

Microstructured surfaces and gradients for cellular applications

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Molecular patterns and gradients play a major role in cell guidance, differentiation and development. They organize molecular clusters and trigger receptors. To establish a easy-to-use system to generate patterns and/or gradients of biomolecules would be helpful for to investigate such effects.

Using “softlithography”, also referenced as “microcontact printing (μ CP)”, enables the printing of molecules onto a surface in a stamping process. The printed structures range from mm down to the μ m and even nm range. This allows patterns of biomolecules even in a sub-cellular manner. Microfluidics enables by diffusion processes the application of gradients onto cells. Several examples for cellular or biochemical applications are shown in the talk. But, both techniques need a certain high-tech equipment and at least the use of a clean room facility, which may not be available for every biologist.

We like to combine now microfluidics and μ CP to generate a “preformed” patterned gradient onto a surface compatible to classic cell culture and immuno assays environments. The gradient is preformed with molecules providing a binding pattern against e.g. Hexa-his-tag or myc-tag. For a biological experiment the biologist simply has to add the molecules of choice tagged with Hexa-his or myc. After a simple blocking step a cell experiment could be performed. This separates the (pre-)fabrication of gradients and patterns in a clean room facility and the biological experiment. Making such gradients finally to a easy-to-use technique.