Biocompatible and biodegradable drug delivery system for encapsulation of antituberculotic agents

G. Gyulai¹, K. Pribransky¹, K. Horváti², B. Bacsa², Sz. Bősze², É. Kiss¹*

¹ Laboratory of Interfaces and Nanostructures, Eötvös Loránd University, Hungary
² Research Group of Peptide Chemistry, Eötvös Loránd University, Hungarian Academy of Sciences, Hungary
*e-mail: kisseva@chem.elte.hu

Tuberculosis is a disease with a global significance leading to almost 2 million deaths annually. Traditional treatment of the disease needs prolonged chemotherapy with possible serious side effects. Various colloidal drug delivery systems have been used extensively in the last decades to increase therapeutic benefit of drug while reducing the duration of treatment.

The biodegradable polymers as the polyesters including polylactide-co-glycolide (PLGA) have of special interest because of their ability to be resorbed by the body. Surface hydrophobicity of the PLGA however triggers the adsorption of plasma proteins leading to their eventual fast clearance from the blood stream.

PLGA was blended with poly(ethylene oxide)-poly(propylene oxide)-poly(ethylene oxide) block-copolymers (Pluronics) to increase their hydrophilicity and biocompatibility. Surface composition and protein adsorption were investigated by X-ray photoelectron spectroscopy and in situ spectroscopic ellipsometry, respectively in a form of solid supported films with various thicknesses. Mechanism of hydrophilization was evaluated from the layer thickness dependence of surface biocompatibility.

PLGA-Pluronic blend particles with a mean diameter of 200 nm were prepared by the nanoprecipitation method. Peptide conjugate of antituberculotic drug (isoniazid) was successfully encapsulated into PLGA nanoparticles. Significant and controllable drug content (10-40% w/w) and high encapsulation efficiency (90%) were achieved by the optimized preparation technique.

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