Electronic Supplementary Material (ESI) for Lab on a Chip.

Lift-off Cell Lithography for Cell Patterning with Clean Background

Supporting Information

Increase Ramos cell attachment with serum-free culture medium

Ramos human Burkitt lymphoma B cells were purchased from ATCC and grown in RPMI-1640 (Corning) supplemented with 10% fetal bovine serum (FBS, Omega Scientific), 1% penicillin/streptomycin (Corning) and 1% sodium pyruvate (Corning) at 37ºC under a 5% CO_2 atmosphere. During tests, clean glass slides were treated with oxygen plasma. 150µL cell medium containing $1x10^6$ cells mL^{-1} was resuspended into the same amount of new culture medium but with different serum concentrations, dispensed onto the glass slide to cover the whole surface and incubated for 30 minutes. Then excessive medium was aspirated leaving only attached Ramos cells on the glass slide. Images were taken at 10 locations on each glass slide under 10X view on an inverted microscope to record the average number of attached cells per unit area (mm^2). The images show a clear trend of increasing non-adherent cell attachment with lower serum concentrations in the medium.

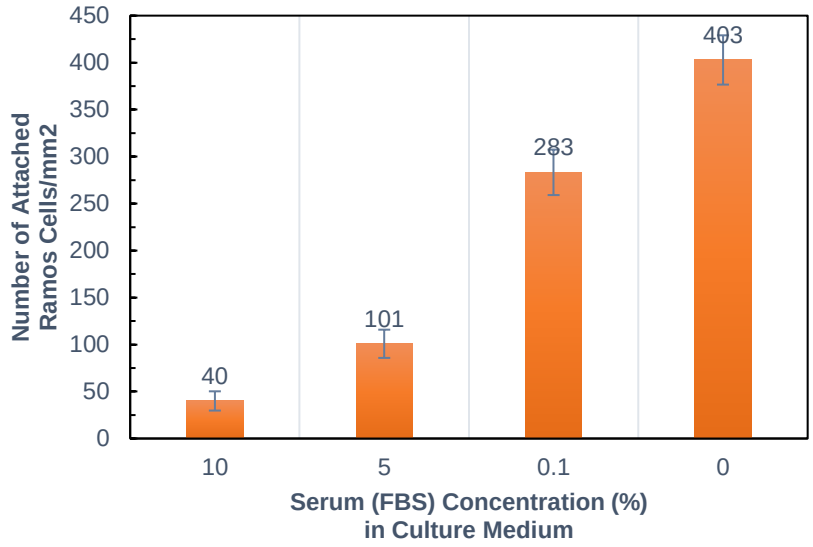

Fig. S1 Attachment of Ramos cells per mm^2 on coverslips in the culture media containing different serum (FBS) concentrations at 10% (regular), 5%, 0.1% and 0, respectively, after 30 minutes. Error bars denote standard deviation of the average value.

