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Biocompatible Poly(Vinyl Alcohol)-Based Hydrogels For Medical Applications

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The biomaterials field is always evolving towards finding new wound dressing formulations which can provide active protection of the wound from bacterial infections. Hydrogel-based materials are especially interesting for such a purpose, considering their favorable biocompatibility, sorption and mechanical properties, as well as the potential for immobilization and incorporation of antibacterial agents. The synthesis of silver nanoparticles (AgNPs) became very interesting for potential applications in biomedicine, since nanocrystalline silver is proved to be the most efficient antimicrobial agent with a wide inhibiting spectrum towards different types of microorganisms. AgNPs embedded in hydrogel matrices are attractive for biomedical applications due to possibility for their controlled release resulting in antimicrobial activity. Thus, combination of AgNPs with biocompatible hydrogels, poly(vinyl alcohol) (PVA) and chitosan (CHI), provides potential for design of improved medical treatments. Graphene (Gr) has exceptional mechanical properties and has therefore been applied as adequate reinforcing component for composite materials. In this work, we synthesized new composite hydrogels with electrochemically synthesized silver nanoparticles, Ag/PVA/Gr and Ag/PVA/CHI/Gr, aimed for wound dressing materials. Hydrogels were characterized by UV-Vis, CV, FE-SEM, Raman, AAS, FT-IR, MTT cytotoxicity tests and test of antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*. The results indicated that both hydrogels are excellent candidates for soft tissue implants and wound dressings [1-3].

Keywords: hydrogels, poly(vinyl alcohol), silver nanoparticles.

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