Nanostructured Bioactive Polymeric Layers for Trapping DNA and Proteins

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Abstract
The present study strongly relates to ongoing research on the development of cationic (anionic) polymers which are of great interest due to their enormous potential for biomedical applications, especially as non-viral vectors for gene therapy, antimicrobial agents and active components in DNA (protein) sensing devices [1]. We demonstrated that a functional group approach can be successfully realized in a free-radical copolymerization process to prepare cationic copolymers with a desired composition of bioactive functional groups, which can be activated in water thus, providing electrostatic interactions between a polycation(anion) and DNA (protein) [2, 3].We developed a protocol of the film casting, which permits to reproducibly prepare bioactive films with regular cavity-like nanostructured surfaces. The proof-of-concept experiments demonstrated the capabilities of these nanovcavities to trap single DNA (protein) molecules (Fig. 1 and 2).

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Figures

Figure 1: 3D rendered images of the topography information and bimodal colors of cavity-like nanostructured surfaces: left, as prepared cavities and right, cavities fitted with mioglobine. Roughness is topography while the colors is the surpimposed image of Bimodal phase