

Universitätsklinikum

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* Gelest Inc.

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Aim



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Micromolding of micropatterned PDMS surfaces to define the

adhesive behavior of human cells in vitro

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Formation of network with increased Young's modulus



vinyl functionalized linear di-methyl-siloxane [5] silicon-hydride functionalized linear di-methyl-siloxane [5]

* Sylgard 184 consists of a liquid silicone rubber base and a curing agent

addition reaction of a silicon hydride group and a vinyl group [5]

Fabrication of PDMS-thin films





Experimental Results

Results of plain PDMS-thin films								Cell cı	Results of micro-patterned PDMS-thin film							
PDMS type	Plasma treatment	Surface energy SE (mN/m)	Dispersive component (mN/m)	Polar component (mN/m)	Water contact angle WCA (°)	a) 114°		 C57BL/6 mouse- derived B16F10 melanoma cell line bearing the haplotype 			Pattern	Surface energy S (mN/m	e D SE co 1))ispersive omponent (mN/m)	Polar component (mN/m)	Water contact angle WCA (°)
S-PDMS	none	10.2±0.7	8.9±0.7	1.3±0.2	114.6±0.5						p pillars	15.0±1.	.2	14.2±1.2	0.9±0.3	112.3±1.8
H-S-PDMS	none	14.9±0.9	11.9±0.8	3.1±0.4	101.4±1.2			H2b sup	b) b	ottom pillars	5.6±0.3	3	5.6±0.3	0.0±0.0	138.1±2.6	
S- and H-S-	N_2/H_2	~ 70.0	~ 20.0	~50.0	~0.0			with10%	fetal bovine	c) h	oles	12.1±0.	.3	11.2±0.3	0.9±0.1	112.7±0.6
 Differe H-S-PI Higher PDMS Hig bon 	nces in S DMS value of : h formati ding beh	SE and W SE for H on of net avior and	/CA betwe I-S-PDMS working cl d chemica	een untrea compared reates a hi l interactio	ted S- and d to S- igher on with	S-PDMS (a) before and (b) after plasma treatment		penicillin Cell cult and 5.59 standard culture p	h/streptomycin uring: at 37° C % CO ₂ in d tissue blates		Higher Wo plain films Particular surface w No observ the botton	CA of bot s, but diffe ly, a stror ith higher /ation of p n side	th sides erent S ng hydi r pillars polar c	s of PDI E rophobio compone	MS films con city with lowe ents for all su	npared to er SE at the urfaces on
wat Drastic plasma	er on H-S al increa	S-PDMS ise of SE ent	surface. and decre	ease of W	CA after				100		Single	e cells c	day 1	••••	Significances t-Test	
 Incr → Higl wet 	ease of f ner polar table	unctiona compon	l groups ent makes	s the surfa	ce more	A			08 % 00 % 00 %	:	•				AB 0,616 BC 0,001 CD 0,262 DE 0,009 AC 0,021	A
Cellular clusters day 1								9 40 9 00 10 20	•	•				BD 0,001 CE 0,000 AD 0.028		
100			••		Significance t-Test	s B	CHE IC		0	•		••••	•		BE 0,000 AE 0,001	B
دا 80 %	•••		• •		AB 0,002 BC 0,001	500				A	B	C	D	E		8 g C
09 10 09 09	•		•		DE 0,374 AC 0,352 BD 0,378 CE 0.001	C		O	30 <u></u> 25	Cells in Clusters	Average Cells in dependi Water Conta	in Clusters ing on act Angle	s uay	y S s	Significances Kruskal Wallis AB 0,251	C









A S-PDMS_plain C H-S-PDMS_plain E Culture plate B S-PDMS + Plasma D H-S-PDMS + Plasma



Summary

- Plain and micro structured PDMS films were successfully prepared
- H-S-PDMS films (material with higher networking) are advantageous for improving wettability
- Treatment of PDMS films with forming gas plasma decreases WCA values and formation of cellular clusters
- Micro patterning of the surfaces with dedicated geometry leads to an increase of WCA and a modification of cell-substrate adhesion behavior

BC

CD

0,754

0,047

- There is no proportional relationship between WCA and cell cluster formation, although PDMS substrates with high WCA values tend to support cluster formation
- The micro pattern exerts impact on cell adhesion independent of the WCA values

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