Supporting Information

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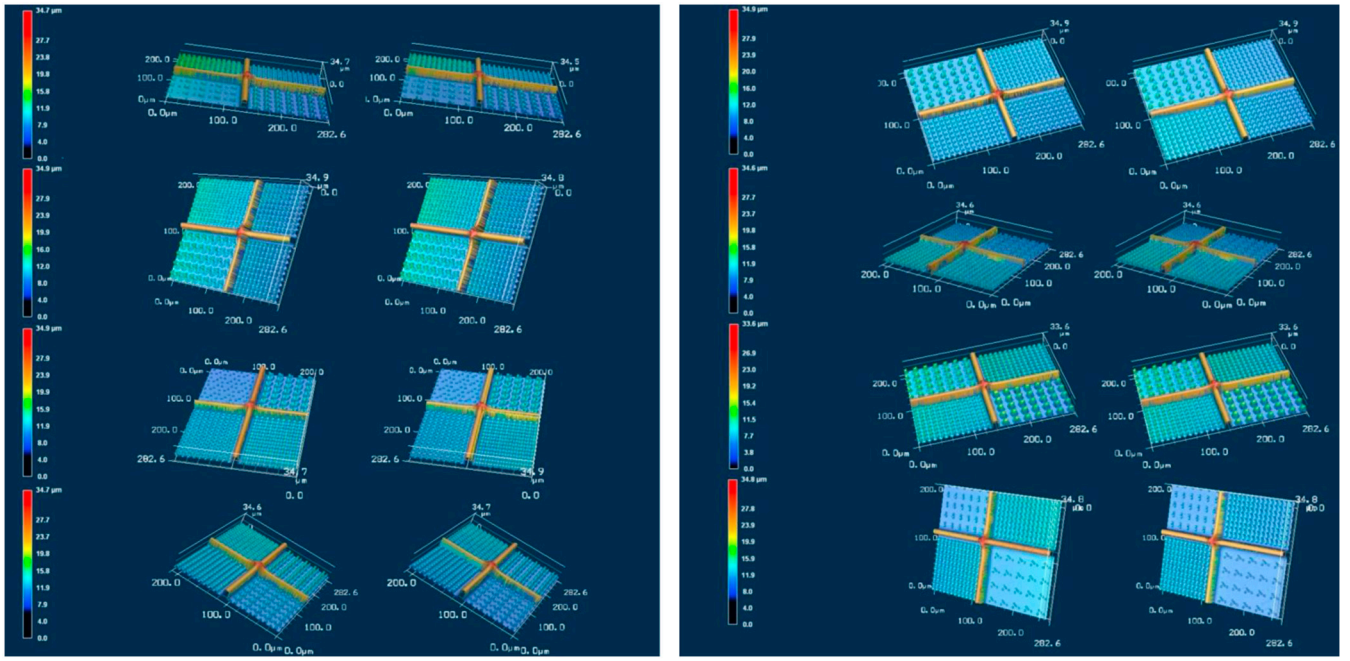

Fig. S1. Height profiles of TopoUnits measured using confocal laser scanning microscopy. Each image has four representative areas of TopoUnits. In total 32 individual TopoUnits were analyzed for replication efficiency.

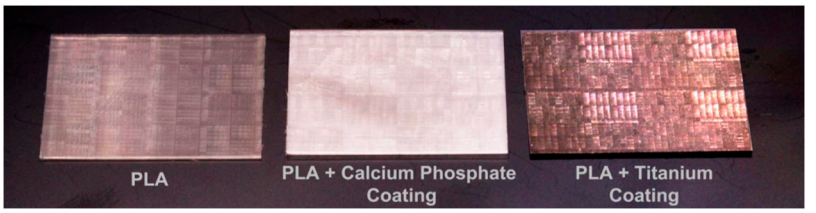

Fig. S2. Conventional PLA TopoChip (left) as well as TopoChips coated with calcium phosphate (middle) and titanium (right).

