GRAPHENE OXIDE CHITOSAN COPPER PLATINUM NANO COMPOSITE THIN FILMS FOR ANTI-BACTERIAL APPLICATIONS

Edith Flora Joel[1], Galina Lujanienė[1], Ieva Uogintė[1], Sandra Stanionytė[1], Martynas Skapas[1], Loreta Leviskaitė[2]

[1] SRI Center for Physical Sciences and Technology, Lithuania
[2] SRI Nature Research Centre, Vilnius, Lithuania
edith.joel@ftmc.lt

The irreversible attachment to and on the surface of the microorganisms and the formation of an extracellular matrix improves the ability of cell growth and the gene transcription, eliminates their response to antimicrobial components. Developing ideas about biofilm has a great impact on public health, based on the role of several infectious diseases and various device-related problems [1]. The problem with antibacterial coatings and thin films is resistance to clinical drugs [2]. The progress in the new developments associated with metal nano-composites particles demonstrates a growing potential in infection control of bacteria and demanded to prevent biofilm formation. This work shows the synthesis and the antimicrobial activity of chitosan capped metal inorganic nano-particles, which have been expected to have strong antimicrobial effects in the clinical field. Chitosan nanoparticles having an extensive spectrum of antibacterial characteristics and are used to improve the antiseptic characters of inorganic nanoparticles toward biofilms. In addition to Chitosan (CS) nanomaterials, Copper (Cu), copper oxide (CuO), Graphene oxide (GO), Platinum (Pt) which are claimed to have high antimicrobial activity on bacteria [3–5]. In this study the chitosan copper oxide, chitosan capped copper, chitosan-graphene oxide-platinum and chitosan-graphene oxide-platinum-copper nano-materials were synthesized using various chemistry methods and applied to make thin films by a cast solution method; since the combination of nano-materials is also considered to have noticeable inhibitory effects on the bacteria [6].

The Copper nanoparticles are claimed to have greater toxicity to the bacteria than Copper Oxide, they are kept as a control for composites thin films in the study [3]. Copper and Platinum have been well known as efficient antibacterial materials, along with graphene oxide that has destructive interactions with microbes when the problem of biofilm is encountered. The amount of Copper introduced into nanomaterial can be an important factor effecting in the antibacterial properties. Physical Characteristics, as well as microbial properties of the developed materials in the thin film, were studied and characterized by the Transmission Electron Microscope (TEM), X-Ray Diffraction (XRD). The antibacterial effects of chitosan-nanocomposite thin films against bacteria were examined by film attachment method and zone inhibition method. The bactericidal activity was studied was estimated by the relative number of bacterial colonies survived calculated from the number of viable colonies. The possible applications include wound dressing, food packaging, anti-biofilm coating, etc.

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