P-C-591

NANOSTRUCTURED POLYMER SURFACES TO OPTIMIZE CELL BEHAVIOUR

C. Holzer[1]*, S. Laske[1], M. Katschnig[1], W. Balika[2]

[1]Department Polymer Engineering and Science; Chair of Polymer Processing, Montanuniversitaet Leoben, Otto Gloeckel Strasse 2, 8700 Leoben, Austria and [2]Sony DADC Austria AG, Sonystraße 20, A-5081 Anif, Austria

**Corresponding author: clemens.holzer@unileoben.ac.at*

Recently, there has been growing interest in producing material surfaces that have dimensions at the micro- or nano-scale to achieve new functionalities like the lotus effect etc. On that score a very interesting characteristic of nano-structured surfaces is the ability to manipulate and control specific cell functions like proliferation, migration and differentiation. Thus the polymeric nano-surface imitates the extracellular matrix, whose topography interacts in vivo with the cells and regulates their activity and morphology. The possibility to optimize the tools for tissue engineering and regenerative cell cultivation, which should be the outcome of this interdisciplinary project, will be highly interesting for both the biomedical and polymer processing research and industry.
At the beginning the target was to examine surface- and material impacts of an unstructured polymer on cell behavior, before the influence of nano-structures is determined. Basic requirement for cells to interact with a surface is sufficient adhesion. Hydrophilic surfaces are known to increase adhesion, so in the first place the polymer surfaces were corona-treated to enhance hydrophilicity. For defining the corona impact and for comparing hydrophilic surface qualities with commercial cell plates contact angle measurements were conducted. The results of these measurements are presented in this work. It can be said that due to the corona treatment all contact angles decrease with or without UV sterilization, which is equivalent to an increase of hydrophilicity. Furthermore the compared commercial products can be outreached concerning hydrophilicity by choosing appropriate corona outputs.
Future goal will be to analyse proliferation, migration, motility and differentiation on various nano-structures with the help of a life imaging method. One important target thereby is to adapt the nano-surfaces for the different stages of cell life.
From the polymer processing perspective a replication of diverse pads with nano-surfaces will be carried out by injection molding. The long-term objective thereby is to shift to a variotherm injection molding process with a specific designed mould to produce a larger number of test pieces cost-effectively. Specific challenges are the precise molding of nano-scaled surfaces with very small patterns, high aspect ratios and short periodicities and an economically reasonable production process (cycle time etc.).
In the end an appropriate design of nano-surfaces should optimally interact with cells to accelerate the cell proliferation, minimalize the differentiation error rates and support the cell functions in any life stage.