Advanced Laser Surface Structuring

Revolutionizing large surface's behavior through small features

Architectures for neuromorphic design using laser structuring: from microcircuits to complete system

System metrics:

Laser q-sw.:	10ns / 10 Hz / 1.25J
Wavelengths:	IR – VIS – UV 1064/532/355/266 nm

Advanced Surface Structuring capabilities:

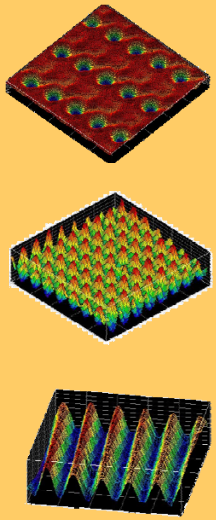
Spacing:	0.5 – 50µm
Density:	200 – 20,000/cm
Feature size:	1 – 500nm
Structured area:	up to 0.27cm²/shot
Velocity:	10,000 lines at a time 79 million dots at a time up to 162 cm²/min.

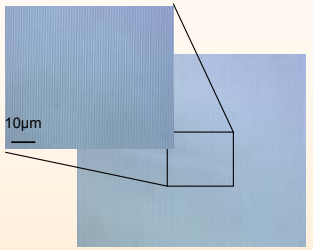
This advanced laser structuring technique is based on the interference of multiple coherent high power laser beams. This allows the fabrication of templates or device features with high control and flexibility in a single step method. The features are 2 dimensional periodic structures with extremely high long range order.

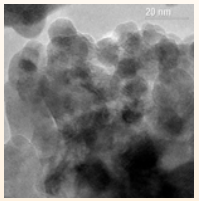
Neuromorphic electronics that have high density synaptic components require extreme microfabrication control that far exceeds conventional approaches. The ability to periodically structure a surface or impart specific features will provide an enabling technology needed to achieve neuromorphic electronics.

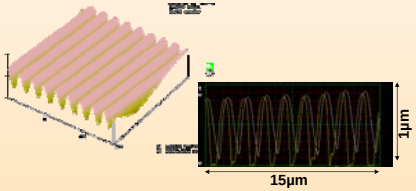
This technology has been proven to be effective for contact guidance. It can control adhesion and directional growth of biological cells.

Pattern variation





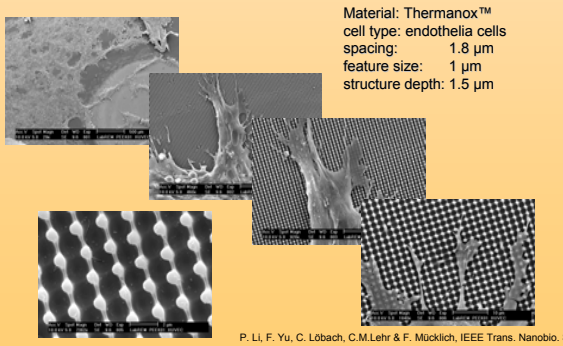




Materials:

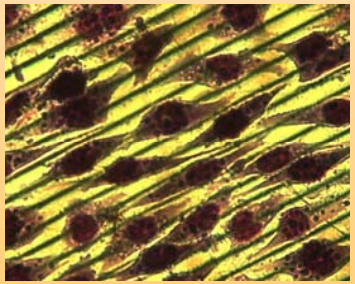
- Metals
- Ceramics
- Intermetallics
- Polymers

Contact guidance
Cell adhesion and directional cell growth



Material: Thermanox™
cell type: endothelia cells
spacing: 1.8 µm
feature size: 1 µm
structure depth: 1.5 µm

P. Li, F. Yu, C. Löbach, C.M.Lehr & F. Mücklich, IEEE Trans. Nanobio. Sci. 2003



Material: Thermanox™ 5µm;
Cell type: fibroblasts

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