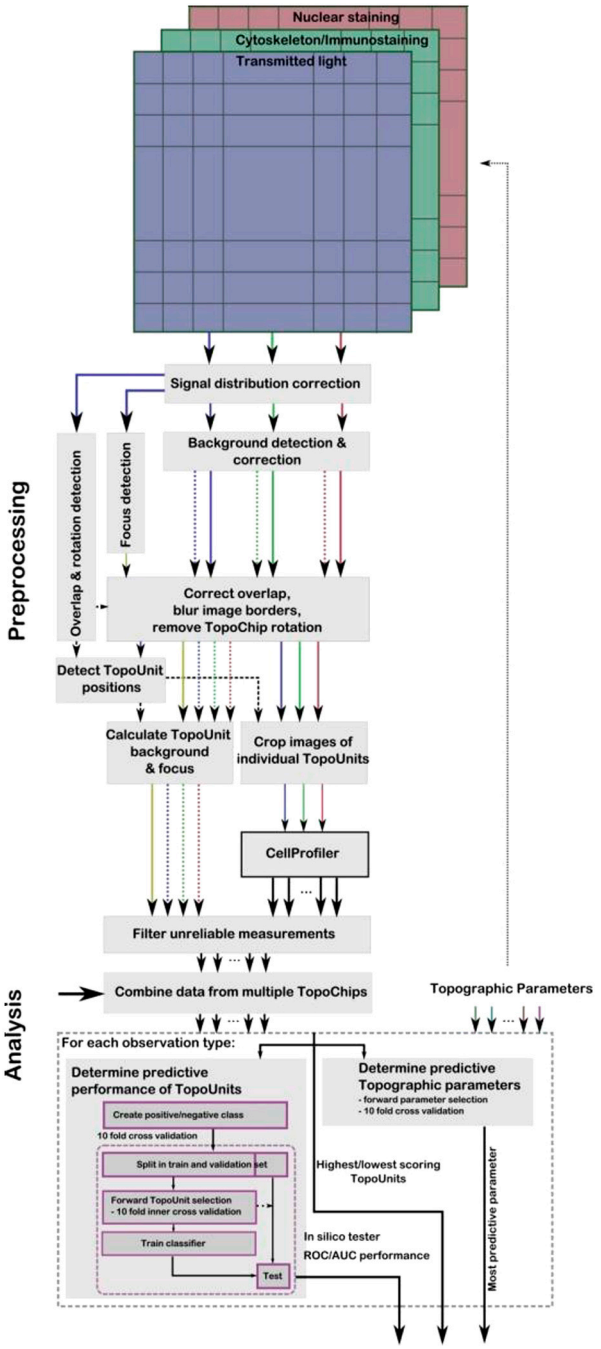

Fig. S3. Schematic representation of image preprocessing, analysis and data analysis.

