Reg. No: 2017/26/D/ST5/00341; Principal Investigator: dr Monika Elżbieta Szefczyk

Peptide foldamer-based nanostructures

Bionanomaterials are nowadays one of the fastest growing research area of material engineering. Special attention has been paid to the materials composed of self-organizing structures, such as nucleic acids, hydrocarbons and peptides. Particularly, self-assembling peptides have revealed many advantages over other organic and inorganic aggregates, for instance biological compatibility, rather simple synthesis and low toxicity. Moreover, vast possibility of peptides chemical properties modulation guarantees a range of possible applications. As so, bionanomaterials based on peptide nanostructures have shown to entrap many different bioactive molecules with a controlled release pattern, thus can be applied as drug delivery systems. However, only ability to rational control over the assembly formation, especially influence on type and size of obtained nanostructures, will provide bionanomaterials useful for applications in nanotechnology and synthetic biology.

The main goal of the project involves rational design of peptide foldamers to be exploited as building blocks for the controlled self-assembly of nanomaterials. Foldamers are oligomers that exhibit a define tendency to folding to stable 3D structure in solution and possess enormous potential among synthetic self-organizing systems to mimic the regular structural behavior of biomolecules. Virtually unexplored is a subject of self-organization of complex α,β-peptides. That is why, there will be carried out studies in order to increase knowledge regarding design, synthesis and aggregation of peptides containing both α- and β-residues, which can be potentially applied in the synthesis of bionanomaterials with a vast range of applications.