Supporting information

Experimental Section

PDADMAC (Aldrich, Mw 200 000-350 000), PSS (Aldrich, Mw 70 000), PAH (Aldrich, Mw 15 000), and PAA (Fluka, Mw 20 000) were used as received to prepare 10^{-4} M aqueous solutions, supplemented with sodium chloride (99+%) with concentrations ranging from 0.1 M to 1 M. PDMS prepolymers were obtained from Dow Corning, Sylgard 184.

Fresh mica was used as substrata. Sequential adsorption of polyelectrolytes on mica was performed by manually dipping. Between alternate exposures to two kinds of polymer solutions for 5-20 min, there were three rinses with 0.1 M NaCl solution for 1-3 min respectively. The NaCl concentration of polymer solutions varied from 0.1 M to 1 M. At the last step, the films were rinsed with triple-distilled water for at least 5 min to eliminate the adsorbed salt, and then dried with a stream of N_2 or in air.

PDMS stamps, with holes each measuring 30 μm in diameter, 30 μm in space and 4 μm in deepness, were molded from lithographically prepared masters. [10] The stamp was then pressed into contact with PEMUs on substrata with dimension of 1cm×1cm. Different weight was utilized to bring certain pressure to bear on the PEMUs (This can be considered as static force compared with the deformation time required). The effect of pressing time was examined in a range from 15 seconds to 1 hour.

The surface morphology, including roughness, was obtained from topographic images collected by atomic force microscopy (AFM, SPI3800N, Seiko Instruments Inc.) in dynamic force mode. In the roughness measurements, all images were 5×5μm scans and were corrected for tilt using the plane fit technique. The same tip was used for a series of measurements. Dynamic track of water contact angle was measured around 10°C on a DSA10-MK2 contact angle measuring system from Krüss. Before the

measurement, all the samples were dried at 30 °C under reduced pressure to a constant weight and stored in ambient air for 1 day.

UV-vis spectroscopy characterization

UV-Vis spectrum was measured on UV-Visible Spectrophotometer (CARY 100 BIO, America). Fig. 1 shows that absorbance at 225 nm acts as function of layer number of PEMUs or salt concentration.

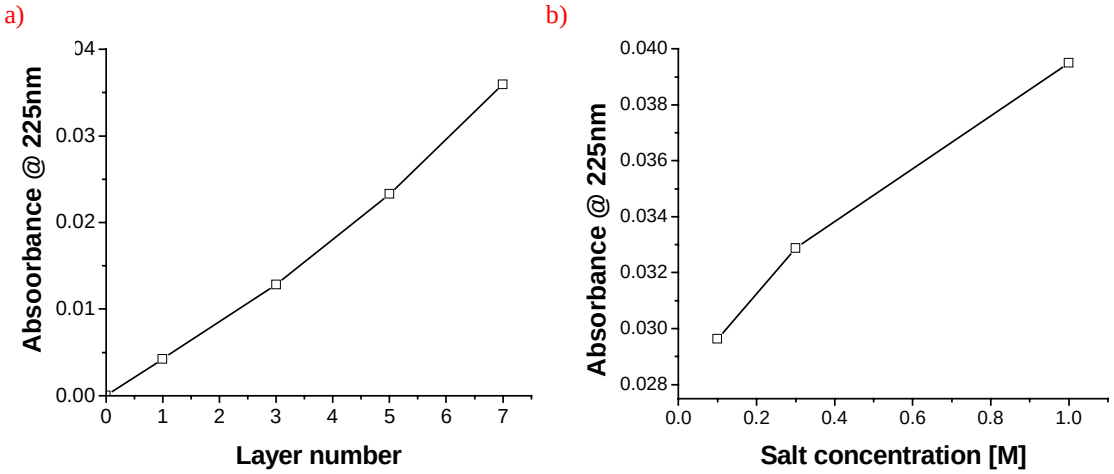


Figure 1. Absorbance at 225 nm as function of a) layer number and b) salt concentration.

