Preparation and Characterization of Bacterial Cellulose Composites Reinforced with Albumin-coated Cotton Fabric

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It is known that wound dressing materials play an important role in woundhealing process. A bacterial cellulose (BC) pelliclehas hydrogel property that makesit have a great potential for using in wound care application. The BC pellicle can provide moist environment to a wound andconsequently promote the wound healing process. However,in a large scale production ofBC pellicles, when large pieces of BC pellicles are required, tearing of BCpellicles may occur during cultivation, sterilization and packing of BCpellicles into packaging materials. To improve mechanical strength of BCpellicles and prevent damage from tearing, BC pellicles were reinforced with areinforcing material to form a composite. In this study, BC pelliclesproduced by the biosynthesis of bacterium Acetobacter xylinum werereinforced with cotton fabric coated with albumin, a water-soluble protein.Albumin was coated on the cotton fabric with the aid of dielectric barrierdischarge (DBD) plasma in order to minimize the loss of albumin into culturemedium during cultivation of the bacteria. The BC composites were then producedby immobilization of Acetobacter xylinum cells on surfaces of cotton fabric with and without albumincoating before cultivation in culture medium. The results of SEM imagesand FTIR spectra illustrated that DBD plasma treatment increased the surfaceroughness and polar functional groups on the plasma-treated cotton fabric,respectively. The results from CHN analyzer indicated that the amount ofalbumin coated on the cotton fabric increased with the increasing of the numberof cycle of albumin coating process. The effect of the coated albumin contenton the production of BC pellicles was investigated.