

Supplementary Information

Figure S1

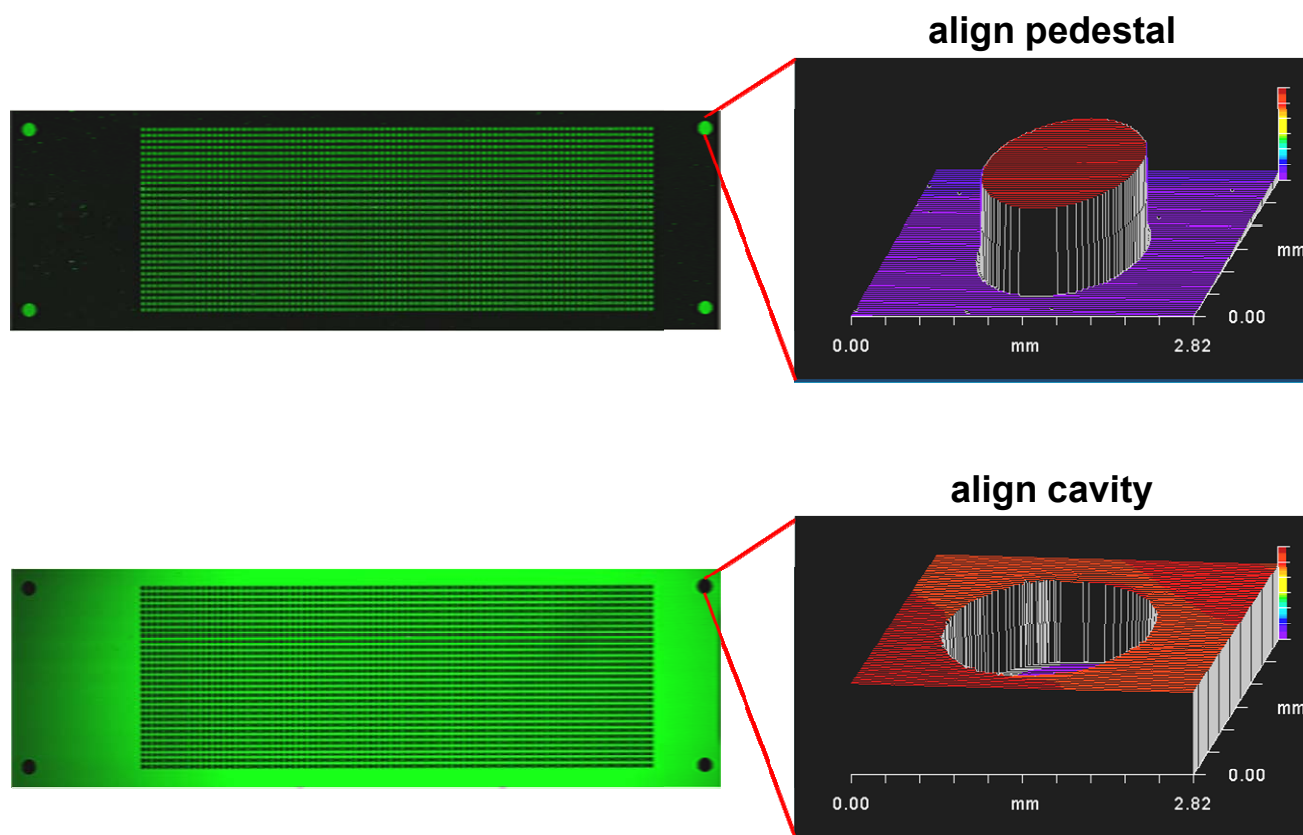


Figure S1. Microcolumn to microwell alignment. Structures of MEMS-fabricated microcolumn (upper panel) and microwell arrays (lower panel) were examined by Axon Scanner and ellipsometer measurement. The ellipsometer images showed the 3-D structure of the align pedestals (1.35 mm in diameter, upper right panel) located on the microcolumn array and align cavity (1.5 mm in diameter, lower panel) on the microwell array. The alignment was carried out by matching the four pedestals to the complementary cavities to ensure that the right wells were inserted with the right columns.

