SUPPLEMENTARY DATA

1. Swell ratio of PDMS in 51 different organic solvents

Table S1. Screening of solvents for their swelling capability for PDMS and solubility of PS

Solvents		PDMS Swell Ratio	PS Solubility
#	Name		
1	water	1.00*	
2	glycerol	1.00*	
3	ethylene glycol	1.00*	
4	perfluorotributylamine	1.00*	
5	perfluorodecalin	1.00*	
6	gamma-butyrolactone	1.00	+
7	dimethyl sulfoxide	1.00*	
8	delta-valerolactone	1.00	+
9	gamma-valerolactone	1.00	+
10	nitromethane	1.00*	
11	tetramethylenesulfone	1.00*	
12	acetonitrile	1.01*	
13	propylene carbonate	1.01*	
14	trifluoroethanol	1.01*	
15	delta-caprolactone	1.01	+
16	dimethylformamide	1.02*	+
17	methanol	1.02*	
18	1,1,3,3-tetramethylurea	1.02*	+
19	1-methyl-2-pyrrolidone	1.03*	+
20	dimethyl carbonate	1.03*	+
21	1-methoxy-2-propanol	1.03	
22	ethanol	1.04*	
23	1-butanol	1.05	
24	acetone	1.06*	
25	pyridine	1.06*	
26	propylene glycol monomethyl ether acetate	1.07	
27	cyclopentanone	1.08	
28	isopropanol	1.09*	
29	4-methyl-2-pentanone	1.16	
30	1,4-dioxane	1.16*	
31	ethyl acetate	1.18*	
32	2-heptanone	1.20	
33	2-butanone	1.21	
34	tert-butyl alcohol	1.21*	
35	methylenechloride	1.22*	
36	butyl acetate	1.22	
37	chlorobenzene	1.22*	
38	benzene	1.28	
39	toluene	1.31*	
40	dimethoxyethane	1.32*	
41	cyclohexane	1.33*	
42	heptane	1.34*	
43	trichloroethylene	1.34*	
44	hexane	1.35*	
45	diethyl ether	1.38*	
46	tetrahydrofuran	1.38*	
47	chloroform	1.39*	
48	xylene	1.41*	
49	pentane	1.44*	
50	triethylamine	1.58*	
51	diisopropylamine	2.13*	

** denotes the swell ratio dataobtained from reference 26.*

2. Apparent deformation of PDMS mold by solvent

To show that swelling of the PDMS mold will lead to its distortion and is unsuitable for replication, 2 mL PS solution (25 wt% in toluene) was added to a PDMS sheet (75 mm × 50 mm × 0.5 mm).Within 5 min, the PDMS sheet curled due to the swelling caused by the toluene (Fig. S1A). In contrast, when 2 mL of PS solution (25 wt% in GBL) was added to a PDMS sheet (75 mm × 50 mm × 0.5 mm), the PDMS sheet did not show distortion even after 2 h at room temperature (Fig. S1B).

