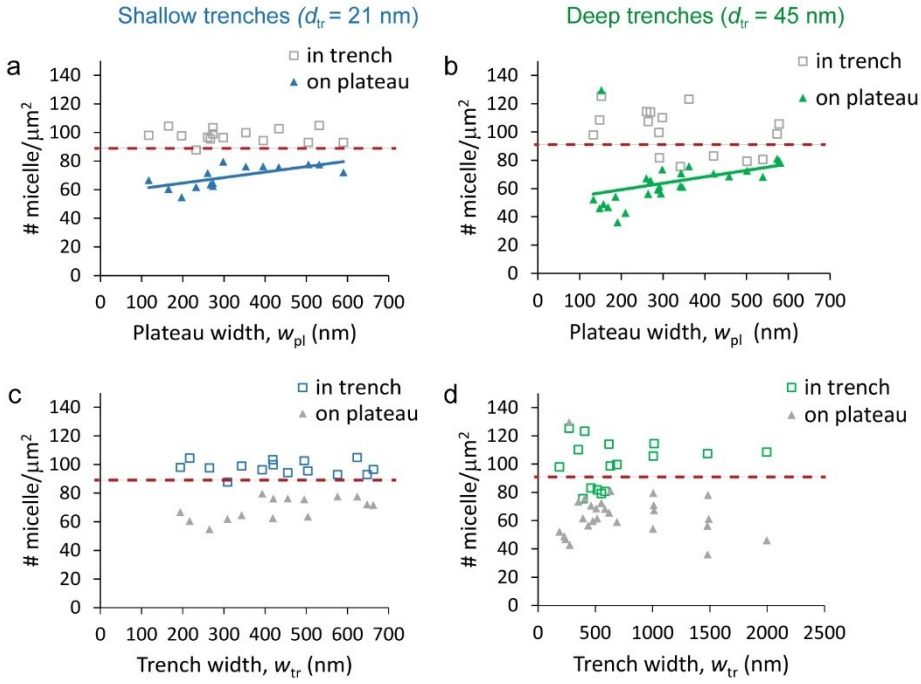

Fig. S6 The dependence of local number density of micelles cast from 1.0 wt% toluene solution on the plateau width (a) and (b) and trench width (c) and (d) when deposited on shallow (a) and (c) and deep (b) and (d) trenches. The red dashed lines represent the micelle density values measured on flat regions (87 and 91 micelles per µm² in the shallow and deep trench cases, respectively). Trendlines were calculated by linear regressions for the data aimed at probing direct influence (plateau data in (a) and (b) and the trench data in (c) and (d)), and are provided as a guide to the eye only. Grey datapoints correspond to data aimed at probing cross-correlations.

