

Biocatalytic response of multi-layer assembled nano-engineered capsules

Fernanda Sousa¹, Gleb Sukhorukov², Oliver Kreft³, Helmut Möhwald³, Vanja Kokol^{1*}

^{1*}Department of Textile Materials and Design, University of Maribor, Slovenia, vanja.kokol@uni-mb.si;

²Department of Materials, Queen Mary University United Kingdom; ³Max Planck Institute of Colloids and Interfaces, Potsdam, Germany

The building of polyelectrolyte multilayered nano-sized capsules using layer-by-layer (LbL) self-assembly deposition method was used as reported [Sukhorukov, 2005. *Prog. Polym. Sci.*]. The shell of the capsules were constructed with type-I collagen (COL) and hyaluronic acid (HA) (Fig. 1). The LbL deposition was done by consecutive adsorption of oppositively charged polyelectrolytes onto the surface of colloidal particles, i.e. calcium carbonate microparticles. After the assembling, the core was removed and the release rates were determined using albumin-FITC as a model protein (Fig. 2). The albumin-FITC was loaded into the core and its release from the capsules was assessed using collagenase. The release kinetics was controlled by modulating the number of the layers and with cross-linked collagen. Both COL and HA are components of extracellular matrix being biocompatible and biodegradable. Due to these features inclusion of medical or therapeutic agents into COL/HA assembled capsules make them suitable as drug delivery systems as well as tuneable biomaterial interfaces [Zhan, 2005, *Biomaterials*]. / This research has been supported by a Marie Curie Transfer of Knowledge Fellowships of the EC 6FP under the contract no. MTKD-CT-2005-029540, POLYSURF - Development of smart polymer surfaces.

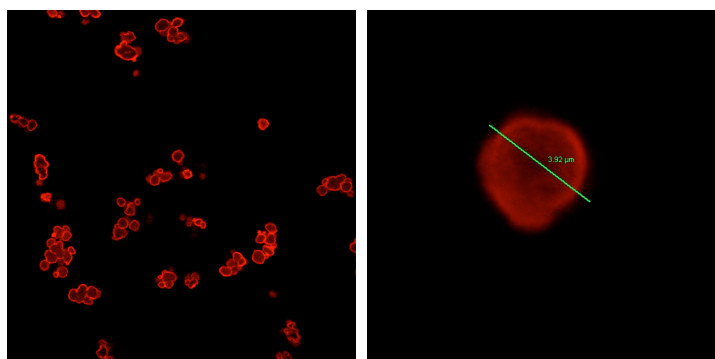


Fig 1. Fluorescent confocal microscopy image of polyelectrolyte capsules with 6-double layers of COLL/HA filled with BSA-rohdamine, after core dissolution

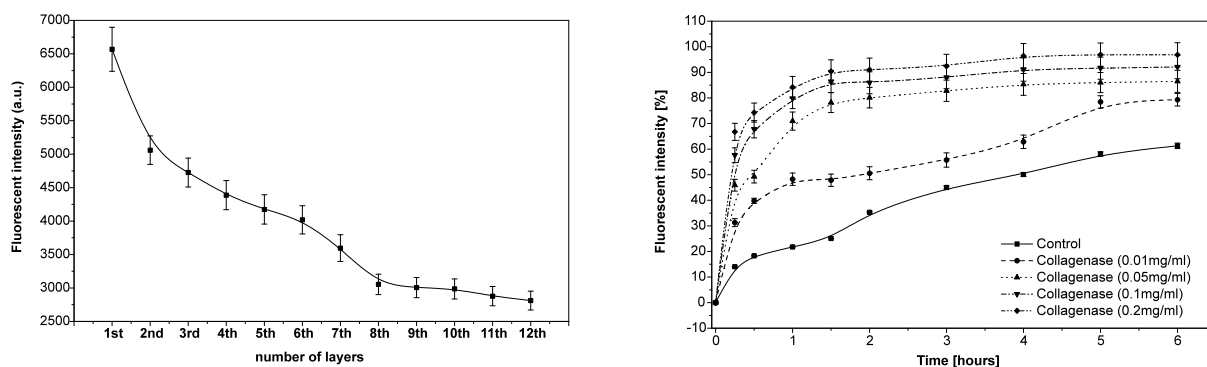


Fig.2: Release of FITC-albumin during LbL assembling (left) and from COLL/HA microcapsules with 6-double layers by action of collagenase (right) after 6 h of incubation at 37°C.