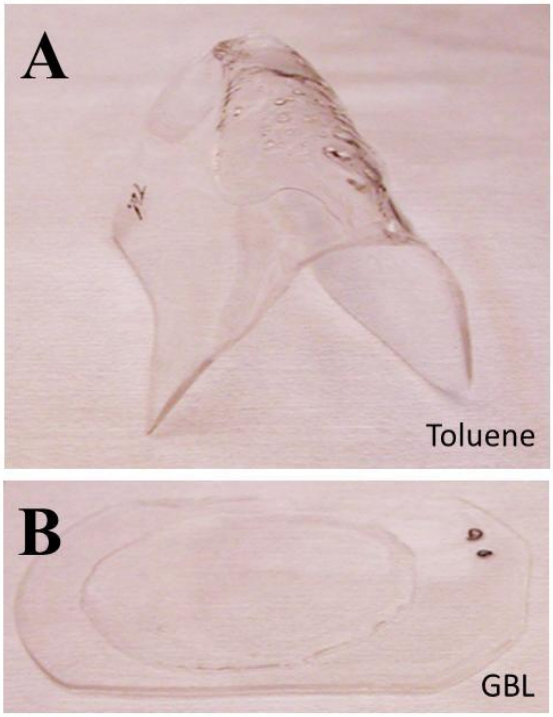

Fig.S1. Swelling test of PDMS by solvents. (A) A PDMS slab exposed to polystyrene dissolved in toluene. (B) A PDMS slab exposed to polystyrene in GBL. In both “A” and “B”, 2 mL of polystyrene solution (25 wt% in solvent) was placed onthe PDMS surface. The toluene solution swelled and distorted the PDMS slab within 5 min, while the GBL solution showed no swelling or distortion of the PDMS slab after 2 h.

3. Baking temperature for PS solution in GBL

Various temperatures (100°C, 150°C and 200°C) were tested for baking the PS solution (25% in GBL). The remaining weight of PS solution (expressed as relative weight)*vs.* baking time is shown in Fig. S2. The optimal temperature was 150°C with a bake time of 10-16 h. Very little (~0.6%) GBL was left in PS under these baking conditions. If required, a higher temperature (200°C) can be used to completely evaporate GBL.

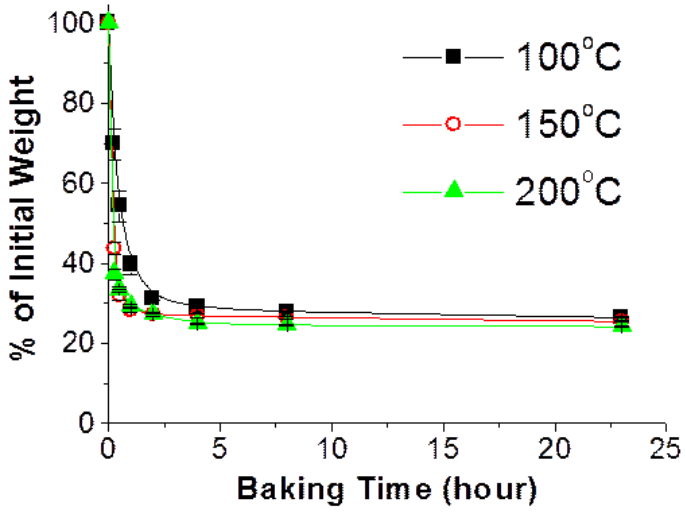

Fig. S2. Weight change (expressed as% of initial weight) vs. baking time for PS solution (25% in GBL).

4. Micromolding of PS from GVL solvent

A number of other solvents can replace GBL, for example, gamma-valerolactone (GVL) and delta-valerolactone. GVL is attractive since it is a naturally occurring chemical in fruits, and is a promising "green" solvent. GVL is used in the perfume and flavor industries. PS was dissolved in GVL to obtain 25% solution. GVL was then used to replace GBL for micromolding of PS. The microstructures created from GVL-dissolved PSpossessed the same resolution and fidelity as those obtained using GBL as a solvent. Fig. S3A shows brightfield microscopy images of the replicated PS molded from a standard USAF 1951 resolution test pattern on the PDMS mold. The best resolution obtained was 3 μm and was limited by the resolution of the SU-8 master mold made to form the PDMS mold. Fig. S3B shows a hollow square pattern created in PS by using GVL as solvent. It demonstrates the high fidelity of replica micromolding.

