

The initial results indicate that the incorporation of clay improved the swelling behavior in contrast to the pure chitosan beads. There also had been revealed significant disproportion of viscosity received hydrogels according to different type of LA or different concentration. Increasing content causes telling rise of viscosity, especially reported in higher content of used crosslinker.

The aim of research is to develop a bioactive system biopolymer/layered silicate intelligent nanocomposite based on chitosan and synthetic clay by a cross-linking reaction using sodium tripolyphosphate as the gel factor. The resultant composite were characterized by Fourier transform infrared spectroscopy, scanning electronic microscope and X-ray diffraction analysis. The bioactivity in physiological pH solution (SBF pH=7.40) [8], drug encapsulation efficiency and controlled release behaviour were also investigated by using the model drug to reveal the effects of introduced LA.

[Engineering of Biomaterials, 122-123, (2013), 1-2]

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MECHANICAL AND TRIBOLOGICAL PROPERTIES OF A-C:H/TI COATINGS DOPED BY SILVER USING ION IMPLANTATION AND MAGNETRON SPUTTERING METHODS

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Abstract

Due to favorable mechanical, tribological and biomedical properties the carbon coatings are of interest of many branches of the industry [1]. Growing interest in Ag doped DLC coatings is observed within the space of the last several years. Both, well known antibacterial properties [2] of silver as well as a good biocompatibility [3] of carbon coatings constitute the outstanding solution for a variety of applications, especially for medical implants.

The aim of this study was the evaluation of influence of silver onto the mechanical and tribological properties of nanocomposite DLC coatings. Carbon coatings were produced using a hybrid RF PACVD/MS method and silver ions were incorporated into carbon matrix. The processes consist of followed stages: synthesis of nanocomposite carbon (CVD) doped titanium coatings (PVD) [4] and next-stage carbon (CVD) and silver deposition (PVD) or Ag ion implantation into carbon coating. Carbon layers synthesis was performed with use of the classic RF PACVD process in methane atmosphere whereas as the titanium ions source the pulsed magnetron sputtering (MS) process was applied. Second stage was performed in the same reaction chamber but the PVD process was carried out using the silver cathode. The ion implantation process was carried out with the use of silver ions with energy of 15 keV. In order to determine the influence of silver ion implantation process onto overall physiochemical properties of carbon coatings four ion doses of 2, 4, 7 and $10 \times 10^{16} \text{Ag}^+/\text{cm}^2$ were applied.

Due to application of the gradient of chemical composition of Ti-C it is possible to manufacture thick and well adherent carbon layers with a very good mechanical, tribological parameters and corrosion resistive. Application of silver as a doping material allowed modification of the mechanical and biological properties of manufactured layers depending on the silver amount (C:Ag ratio).

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