Supplementary Material

1. Synthesis of poly(styrene-co-acrylic acid) (PS-AA)

The surface of a microstructure composed of poly(styrene-co-acrylic acid) (PS-AA) is suitable for cell attachment and proliferation due to its negative charge.[1] Arrays composed of PS-AA microrafts were prepared from 40 wt% PS-AA in GBL. The molar ratio of styrene to acrylic acid was 9:1. PS-AA was synthesized by standard free-radical copolymerization with GBL as the solvent and azobisisobutyronitrile as the initiator. Briefly, 22.9 g acrylic acid, 297.3 g styrene, 0.3009 g azobisisobutyronitrile, and 482.5 g GBL were added to a 2-liter flask. The mixture was heated at 80 °C and stirred for 24 h then cooled to room temperature. This viscous PS-AA solution was used in the dip coating process to fabricate the PS-AA microraft array.

2. Experimental setup for dip coating

The experimental setup for dip coating is shown in Fig. S1. Coating solution (500 mL) was added to a large glass jar. The PDMS mold attached to a string was immersed in the coating solution, and then slowly withdrawn vertically from the solution. The string was attached to a slow DC rotary motor (Parallel Shaft 12 V DC Gearmotor, Model: 2L003, Drillspot, Boulder, CO) to control the withdrawal rate. By varying the voltage (0.7-12 V) applied to the DC motor, the withdrawal speed could be adjusted between 0.5 - 10 mm/min. The withdrawal speed was adjusted to be slower than the rate of dewetting of the coating solution resulting from gravity. Generally, the more viscous the coating solution, the slower the withdrawal speed required.

3. Protocol for generating suspension of viable cells from a needle biopsy

A sample of cells obtained by needle biopsy of a resected human pancreatic adenocarcinoma was provided by UNC Lineberger Comprehensive Cancer Center. Before digestion with collagenase, the sample was minced completely using a sterile scalpel blade. To obtain single-cell suspensions, the resultant minced tumor pieces were mixed with 1 mg/mL collagenase (Sigma-Aldrich C9697) in Hanks' balanced salt solution (Sigma-Aldrich H9269) and allowed to incubate at 37 °C for 3 h for enzymatic digestion. The specimens were further mechanically dissociated every 15 to 20 min by pipetting with a 5-mL pipette. At the end of the incubation, cells were filtered through a 40-μm nylon mesh and washed with Dulbecco's modified eagle medium supplemented with 10% fetal bovine serum to obtain a single-cell suspension. Dissociated cells were plated on a microraft array coated with human plasma fibronectin. To assure that one or fewer cells occupied each microraft, the number of cells plated was 1/3 of the number of microrafts on the entire array.

