



CHAPTER V

CONCLUSIONS

In this work, we succeeded in the introducing antimicrobial property to bacterial cellulose (BC) from *A. xylinum* by coating with different concentrations of chitosan having molecular weight (M_v) of 8×10^5 and degree of deacetylation (%DD) of 98. The chitosan-coated BC had higher swelling ratio, resulting in the high absorbency in hydrated state and exhibited the great elasticity and high wet strength, which are the important properties for wound dressing material (Maneerung *et al.*, 2008). To improve the interaction between the BC and chitosan, the surface of the BC was treated with dielectric barrier discharge (DBD) plasma prior to chitosan coating. The data demonstrates that the amount of chitosan coated on the BC increased by the rising of chitosan concentrations from 0.25 % to 1.00 % (w/v) and at the concentration beyond 1.00 % (w/v), it remained almost unchange. The saturated amount of the chitosan coated on the plasma treated BC was higher than that of the non-plasma treated one. Such amounts of chitosan released from the surface of the BC when immersing in phosphate buffered saline (pH = 7.4) and acetate buffer solution (pH = 5.5) slowly and continually, For the plasma treated BC, the release amount of chitosan was relatively lower than the non-plasma treated one due to the better interaction. As we found the evidences of an increasing in hydrophilicity of the BC surface, the XPS analysis presents the increment of the oxygen containing polar groups after plasma treatment, the FTIR spectra shows the increment of the peak intensity at 2335 and 1236 cm^{-1} , associated with the O-H bending and C-O stretching of the carboxyl group. From the SEM images, the morphology of the chitosan-coated samples were homogeneous with a denser structure than that of the pure BC and the relatively higher amount of chitosan was observed on the surface of the plasma treated BC than that of the non-plasma treated one. After chitosan coating, the number of colonies of *S. aureus* and *E. coli* significantly decreased from those of the pure BC. The bacterial reduction rate (BRR) values of the chitosan-coated BC increased with the increasing of chitosan concentrations used for chitosan coating and with the plasma treatment, resulting from an increasing amount of chitosan on the bacterial cellulose surface.