SU-8 film lift-off

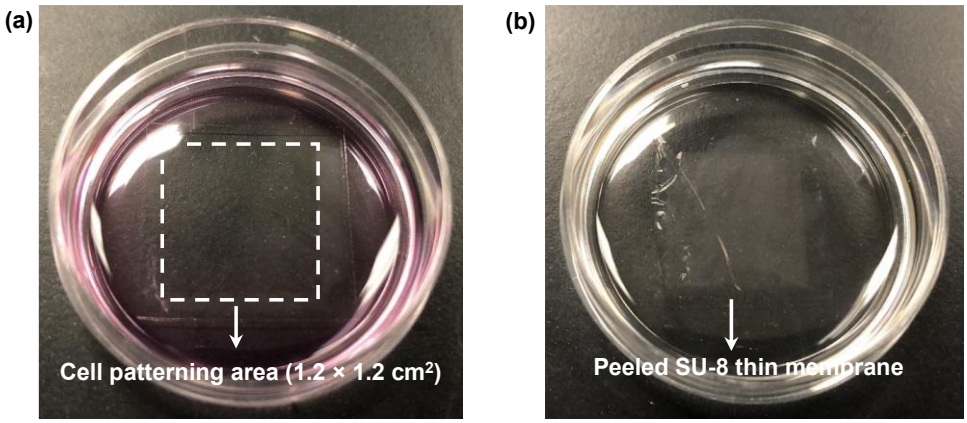

Fig. S2 Pictures of (a) fabricated substrate with cells seeding across a large patterning area, and (b) intact peeled SU-8 thin membrane with cells after cell lift-off.

Ramos cell lift-off

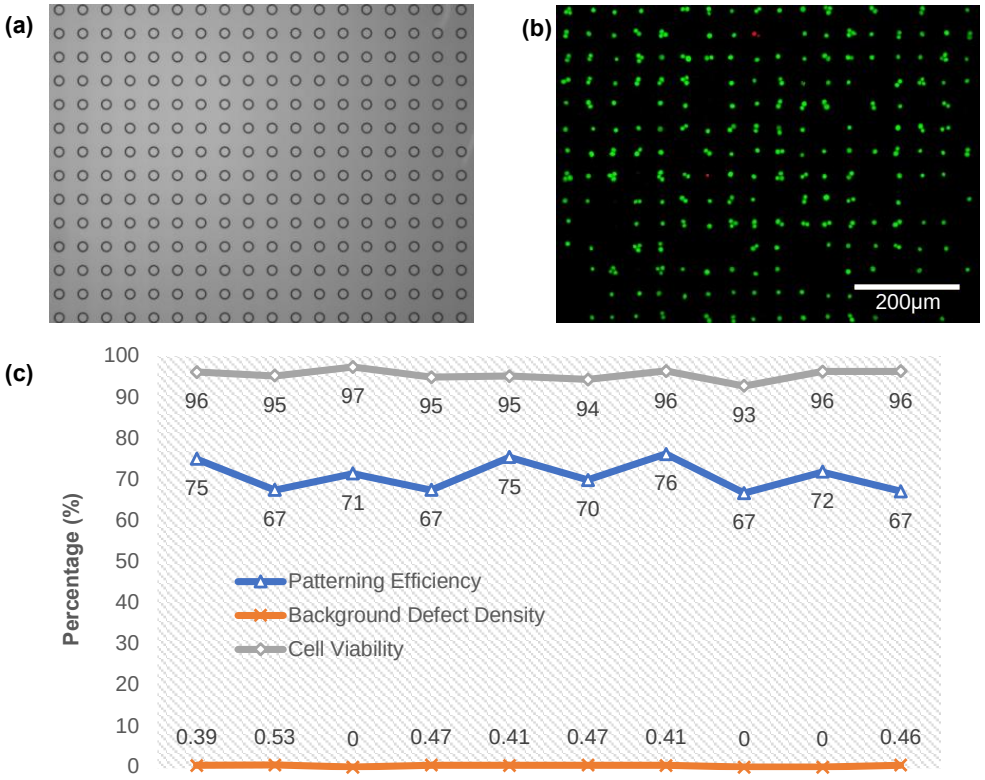

Fig. S3 (a) Microscopic images of fabricated SU-8 microwells before experiment; (b) a representative fluorescent microscopic image of Ramos cells stained by Calcein AM/PI after lift-off under 10X objective; (c) recorded data from 10 random selected locations on the chip after lift-off to estimate the patterning performance.

