Supplementary Material (ESI) for Lab on a Chip

Supplementary Information for:

Direct patterning of composite biocompatible microstructures using microfluidics

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Fig. I. Schematic representations of composite structure patterns for Figs. 1-4. The numbers within each panel indicate the cycle number for a particular structure. The top left and top middle panels represent patterns created using a widefield fluorescence microscope and the top right and bottom panels represent patterns created using a confocal microscope.

Table I. Combinations of fluorescent dyes/beads used to fabricate the microstructures in Figs. 1-4. Cycle numbers correspond to the structures schematized in the panels in Fig I.

Fig. II. 3T3 fibroblasts encapsulated in PEG-DA with LIVE/DEAD cyctotoxicity assay stain. Radical generation during the excitation of photoinitiator has shown to cause cell death in previous work.[1,2] We examined the cytotoxic effect of photocrosslinking PEG-DA by Irgacure 2959 at 365 nm. We observed a 95% fibroblast viability, which agreed with the values reported previously in the literature.[1,3]

Fig. III. Resolution measurement of a microstructure fabricated with a confocal laser scanning microscope. Using ImagePro digital image analysis software, we measured a minimum spatial resolution of 2.5μm using a 10x 0.5 N.A. air objective in the confocal system. Using a conventional fluorescent microscope (Leica) with a 40x 1.25 N.A. oil immersion objective, we obtained a resolution of 40 μm, which was the projected diameter of the smallest aperture (data not shown).