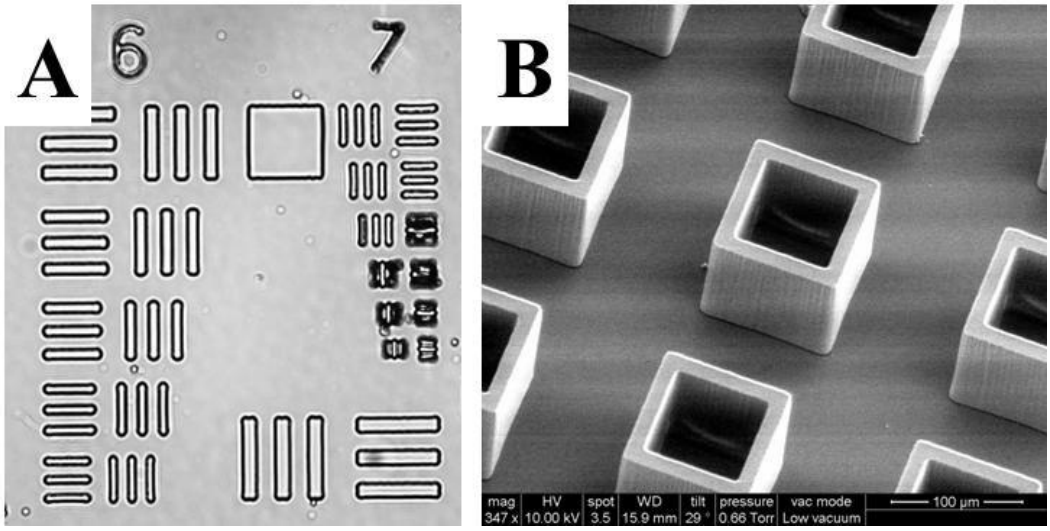

Fig. S3. Micromolding PS from GVL solvent. (A) Brightfield microscopy images of the replicated PS molded from a standard USAF 1951 resolution test pattern on the PDMS mold. (B) SEM image of a hollow square pattern created in PS by soft lithography using GVL as solvent.

5. Replica PS on a rigid mold vs. a soft mold

To illustrate the importance that an elastomeric PDMS mold is needed for PS soft lithography, PS was molded on a rigid mold composed of arrayed SU-8 posts on a glass surface. The mold possessed square posts with a height of 90 μm, size of 50 μm, and an aspect ratio of 1.8. The mold was treated with octytrichlrosilane to render it non-sticky. After baking, PS was separated from the mold using a razor blade to pry the two pieces apart at their edges. The posts wereeither broken or detached from the mold, and therefore retained in the PS (Fig. S4B).In contrast, when a soft PDMS mold was used, PDMS was easily peeledfrom the PS piece without breaking the PDMS posts yielding the microwell patterns on the PS (Fig. S4A).

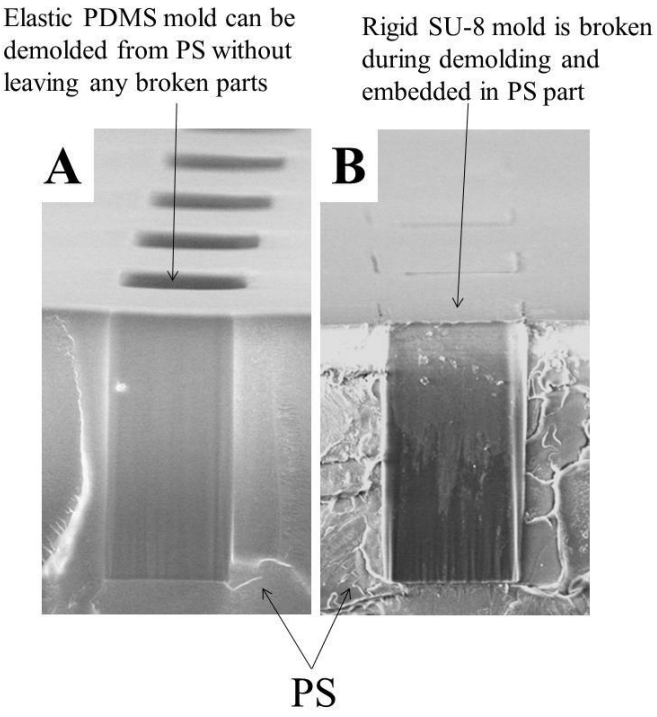

Fig. S4. (A) PS was successfully micromolded from a PDMS mold. (B) PS could not be moldedusing a rigid mold. Posts were detached from the mold and retained in the PS film.