Figure S2

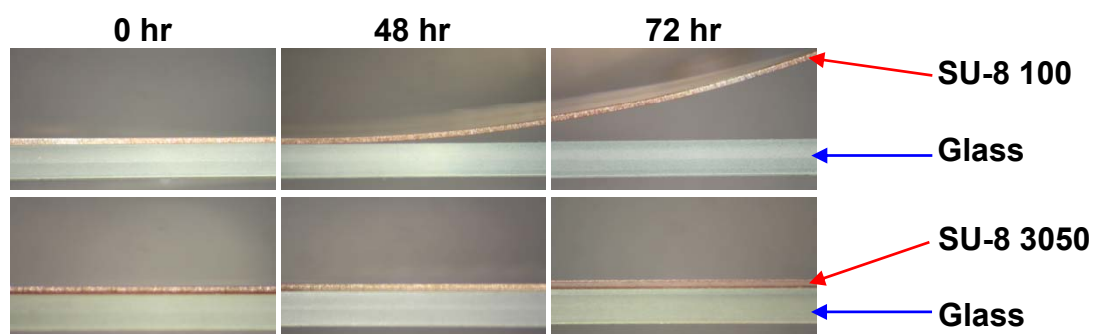


Figure S2. Adhesion test of the MEMS microstructures in cell culture medium. The UV-sterilized microwell array chips fabricated with SU-8 3050 or SU-8 100 photoresist films were immersed in culture medium for 2-3 days at 37°C. The microscope photographs showed that SU-8 100 film peeled off from the glass wafer after 48h incubation. SU-8 3050 film remained intact after 72h incubation.