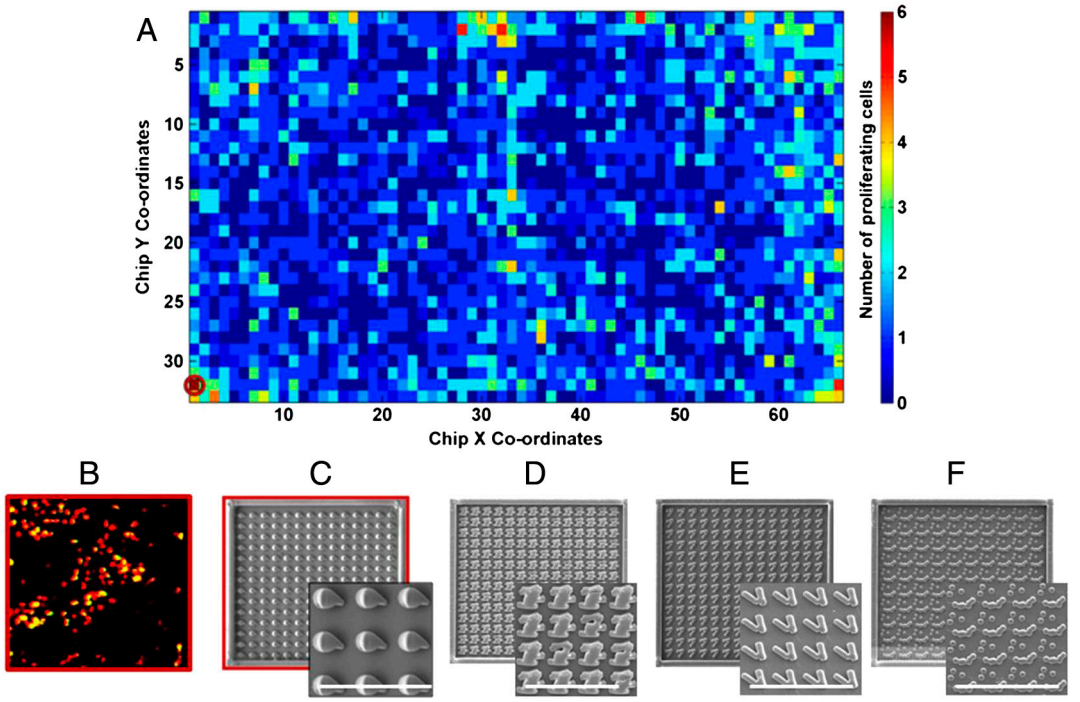

Fig. S4. Cell proliferation assay. (*A*) Heat map of mean proliferating cell count of cells grown on different topographies. The TopoUnit showing the maximum number of proliferating cells is marked with a red circle. (*B*) Fluorescently stained pseudocolored merged image of hMSCs on the highest scoring TopoUnit. In this image the Alexa Fluor 488 EdU (representing proliferating cells) is pseudocolored yellow whereas TOTO-3 (nucleic acid stain representing all the nuclei) is pseudocolored red. (*C–F*) SEM images of the TopoUnits showing the highest score for proliferating cells. The insets show higher magnification views of features. (Scale bar: 50 μm.)

Table S1. Overview of parameter values and ranges used to construct features

Parameter	Value or range
Feature side length	10 μm, 20 μm, or 28 μm
No. of primitives used (10 μm)	3–5
No. of primitives used (20 μm)	3–12
No. of primitives used (28 μm)	3–16
Diameter of a circle primitive (10 μm)	3.0 μm–4.0 μm
Diameter of a circle primitive (20 μm)	3.0 μm–10.0 μm
Diameter of a circle primitive (28 μm)	3.0 μm–10.0 μm
Shortest side length of a triangle primitive (10 μm)	3.0 μm–4.0 μm
Shortest side length of a triangle primitive (20 μm)	3.0 μm–8.0 μm
Shortest side length of a triangle primitive (28 μm)	3.0 μm–10.0 μm
Top angle of a triangle primitive	36°
Length of a line primitive (10 μm)	3.0 μm–8.0 μm
Length of a line primitive (20 μm)	3.0 μm–16.0 μm
Length of a line primitive (28 μm)	3.0 μm–23.0 μm
Thickness of a line primitive	3 μm
Standard deviation for the rotation of a primitive	0.0°–180.0°

Table S2. Overview of additional parameter values used for detecting parameters leading to enhanced proliferation

Variable	Description
DC	The density of circle primitives
DT	The density of triangle primitives
DL	The density of line primitives
CA	The area of circle primitives scaled with their density
TA	The area of triangle primitives scaled with their density
LA	The area of line primitives scaled with their density
ROT	The scaled standard deviation of the rotation of primitives
CCD	Number of color changes of the feature over the diagonal
WN0.1	The fraction of energy in the signal with wavenumber approximately 0.1
WN0.2	The fraction of energy in the signal with wavenumber approximately 0.2
WN0.3	The fraction of energy in the signal with wavenumber approximately 0.3
WN0.4	The fraction of energy in the signal with wavenumber approximately 0.4
WN0.5	The fraction of energy in the signal with wavenumber approximately 0.5
WN0:7	The fraction of energy in the signal with wavenumber approximately 0.7
WN1	The fraction of energy in the signal with wavenumber approximately 1
WN1.5	The fraction of energy in the signal with wavenumber approximately 1.5
WN2	The fraction of energy in the signal with wavenumber approximately 2
WN3	The fraction of energy in the signal with wavenumber approximately 3
WN4	The fraction of energy in the signal with wavenumber approximately 4