6. PS microarrays to track cells and their clonal colonies

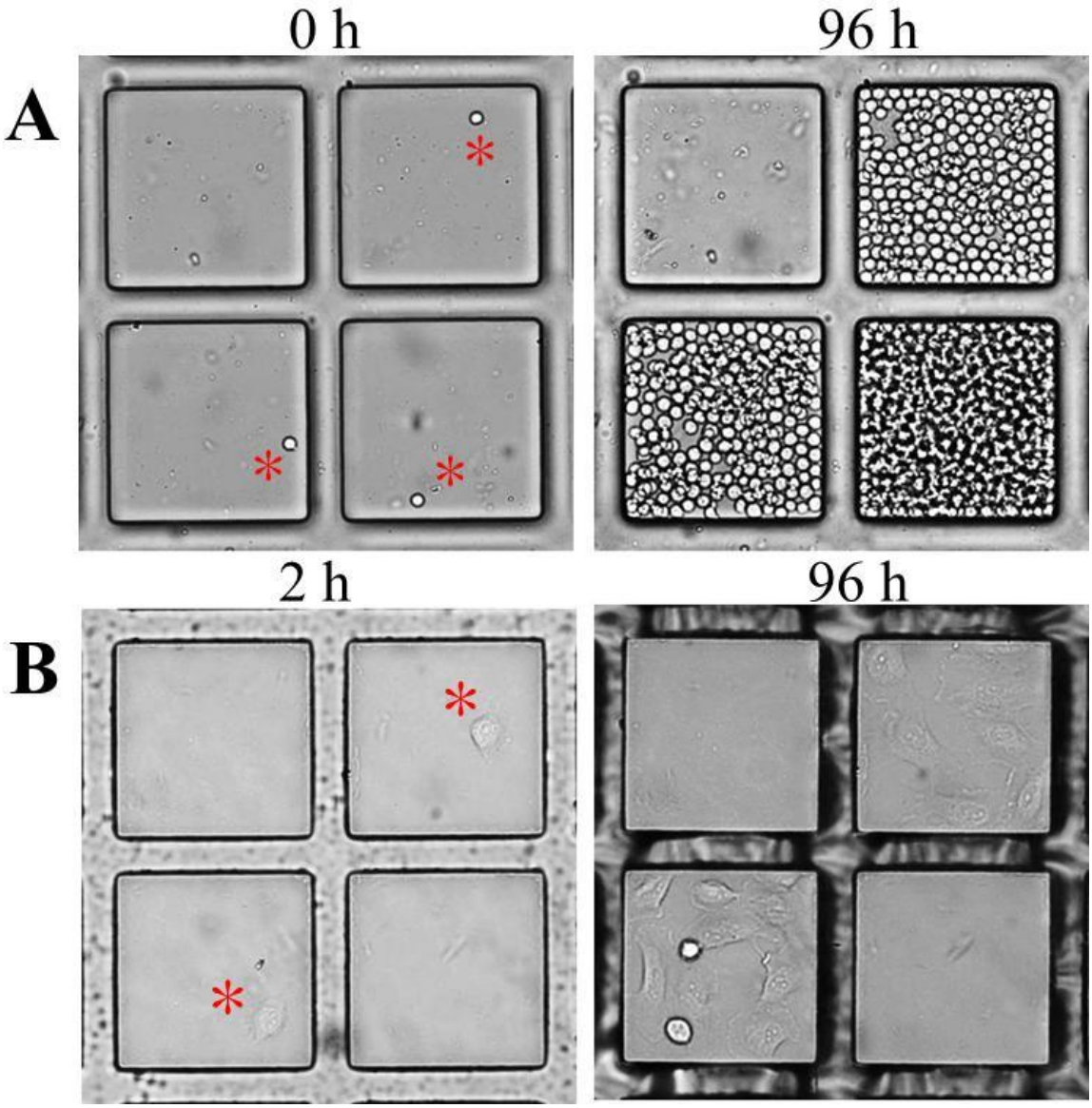

Fig. S5. Effective isolation of cells over many cell cycles using PS microarrays.(A) Ba/F3 cells on a microwell array. (B) HeLa cells on a micropost array. Asterisks indicate single cell occupancy after plating of cells. At 96 h, cells proliferated only on individual wells or posts. Cells did not migrate to neighboring wells or posts.