

## Deposition of functional PLA-b-PEO block copolymers on polylactide surfaces: development of biomimetic surface pattern

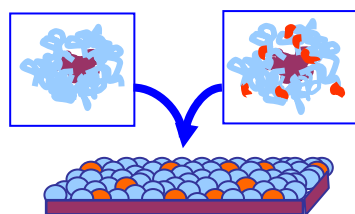
*Eliska Třesohlavá<sup>a</sup>, L. Machová<sup>a</sup>, V. Proks<sup>a</sup>, P. Knotek<sup>b</sup>, Y. Yang<sup>c</sup>, F. Rypáček<sup>a</sup>*

<sup>a</sup>*Department of Bioanalogous and Special Polymers, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nám. 2, CZ-162 06 Praha 6, Czech Republic;* <sup>b</sup>*JLSSC of IMC ASCR and UP, University of Pardubice, Studentská 84, CZ-532 10 Pardubice, Czech Republic;* <sup>c</sup>*ISTM, Keele University, Thronburrow Drive, Hartshill, Stoke-on-Trent, ST4 7QB, UK*

[tresohlava@imc.cas.cz](mailto:tresohlava@imc.cas.cz)

Biodegradable polyesters, such as polylactide (PLA), are important materials in tissue engineering. A specific distribution (pattern) of cell-adhesion structures, e.g. fibronectin-derived peptide sequences (RGDS), over the biomaterial surface is highly desirable in developing materials with controlled cell-biomaterial interactions. Amphiphilic block copolymers composed of polylactide (PLA) and poly(ethylene oxide) (PEO) blocks, containing cell-adhesion fibronectin-derived peptide sequences (RGDS) at the end of PEO block are used in preparation of functional biomimetic surfaces of PLA-based biomaterials, that would facilitate cell migration, growth and differentiation.

Amphiphilic block copolymers in selective solvents form molecular assemblies, surface deposition of which results in nanoscale-organized surfaces.



**Figure 1:** Formation of specific surface pattern: adsorption of functionalized amphiphilic block copolymers from selective solvent.

The surface topography of the peptide functional groups resulting from the

controlled copolymer deposition and the accessibility of peptides on the surface for interaction with proteins, such as cell-adhesion receptors, was studied with copolymers carrying biotin as the adhesion peptide label. The 2D model surfaces were prepared by spin-casting from solutions containing different neutral and functionalized copolymers on PLLA film on a glass support, PLLA film mimicked the surface of real biomaterial. Using biotin as a reporting group, the localization of biotin-labelled copolymer molecules on the surface was accomplished through specific biotin-avidin interaction. Either avidin or avidin-labelled nanoparticles were then visualised by AFM. Both tapping and acoustic mode AFM techniques (AFAM) proved to be convenient methods for characterization of surface topography of functional biomaterials.

The effect of spatial surface pattern of biomimetic peptide structures on cell adhesion was demonstrated in cell culture studies.

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