HIGHLY ORGANIZED SELF-ASSEMBLED NANOSTRUCTURES BASED ON POLY(PROPYLENE IMINE) (PPI) AND PPI-DNA DENDRIMER HYBRIDS

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Abstract

A nanofabrication based on self-assembling of polymeric building blocks could produce novel types of well-organized nanoscaffolds useful for synthesis of hybrid materials with unique physico-chemical properties. Such materials will find future application as functional components of novel nanodevices. Recently, unique types of one-dimensional (1D) nanostructures based on self-assembling of amino-terminated PPI dendrimers in the presence of inorganic ions has been presented [1]. Here we show that similar or even two- or three-dimensional (2D, 3D) well organized nanostructures with the size of up to several micrometers can be obtained from amino-terminated as well as maltose and maltotriose terminated PPI dendrimers and from their hybrid non-covalent complexes with short oligonucleotides. By combined experimental (dynamic light scattering (DLS), atomic force microscopy (AFM)) and computer modeling approaches we have proposed a mechanisms of such self-assembling processes. We discuss the role of HEPES molecules, influence of dendrimer generation, extent of surface modification and type of DNA on morphology of nanostructures. Their application as nanoscaffolds for solution-based fabrication of metallic or semiconductor nanofibres is proposed.

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