Micro-contact printing (μCP) and lift-off Poly-L-lysine (LPLL) methods for Ramos cell array patterning

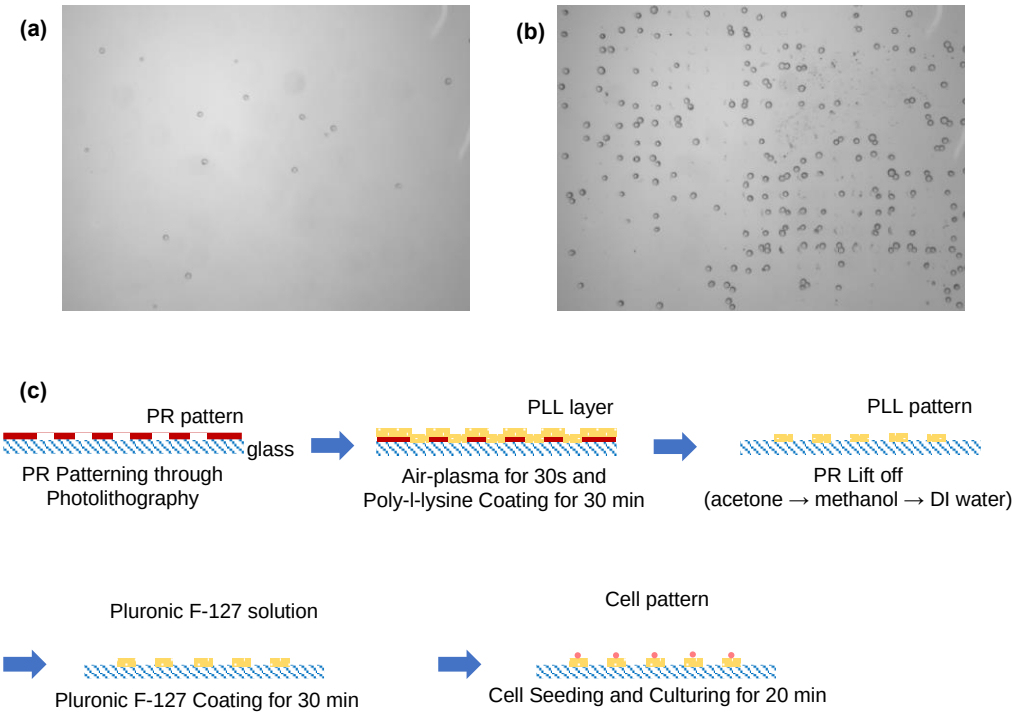

Fig. S4 Comparison of Ramos cell array patterning produced by (a) μCP and (b) LPLL; (c) the process of LPLL.

Timed release of cell patterning boundaries after residual PVA completely dissolves

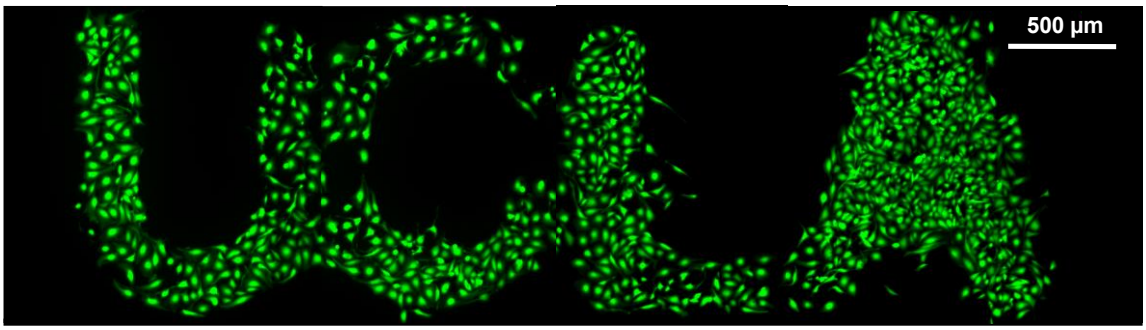

Fig. S5 Fluorescent images of HeLa cell patterned into letters of "UCLA" via LCL after culturing for three days. Cells can grow beyond boundaries and different regions start to merge after the surrounding PVA residue completely dissolves in culture medium. This image is created by stitching four images of each letter taken under 4X objective lens to present images over a large area.