Figure S3

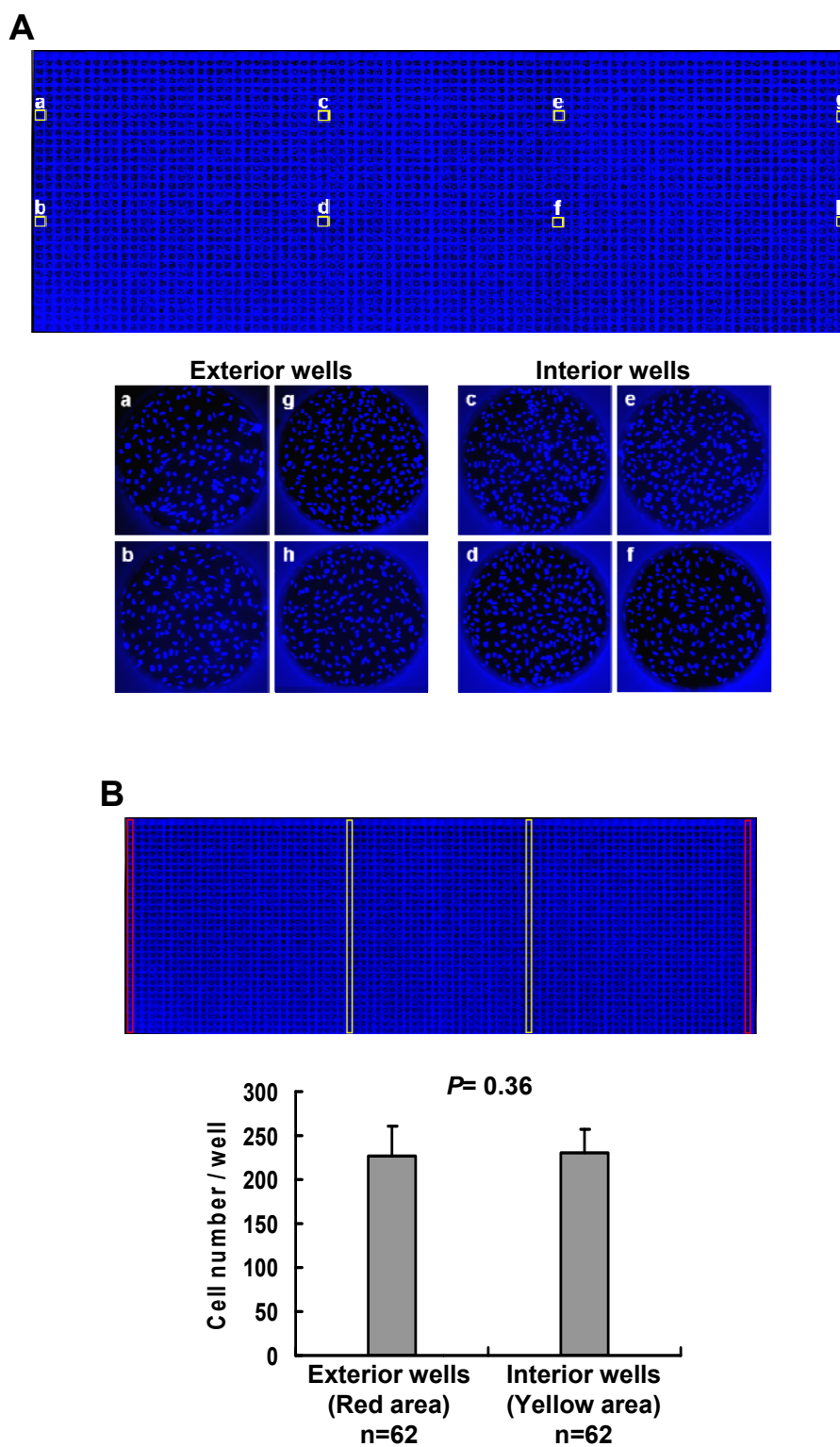


Figure S3. Consistencies of cell densities across the microwell array. (A) HeLa 229 cells cultured for 48 h in 2,666-microwells were labeled with Hoechst. (B) 62 wells selected from each exterior (in red box) and interior (in yellow box) region were analyzed for cell densities. No significant difference found in the two regions.

Figure S4

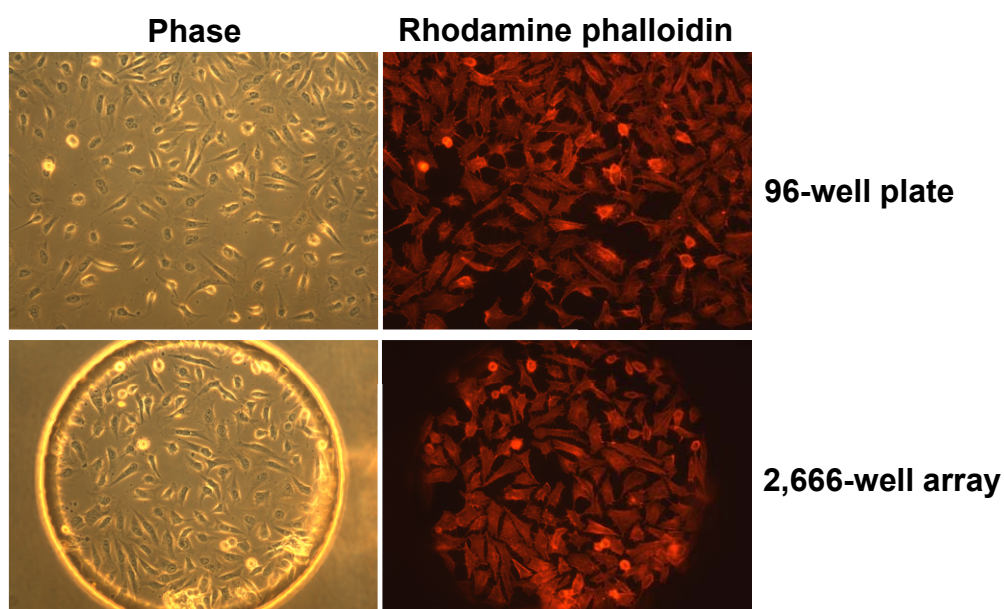


Figure S4. Cell morphology in a microwell array compared to a conventional 96-well microplate. HeLa 229 cells cultured for 24 h were immunolabeled by rhodamine phalloidin to determine the cell morphology. The phase-contrast and fluorescence images showed no visible difference between the two systems.

