## TEMPERATURE-RESPONSIVE GRAFTED POLYMER BRUSHES FOR BIOMEDICAL APPLICATION

Shymborska Y.[1], Lishchynskyi O.[1], Kostenko M.[1], Raczkowska J.[2],
Awsiuk K.[2], Budkowski A.[2], Stetsyshyn Y.[1]
[1]Lviv Polytechnic National University, Lviv, Ukraine
[2]Smoluchowski Institute of Physics, Jagiellonian University, Kraków, Poland
misima97@gmail.com

Butyl methacrylate and butyl acrylate are two extremely widespread synthetic monomers that have found applications for the fabrication of copolymers for adhesives and coatings. In recent years, there have been noted numerous examples in the applications of PBA (poly(butyl acrylate)) and PBMA (poly(butyl methacrylate)) surfaces and coatings for biomedical applications. For example, soft PBA networks were introduced as polymer networks with adaptable mechanical properties and proposed as soft substrates for the passive mechanical stimulation of some types of cells, which could potentially be used in vivo as implant coatings. PBMA films decorated by end primary amine groups have been successfully used for cell adhesion and the proliferation of renal epithelial cells.

The PBMA and PBA grafted brush coatings attached to glass were prepared using atom transfer radical polymerization (ATRP) "from the surface" in a three-step process, and thus for a glass surface previously functionalized by (3-aminopropyl)triethoxysilane and then ATRP molecules. To gain information about the composition, morphological transformation at different temperatures, and thicknesses of the PBMA and PBA grafted brush coatings, multitechnique characterizations (Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS), Atomic Force Microscopes, wetting contact angle, and ellipsometry) were performed.

Fluorescently labeled bovine serum albumin (BSA) was used to study the protein adsorption onto PBMA as well as PBA grafted brush coatings. For PBMA coatings, protein adsorption depicts a strong temperature dependence and increases almost twofold, for a temperature rise from 10 °C (below transition) to 35 °C (above transition). In contrast, for the PBA coating, protein adsorption almost displays no temperature dependence. Since fluorescence microscopy has revealed the strongest temperature dependence for BSA adsorption to be onto the PBMA coatings, further studies with ToF-SIMS and principal component analysis for these types of brushes were performed.