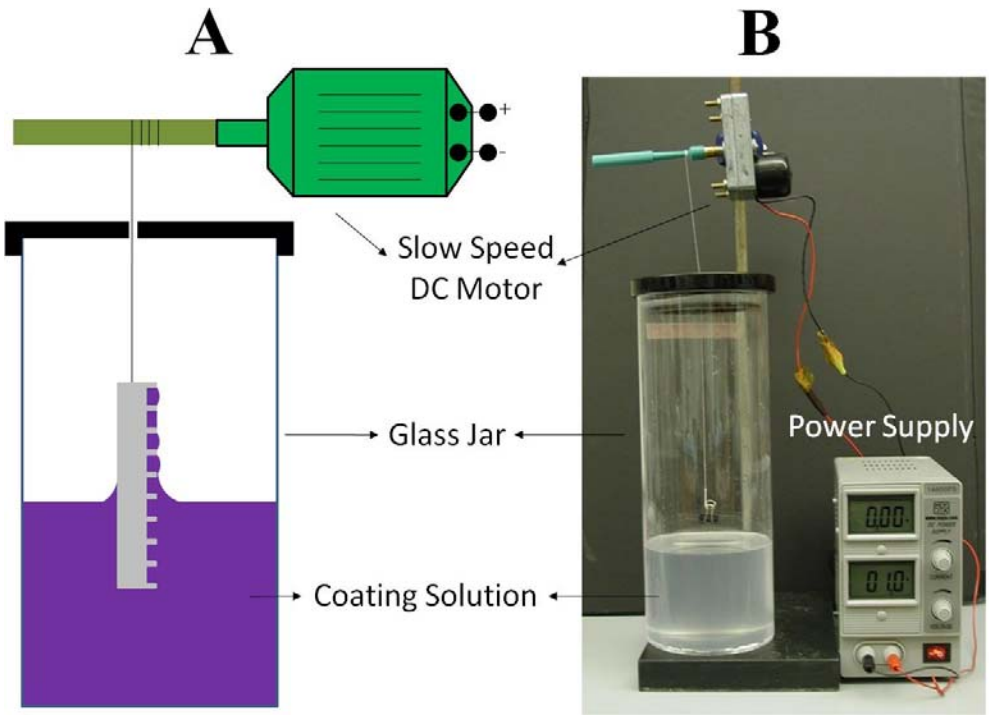

Figure. S1. Dip coating setup. (A) Schematics. (B) Experimental setup.

