Synthesis and characterization of double-stimuli-responsive terpolymers based on poly(ethylene oxide), poly(histidine) and poly(cysteine)

Iro Kyroglou, Hermis Iatrou

Laboratory of Industrial Chemistry, Department of Chemistry, National and Kapodistrian University of Athens, Zografou GR-15771, Greece
e-mail: irokrg@gmail.com

In this poster the synthesis of a series of hybrid double-stimuli-responsive polypeptide terpolymers of the type $mPEO_{227}$-b-P(His_x-co-Cys_y) with two different rates (of 13% and 29%) by mole% in cysteine content is presented. The synthesis of the polymers was accomplished through ring opening polymerization of the corresponding protected N-carboxy anhydrides (monomers) using amine end-functionalized poly(ethylene oxide) ($mPEO_{227}$- NH_2) as a macroinitiator. High vacuum techniques were used for the synthesis of N-carboxy anhydrides, for the purification of solvents and for the isolation of well-defined polymers, ensuring high purity in the system and the absence of impurities that could lead to uncontrolled polymerization processes. The amphiphilic terpolymers synthesized have the ability to self-organize in aqueous solutions and form micelle-like structures on a nanoscale. The outer hydrophilic corona of the nanostructures consists of PEO chains and the pHresponsive core from PHis and PCys, which was used as a hydrophobic component but also as a cross-linking agent. The successful synthesis of the polymers was confirmed by extensive molecular characterization and techniques were used to study the dependence of the secondary structure of the polypeptides on pH and temperature, the ability to self-organize and the size of the synthesized nanoparticles. The ultimate goal is to create stable and stimuli-responsive to cancerous environments nanostructures, which will be used in targeted and controlled drug release applications in cancerous tissues.

References:

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