Figure S5

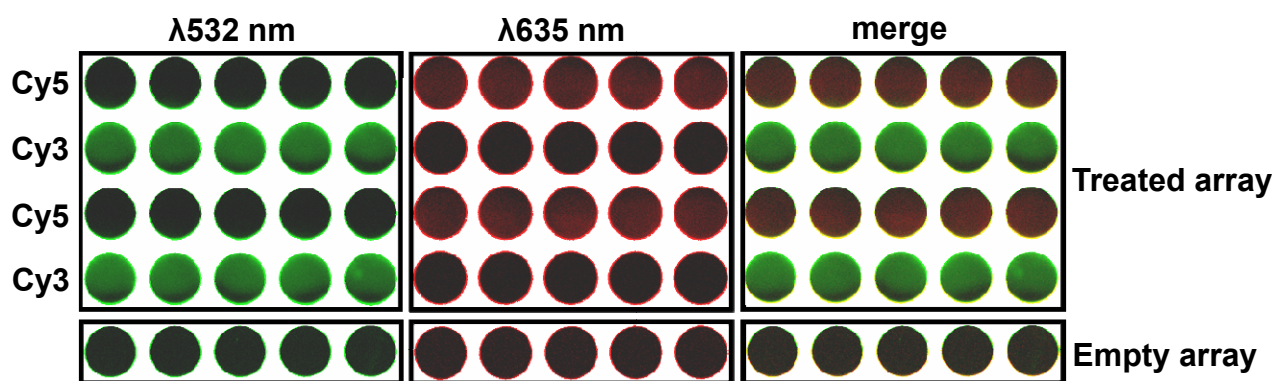


Figure S5. Segregation of fluids in microwells. Sequential rows of microcolumns coated with alternating soluble fluorescent dyes of Cy3 and Cy5 were inserted into microwells filled with cell culture medium for 1 h. Fluorescent images were photographed by an Axon Scanner.