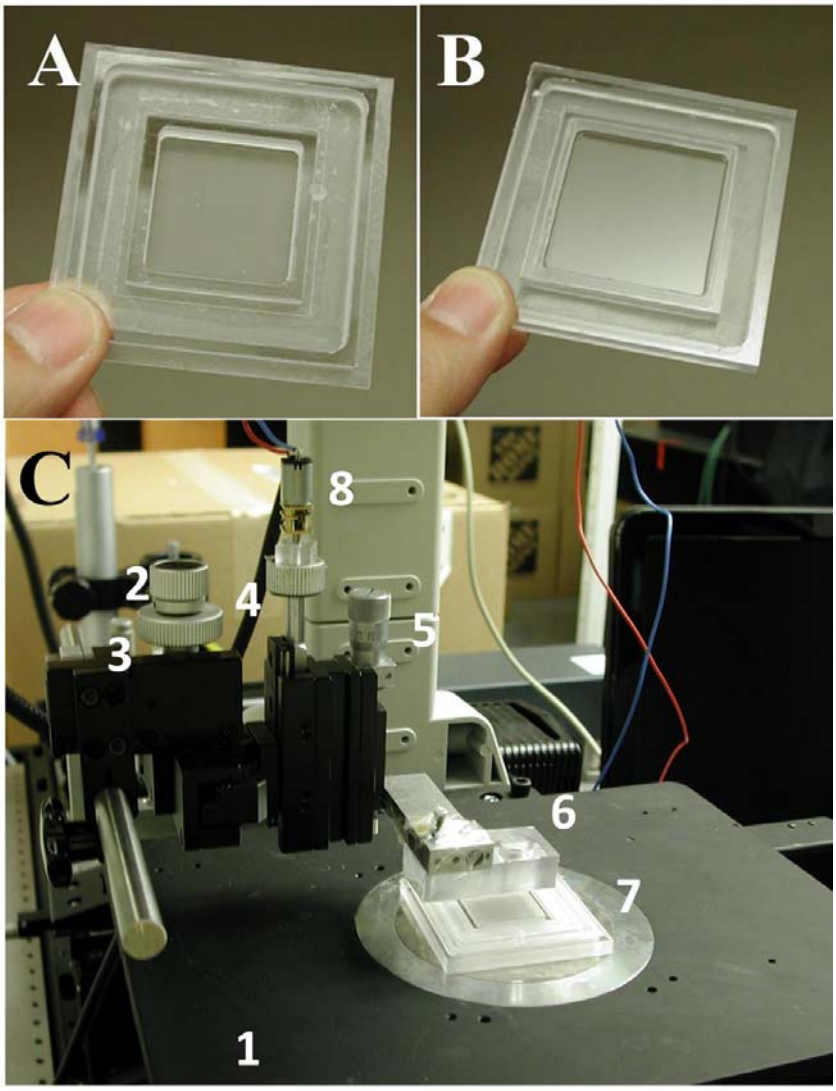

Figure. S2. (A) Polycarbonate holder for the microraft array. An array of 25.4 mm x 25.4 mm is bonded to the polycarbonate structure. The culture chamber dimensions are 25.4 mm × 25.4 mm × 6.35 mm. (B) Polycarbonate holder for the collection plate. A glass slide (38 mm × 38 mm) is bonded to the polycarbonate structure. The collection chamber dimensions are of 38 mm × 38 mm × 6.35 mm. The structures in "A" and "B" mate forming an enclosed cassette that enables sterile collection of the microrafts on the microscope stage. (C) A motor controlled needle

release system. 1 - Microscope stage. 2 - X micrometer. 3- Y micrometer. 4 - Z micrometer. 5 - Z (fine) micrometer. 6 - Plastic needle mount. 7 – Mated array/collection cassette. 8 - DC motor.

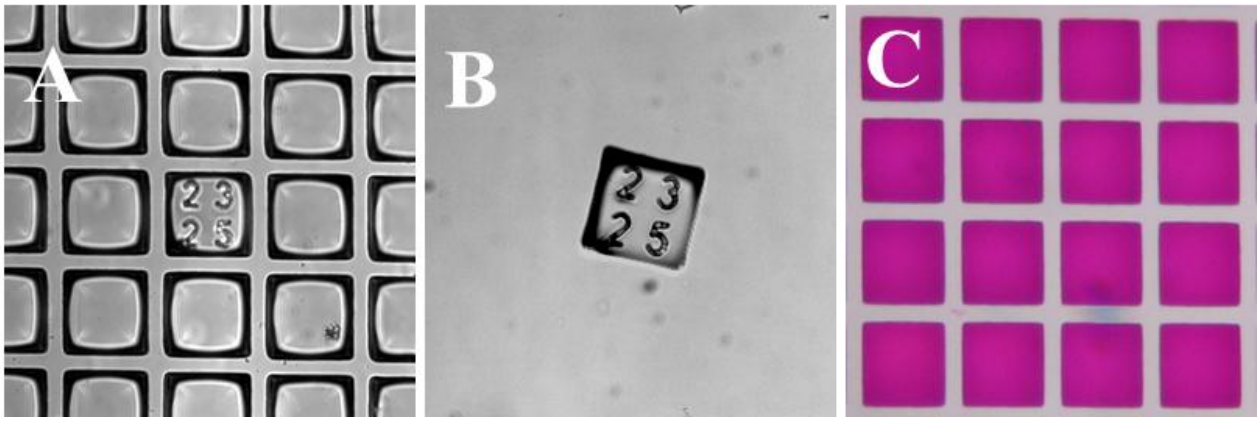

Figure S3. Versatility of molded microraft array. (A) Numerically enoded polystyrene microraft (#2325) on the array. (B) The same microraft in “E” has been released from the array and transferred to the collection dish. (C) Rhodamine-B doped polystyrene microrafts (100 µm, 20 µm inter-raft spacing).

