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PEG based amphiphilic copolymers: From self-folding in solution to self-assembly at the film surface

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Abstract

Amphiphilic polymers possess multimode capacities of self-assembly on nano-to-micrometer length scales when present in a variety of states, e.g., from dilute solution to thin film. Amphiphilic random copolymers can self-fold in water in single-chain nanoassemblies, so-called unimer micelles, via the intramolecular interactions of the hydrophobic component. We present and discuss different amphiphilic (co)polymer structures all based on the hydrophilic, thermoresponsive polyoxyethylene glycol (PEG) and highlight the effects of the polymer structure and composition on the size and morphology of the nanoassemblies in solution below and above the critical solution temperature. On the other hand, novel green technologies incorporate amphiphilic polymers into nanostructured-surface films to affect their properties. We point out how the surface activity, functionality, structure and reconstruction of the tailored amphiphilic polymer platform can interplay and add synergistically to combat the adhesion and settlement of a variety of biofouling organisms.

Biography

Dr. Elisa Martinelli received her PhD in Chemical science in 2008 at the University of Pisa. In 2008 to 2014 she held a Post-doc position at the Department of Chemistry and Industrial Chemistry where she is now a research associate and lecturer. She spent some period of time doing research abroad, including those at Ivoclar- Vivadent AG Schaan, The school of Biosciences, University of Birmingham (UK), and the school of Marine Science and Technology, university of Newcastle (UK). Her research interests are mainly focused on the synthesis and characterization of polymers and nanostructured materials for innovative and advanced applications with low environmental impact. She has been involved in numerous research projects, namely EU funded projects on the prevention and release of biofouling, namely EU- funded projects on the prevention and release of biofouling (FP6 AMBIO, FP7 SEACOAT, FP& LEAF), in which she has contributed significant publications and industrial patents.

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