Title : Synthesis and properties of amorphous hydrogels composed of bacterial cellulose and iodine for application as antibacterial wound dressing

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ABSTRACT

Currently, hydrogels are another type of wound dressing material that is commonly used in medical applications due to their excellent absorption properties and moisture retention. Additionally, they can be incorporated with natural materials, additives, or drugs to enhance the properties of the hydrogel. This study focuses on the synthesis of amorphous hydrogels from sodium 2-acrylamido-2-methyl propane sulfonate (Na-AMPS) and bacterial cellulose (BC) at different weight percentages of 0, 0.1, 0.3, and 0.5, using potassium persulfate as an initiator and poly (ethylene glycol) diacrylate (PEGDA 575) as a crosslinker through a free radical polymerization reaction. The synthesis of amorphous hydrogels exhibited a viscous and opaque white appearance. From the viscosity test results of the amorphous hydrogel using a viscometer, it was found that the viscosity of the amorphous hydrogel increased with the amount of BC, revealing a maximum viscosity of 7,884 mPa/s. This indicates that BC can enhance the mechanical properties by increasing the strength of the amorphous hydrogel. In this study, iodine was added at different percentages by weight to volume of 38.5, 58.0, and 77.0 to enhance wound healing efficiency. The iodine diffusion properties were tested using the agar disc diffusion technique, revealing a maximum diffusion distance of 35 mm in 48 hrs. The water content and water retention tests have reached maximum values of 367.6 % and 14.8 %, respectively. This indicates that the amorphous hydrogel can provide moisture for the wound. This demonstrates that the amorphous hydrogel can release iodine externally. In conclusion, the amorphous hydrogel prepared in this study has good properties for application as a wound dressing material.