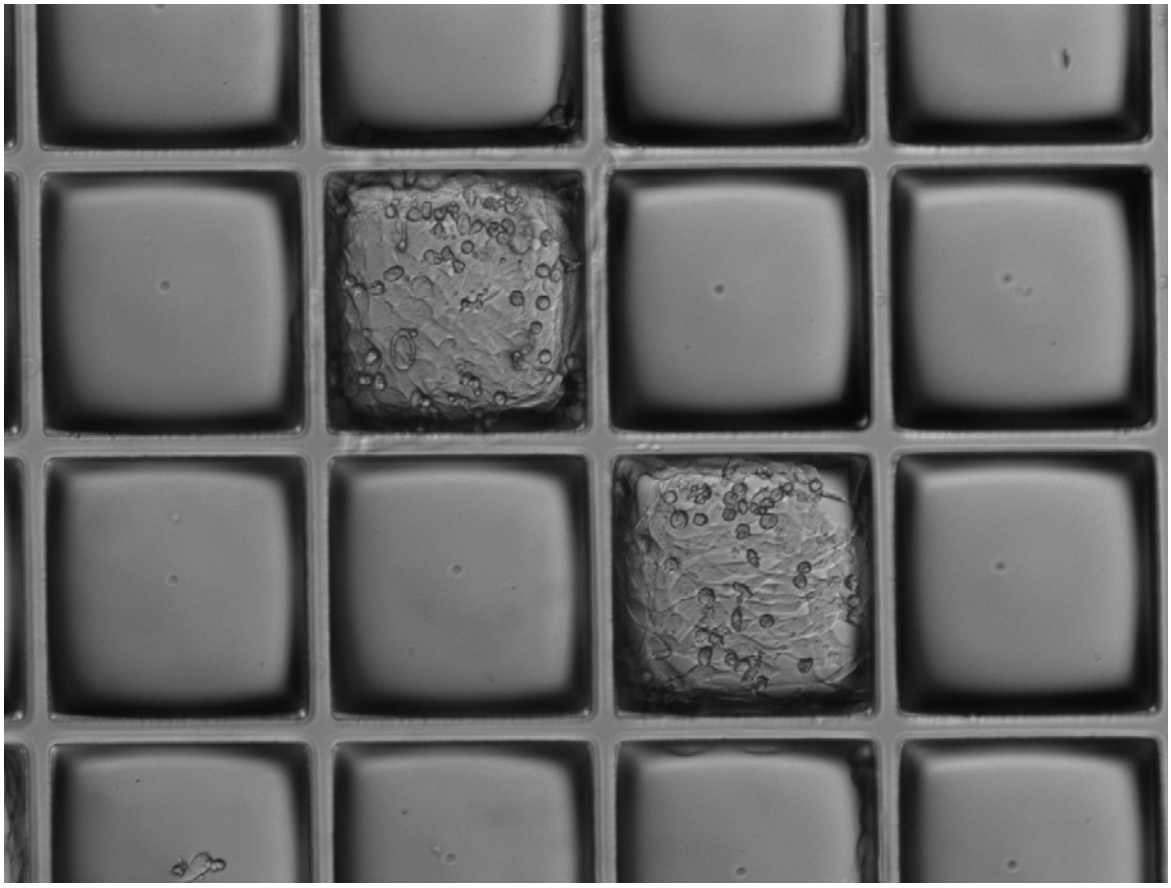

Figure. S4. Culture of HeLa cells on an array composed of PS-AA microrafts. Shown are HeLa cells that have remained sequestered in the microwells after 8 days in culture (200 μm size, 20 μm inter-raft gap).

