

## Scientific Report stage 3/5.12.2012

**General Objectives:** Having a platform to stimulate cell growth and guidance for tissue regeneration is essential in various biomedical applications and in tissue engineering, and involves the need to obtain two and three-dimensional structures, specifically localized micro-and nano-textured surfaces of hybrid or composite materials. This project is mainly aimed at obtaining hybrid micro and nano complex structured polymer supports used as platforms for oriented cell growth by using laser based methods (matrix assisted laser evaporation-MAPLE, Laser Induced Forward Transfer - and laser direct irradiation / material processing).

A complementary direction followed in this project is to evaluate the effect of texturing and layout of two and three-dimensional "architecture" type on cells adhesion, growth, inhibition and on other cellular interactions in vitro.

### Phase objectives:

Obtaining controlled microstructures (grooves / channels, craters) by irradiation with lasers or specific localized patterns by LIFT (WP3 July 2012-September 2014) in progress

Testing in vitro (WP5 February 2012-September 2014) in progress

Dissemination and reporting phase project (WP6).

### Summary:

In this phase of the research, controlled microstructures (grooves / channels, craters) were obtained and testes in vitro with mamalian cell lines.

### Results:

This research phase reached its objectives entirely, so the following results were obtained:

1. Tests were carried out for surface architecture and properties by direct irradiation with a laser beam.
2. The thin films/coatings and structures were characterized morphologically and structurally (atomic force microscopy - AFM, scanning electron microscopy, SEM, Fourier transform infrared spectroscopy - FTIR).
3. We obtained polymer structures controlled by LIFT in both the liquid phase and solid. Optimization studies are in progress
4. Biological tests were performed in vitro
5. Dissemination activities: six posters at conferences national and international 4 articles in ISI (Romanian Reports in Physics, Applied Surface Science, Biomedical Microdevices).
6. It was obtained the prize for best international poster (granted to Rusen Laurentiu) at conference EMRs, 2013 in Strasbourg, France, for : Stimuli responsive functional polymeric thin films obtained by matrix assisted pulsed laser evaporation (MAPLE) for cell detachment studies
7. Contacts and collaborations have been established nationally by the Institute of Biochemistry, resulting in a poster presentation at the International Conference BioIron Society Program, 2 articles and submission of project partnerships 2013.

8. International collaborations with Paul Scherrer Institutewere established, resulting in the publication of an article in the journal Applied Surface Science ISI,
9. Some of the results obtained in 2011-2013 were included in the PhD thesis of Laurentiu Rusen, (Department Optics, Department of Fisica, University of Bucharest), scheduled for defence in 2014.