Confocal laser scanning microscopy images of compressed multilayers with inked stamp

Rhodamine-labeled PSS (Rd-PSS) inked stamp was brought into contact with $(PDADMAC/PSS)_7PDADMAC$ deposited with 1 M NaCl solution on mica. Figure 2 demonstrates the success of the transfer process. Similar compression was detected simultaneously by AFM. This proves undoubtedly that the compression is not caused by the removal of polyelectrolytes.

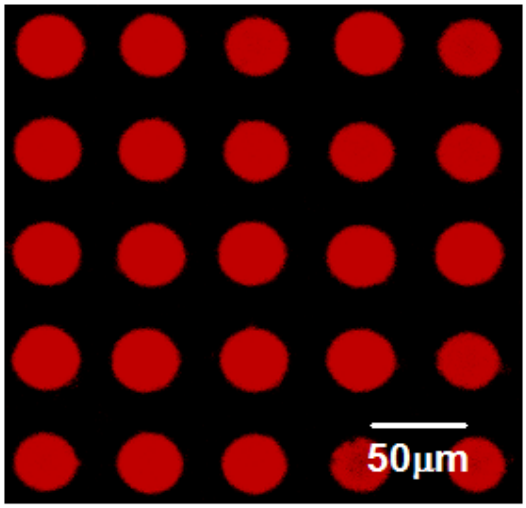
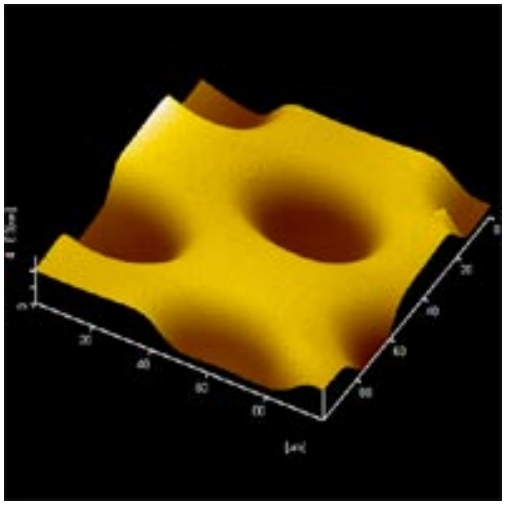


Figure 2. CLSM image to show the chemical patterns formed on the $(PDADMAC/PSS)_7PDAMAC$ multilayers after printing Rd-PSS solution. The bright regions are capped with Rd-PSS, while the continuous black regions are capped with PDADMAC.

AFM images of stamps before and after compression

Comparison of topography between stamps before and after compression would provide further proof that the features are not caused by the removal of polyelectrolytes.

a)



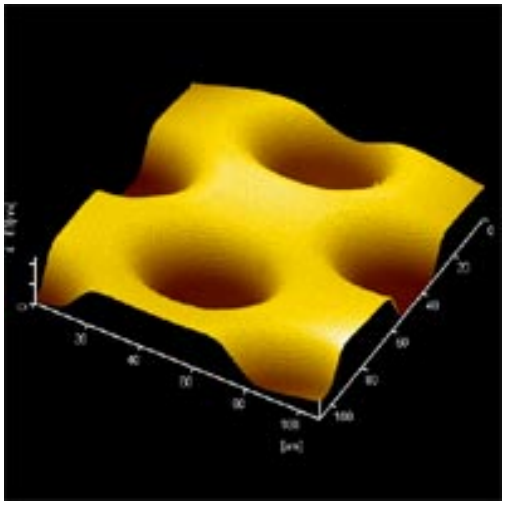


Figure 3. AFM images of PDMS stamp a) before and b) after compression.

References

[10] (a) Kumar, A.; Whitesides, G.M. *Science* 1994, *263*, 60; (b) Xia, Y.; Whitesides, G.M. *J. Am. Chem. Soc.* 1995, *117*, 3274.