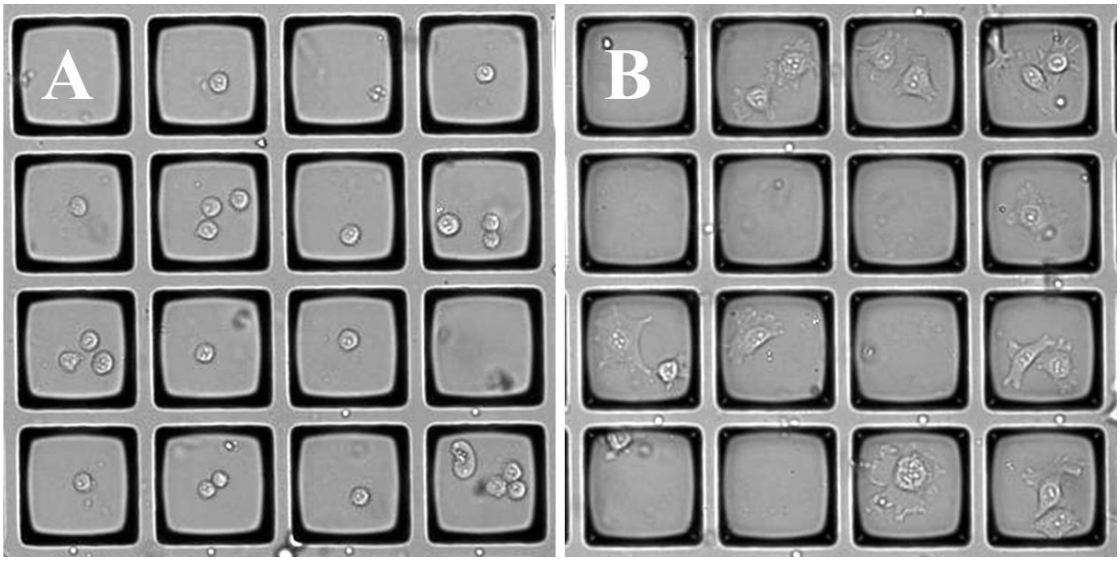

Figure S5. Brightfield images showing attachment of HeLa cells on the microraft array after 2 h of culture. (A) Uncoated raft arrays. (B) Collagen-coated arrays. The raft material was poly(styrene-co-acrylic acid) (PS-AA). The raft size was 100 µm. The inter-raft gap was 20 µm.

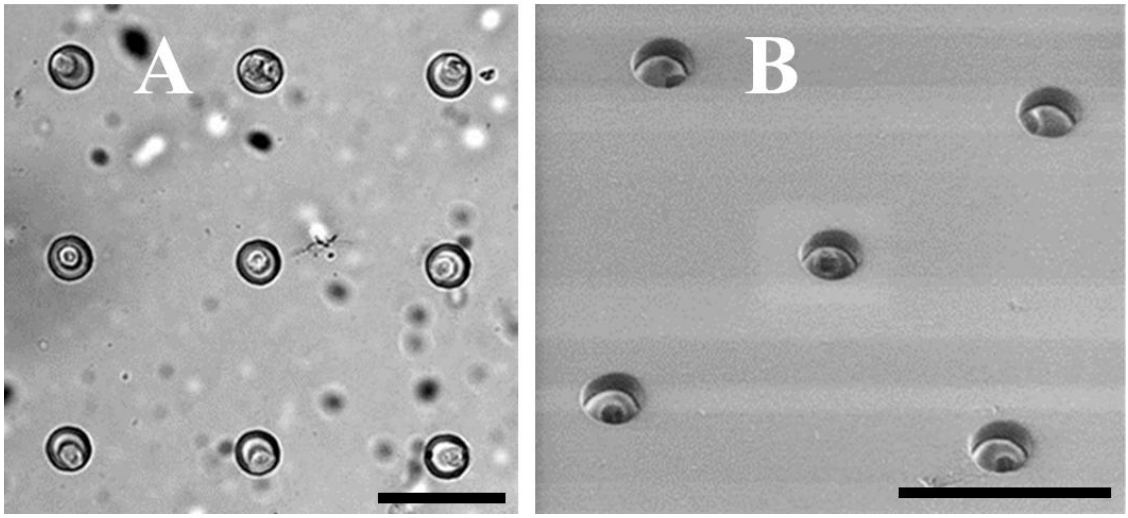

Figure S6. Brightfield (A) and scanning electron (B) images demonstrate single HeLa cell occupancy on the micromolded array after 2 h of culture. The raft material was poly(styrene-co-acrylic acid) (PS-AA). The circular rafts had a diameter of 30 μm. The scale bars represent 100 μm in both panels.

References

1. H. Jung, B. Kwak, H. S. Yang, G. Tae, J. S. Kim and K. Shin, *Colloid Surf. A-Physicochem. Eng. Asp.*, 2008, **313**, 562-566.