Chimeric block copolymer/protein nanostructures via electrostatic self-assembly

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Polyelectrolyte block copolymers constitute an intriguing class of macromolecules, as they combine the structural characteristics of amphiphilic block copolymers, polyelectrolytes and surfactants. [1] Equally interesting is the case of the electrostatic interaction between polyelectrolytes and proteins owing to a vast variety of possible technological applications concerning protein encapsulation, immobilization, purification and separation, as well as in the development of functional nanobiomaterials, while its study provides valuable insight into the interactions between charged biomacromolecules that take place in several biological systems. [2] Electrostatic interaction between polyelectrolyte block copolymers and proteins enables the formation of protein containing nanoparticles of varying structure and properties, suitable for nanobiotechnological and medical applications, e.g., protein/peptide drug delivery, biomacromolecules separation, surface modification, etc.

In this presentation novel nanostructures formed by electrostatic self-assembly between functional block copolymers and proteins will be discussed on the basis of elucidating effects of block copolymer architecture and responsiveness to external stimuli, component concentration, solution pH, temperature and ionic strength on the architecture and functionality of the formed hybrid/chimeric nanoassemblies in solution. Examples of chimeric nanostructures formed on solid surfaces will be also presented.

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