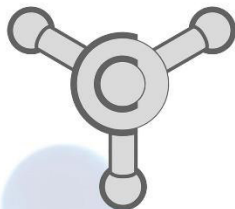


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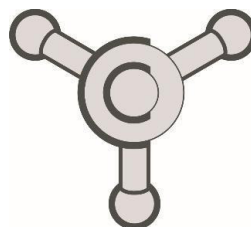
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Graphene-reinforced composite hydroxyapatite/chitosan and hydroxyapatite/chitosan/gentamicin coatings

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Graphene (Gr) is a superior material with favorable mechanical and thermal properties, predominately utilized as a component of exceptional composites [1]. In this work graphene-reinforced composite coatings based on hydroxyapatite (HAP) and chitosan (CS), with and without antibiotic gentamicin (Gent) were investigated.

Composite HAP/CS/Gr and HAP/CS/Gr/Gent coatings were electrophoretically deposited in a single step process from aqueous suspension on pure titanium foils. Detailed physico-chemical and biological characterization analyses were performed in order to evaluate the influence of graphene on the properties of newly formed composites. The formation of HAP/CS/Gr and HAP/CS/Gr/Gent composite coatings was confirmed by X-ray diffraction, field emission scanning electron microscopy and Fourier transform infrared spectroscopy. On micro level, composite coatings exhibited porous, homogenous surfaces suggesting strong interfacial interactions between HAP, CS and Gr.

Agar diffusion testing was performed against *Staphylococcus aureus* and *Escherichia coli* in order to evaluate the antibacterial potential and possible medical applications of obtained composite coatings. The results indicated excellent antibacterial properties of the gentamicin-containing coating (HAP/CS/Gr/Gent) with a slightly more pronounced effect against *S. aureus* compared to *E. coli*. Composite coatings were also subjected to cytotoxicity MTT assay to prove the biocompatibility and non-cytotoxic effect towards MRC-5 and L292 cell lines. Obtained results indicated the high potential of HAP/CS/Gr/Gent coating for use in medicine as a part of bone implants.

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