CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The unique nanofibrilar multilayer structure of bacterial cellulose makes it be an interesting material for using as a template for syntheses of metal compounds since nucleation of metal compounds may occur at the surface of bacterial cellulose nanofibers. In this study, titanium dioxide in the form of anatase was synthesized by hydrolysis reaction in the presence of bacterial cellulose using TTIP as a titanium source. The formation of TiO_2 on the nanofibrilar structure of bacterial cellulose was observed by SEM. Using BC as the template; the synthesized TiO_2 not only was coated on nanofibrils of BC but also existed as individual particles in the porous structure in the interior part of BC, depending on molar ratio of TTIP: H_2O in EtOH. The content of TiO_2 impregnated in BC increased with the increasing of molar ratios of TTIP to H_2O in EtOH. The crystallographic forms of TiO_2 impregnated in bacterial cellulose were affected by the molar ratio of TTIP: H_2O in EtOH and heating time. The photocatalytic as well as antibacterial activities of TiO_2 impregnated in bacterial cellulose were affected by the molar ratio of TTIP: H_2O. The large excess in the mole of TTIP to H_2O in EtOH resulted in the formation of individual spherical particles of TiO_2 in the porous structure of bacterial cellulose, leading to the decreasing in both photocatalytic and antibacterial activities. Moreover, the direction of UV light and surface areas of TiO_2 impregnated in BC for supporting with UV light in order to generate photocatalytic reaction effect upon the photocatalytic and antibacterial activities, as well.

It is recommended that the further study about amelioration the optical response of TiO_2 under visible light excitation by anion doping such as nitrogen and fluorine (Li *et al.*, 2005) so as to increase the photocatalytic and antibacterial activities of TiO_2 impregnated in BC. The TiO_2 impregnated bacterial cellulose may be further developed to be applied for wastewater treatment.