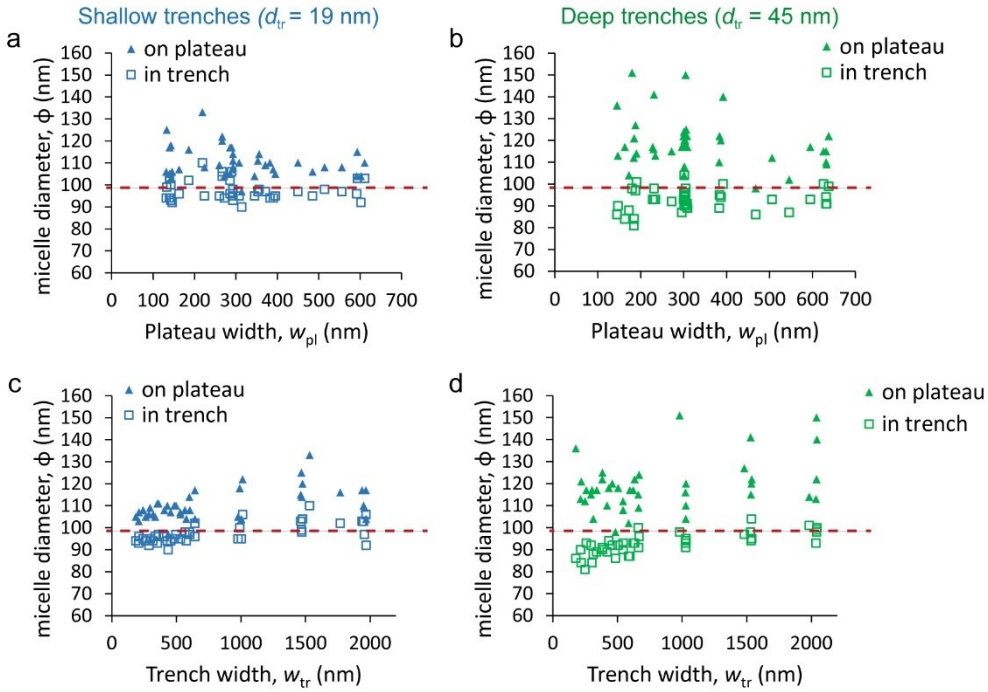

Fig. S7 The dependence of average diameters of micelles cast from 0.5 wt% toluene solution on the plateau width (a) and (b) and trench width (c) and (d) when deposited on shallow (a) and (c) and deep (b) and (d) trenches. The red dashed line represents the average diameter measured on a flat region (99±14 and 99±13 nm in the shallow and deep trench cases, respectively).

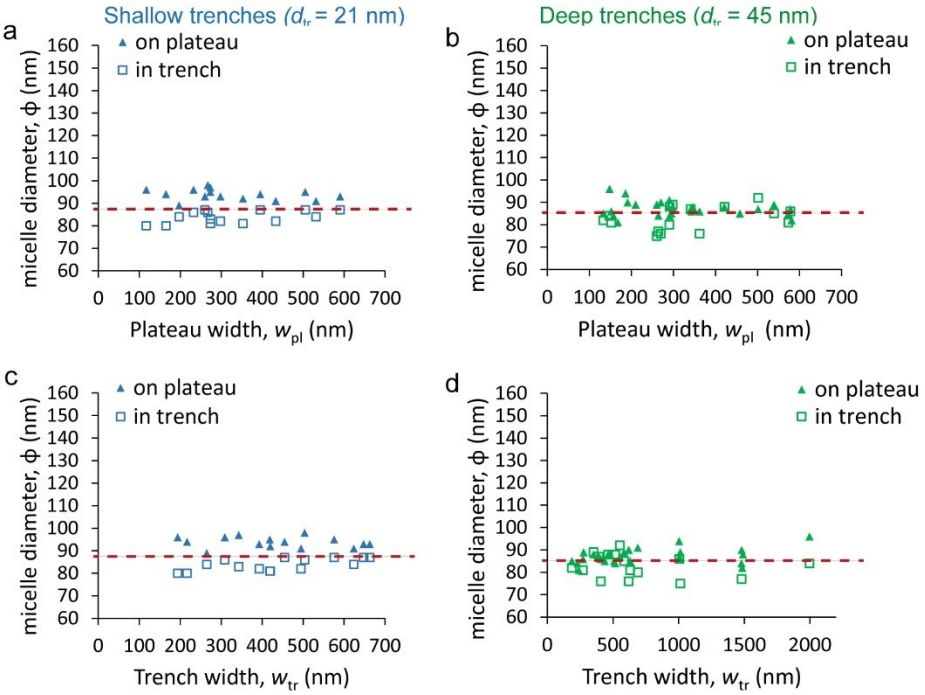

Fig. S8 The dependence of average diameters of micelles cast from 1.0 wt% toluene solution on the plateau width (a) and (b) and trench width (c) and (d) when deposited on shallow (a) and (c) and deep (b) and (d) trenches. The red dashed line represents the average diameter measured on a flat region (88±8 and 86±9 nm in the shallow and deep trench cases, respectively).

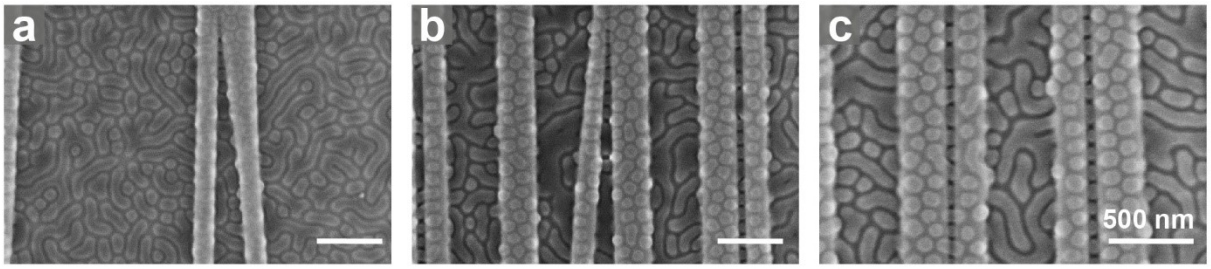

Fig. S9. SEM images of micellar PS_{89}-*b*-$P2VP_{181}$ films cast from 1.0 wt% toluene solutions on non-periodic, 45 nm-deep topographic surfaces. All scale bars represent 500 nm.