Table S1 Screen of EGFR phosphorylation inhibition for 79 compounds

Compound	Average of Intensity Ratio	Standard deviation	P value	Compound	Average of Intensity Ratio	Standard deviation	P value
Mock	0.85287	0.02288		Acetylsalicylic acid	0.83921	0.02249	0.3041
DL-alpha-Methyl-p-tyrosine	0.86563	0.02653	0.3293	Acetazolamide	0.83987	0.03900	0.3659
6-Methoxy-1,2,3,4-tetrahydro-9H-pyrido[3,4b] indole	0.84231	0.01616	0.3262	Amperozide hydrochloride	0.88226	0.02502	0.1729
Acetamide	0.81549	0.00999	0.112	(±)-Nipecotinic acid	0.87042	0.01395	0.2345
Amantadine hydrochloride	0.88046	0.02300	0.176	Atropine sulfate	0.89215	0.00249	0.1227
GABA	0.87071	0.05528	0.3656	Gefitinib	0.37042	0.01394	0.0019 *
Gabaculine hydrochloride	0.81846	0.00538	0.1332	3-aminobenzamide	0.88835	0.01864	0.1181
O-(Carboxymethyl) hydroxylamine	0.86848	0.09091	0.4247	N-Acetyl-5-hydroxytryptamine	0.87058	0.02407	0.2648
(±)-2-Amino-7-phosphonoheptanoic acid	0.82123	0.00847	0.1376	5-(N-Ethyl-N-isopropyl)amiloride	0.89420	0.00677	0.108
AG1478	0.35411	0.01840	0.0011 *	AL-8810	0.87263	0.00212	0.2177
N-Acetylprocainamide hydrochloride	0.86112	0.02126	0.3724	Amprilose hydrochloride	0.86459	0.01190	0.3022
Actinonin	0.88417	0.05840	0.2926	5-(N-Methyl-N-isobutyl)amiloride	0.87349	0.03045	0.2645
N-Phenylanthranilic acid	0.84176	0.00798	0.308	Arecoline hydrobromide	0.90413	0.00013	0.0973
S-(4-Nitrobenzyl)-6-thioguanosine	0.83720	0.00569	0.2527	Aminoguanidine hemisulfate	0.85898	0.03773	0.4331
N-(4-Aminobutyl)-5-chloro-2-naphthalenesulfonamide hydrochloride	0.82579	0.02662	0.1957	Azelaic acid	0.90313	0.00631	0.089
Aminophylline ethylenediamine	0.84998	0.03189	0.4637	Atropine methyl nitrate	0.86821	0.00277	0.2578
3'-Azido-3'-deoxythymidine	0.86590	0.01239	0.2851	(±)-Norepinephrine (+)bitartrate	0.87013	0.01947	0.2518
AC 915 oxalate	0.87820	0.00434	0.1774	Aurintricarboxylic acid	0.86971	0.02621	0.2827
5-(N,N-Dimethyl)amiloride hydrochloride	0.83502	0.02238	0.2564	3-Aminopropionitrile fumarate	0.82673	0.00878	0.1654
(±)-2-Amino-5-phosphonopentanoic acid	0.81908	0.03462	0.1919	1-Aminobenzotriazole	0.87201	0.02348	0.248
Sodium Taurocholate	0.83381	0.02923	0.2735	Alsterpaullone	0.87290	0.01162	0.2084
Methotrexate	0.82598	0.03445	0.2336	Acetylthiocholine chloride	0.86278	0.05359	0.4206
S(-)-p-Bromotetramisole oxalate	0.84578	0.00312	0.3685	A-315456	0.86322	0.01744	0.3322
TMB-8 hydrochloride	0.83983	0.00521	0.2829	Agmatine sulfate	0.88094	0.02356	0.1752
L-azetidine-2-carboxylic acid	0.82898	0.04147	0.2836	Tryptamine hydrochloride	0.84347	0.04137	0.4057
S-(p-Azidophenacyl)glutathione	0.81032	0.00810	0.1012	Arcaïne sulfate	0.89371	0.00789	0.1064
Acetyl-beta-methylcholine chloride	0.85989	0.00163	0.3696	4-Amino-1,8-naphthalimide	0.84614	0.04711	0.439
AA-861	0.80810	0.01103	0.0884	(±)-2-Amino-4-phosphonobutyric acid	0.84151	0.02923	0.3548
Azathioprine	0.79626	0.00296	0.0861	Apigenin	0.84841	0.02342	0.4326
L-732,138	0.84267	0.02463	0.3549	3-Amino-1-propanesulfonic acid sodium	0.85219	0.00162	0.4867
Amfostine	0.86054	0.03733	0.4157	(±)-2-Amino-3-phosphonopropionic acid	0.85763	0.02320	0.4277
Atropine methyl bromide	0.86220	0.04133	0.4062	4 Androsten 4 ol 3,17 dione	0.89250	0.00333	0.1204
5-Aminovaleric acid hydrochloride	0.86554	0.04853	0.3905	GR 4661	0.88917	0.01430	0.1106
4-Aminopyridine	0.84603	0.01296	0.3782	4-Aminobenzamidine dihydrochloride	0.87456	0.01616	0.1992
p-Aminoclonidine hydrochloride	0.86037	0.00667	0.3623	5-Fluorindole-2-carboxylic acid	0.86002	0.01655	0.3787
PP2	0.45420	0.02184	0.0016 *	1-Aminocyclopropanecarboxylic acid hydrochloride	0.87275	0.00092	0.2173
Aminopterin	0.82854	0.00734	0.1789	Reserpine	0.86676	0.02318	0.3038
5-azacytidine	0.83369	0.04360	0.326	N-arachidonylglycine	0.84346	0.04072	0.4043
9-Amino-1,2,3,4-tetrahydroacridine hydrochloride	0.85410	0.00628	0.4761	Apomorphine hydrochloride hemihydrate	0.86400	0.00537	0.3075
Acyclovir	0.85592	0.02426	0.4545	L-Arginine	0.85087	0.02460	0.4704

* P value < 0.05