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Fig. I

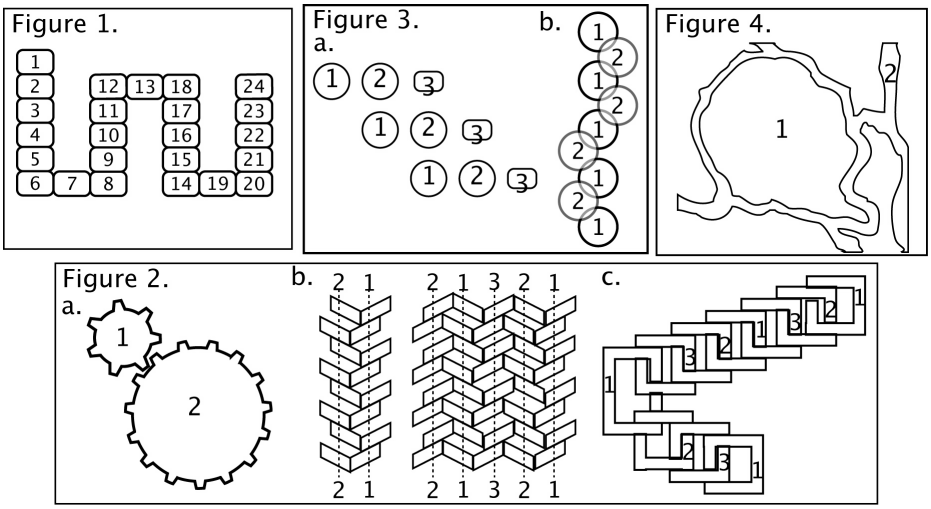

Table I

Figure	*Cycle*[*]	*Polymer composition*		*Solvent*
Fig. 1c	1,7,13,19	3, 2.5, 2, 1.5mM Fluorescein	40%w/v PEG-DA, 2%w/v I2959, 0.4%v/v NVP.	10X TRIZMA buffer (pH 8)
	2,8,14,20	3, 2.5, 2, 1.5mM Rhodamine B		
	3,9,15,21	3, 2.5, 2, 1.5mM Hoechst 33342		
	4,10,16,22	2.5, 2, 1.5, 1mM Fluorescein + Rhodamine B		
	5,11,17,23	2.5, 2, 1.5, 1mM Fluorescein + 2.5, 2, 1.5, 1.5mM Hoechst 33342		
	6,12,18,24	2.5, 2, 1.5, 1mM Rhodamine B + 2.5, 2, 1.5, 1.5mM Hoechst 33342		
Fig. 2a	1	1mM Fluorescein	40%w/v PEG-DA, 200uM Eosin Y, 0.4%v/v NVP, 1.5%v/v Triethanolamine.	1X PBS
	2	1mM Rhodamine B		
Fig. 2b/2c	1	1mM Fluorescein		
	2	1mM Rhodamine B		
	3	1mM 7-(diethylamino) coumarin-3-carboxylic acid		
Fig. 3a	1	1mM Rhodamine B	50%w/v TMPTA, 3%w/v I2959, 0.4% v/v NVP	100% Ethanol
	2	1mM 7-(diethylamino) coumarin-3-carboxylic acid	50%w/v TMPegTA, 3%w/v I2959, 0.4% v/v NVP	
	3	1mM Rhodamine B	50%w/v HEX-DA, 3%w/v I2959, 0.4% v/v NVP	
Fig. 3b	1	With 0.5µm beads	0.27mM Rhoadmine B, 92%w/v PEGDA, 2%w/v I2959, 0.4%v/v NVP	100% Ethanol
	2	No beads		
Fig. 4	1	10%w/v PEG-DA, 100µM Eosin Y, 1.5%v/v Triethanolamine, 0.4% v/v NVP, $5x10^6$ cells/mL.		3T3 serum media
	2	10%w/v PEG-DA, 100µM Eosin Y, 1.5%v/v Triethanolamine, 0.4%v/v NVP, 1mM Rhodamine B.		

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Fig. II

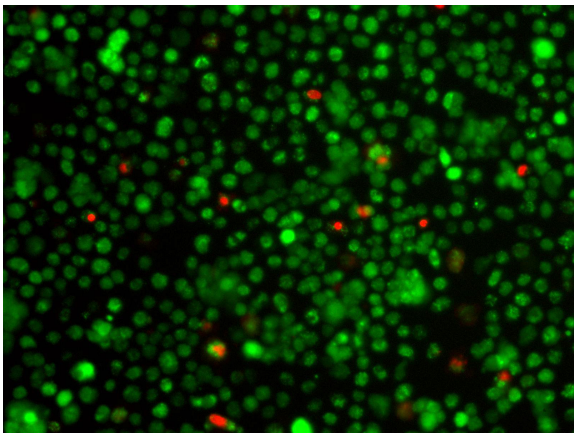
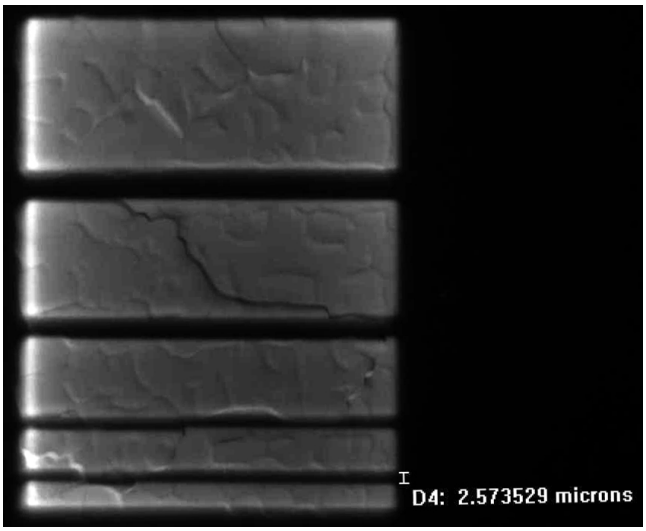


Fig. III



References

1. D. R. Albrecht, V. L. Tsang, R. L. Sah and S. N. Bhatia, *Lab Chip*, 2005, **5**, 111-118.
2. J. S. Miller, M. I. Bethencourt, M. Hahn, T. R. Lee and J. L. West, *Biotechnol Bioeng*, 2006, **93**, 1060-1068.
3. J. Yeh, Y. Ling, J. M. Karp, J. Gantz, A. Chandawarkar, G. Eng, J. Blumling, 3rd, R. Langer and A. Khademhosseini, *Biomaterials*, 2006, **27**, 5391-5398.