CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

Chitosan is an important bio-based material to apply for a variety of applications because of its specific properties, such as bioactivity, biocompatibility, biodegradation, non-toxicity, and antibacterial and antiviral properties. Chitosan is stabilized by inter- and intra-molecular hydrogen bonds, this brings the insolubility in most solvents and the non-thermal plasticity. In previous, our group succeeded in the conjugating reaction in homogeneous water system. The present work, thus, focuses on the applications of this reaction by (i) proposing the simple functionalization of chitosan with amino acids (Chapter III) and (ii) the aerogel formation based on the crosslinked chitosan and clay.

Chapter III demonstrates the use of chitosan whisker (low molecular weight chitosan $M_w \sim 137,000$) and the conjugation with asparagine and tryptophan using WSC in water. The reactions were successful by carrying them out at room temperature. The compounds obtained showed the good solubility in water and swelling in ethanol and chloroform. The TEM studies clarified the nanosphere morphology.

Chapter IV deals with chitosan aerogel nanocomposite via water based system by preparation chitosan aerogel with dicarboxylated poly(ethylene glycol) crosslinker and combining with Na^+-montmorillonite. The reaction was successful at room temperature by using WSC as a conjugating agent and adding the clay dispersed in water. The product obtained showed the porous material. The water absorption was above 1,000 times to be categorized it as the superabsorbent gel.

The points to be studied in the future are as follows. In the case of chitosan conjugated with amino acid, the protected amino acid should be applied. This will not only clarify the selectivity of our reactions but also give the neat reaction procedures to introduce amino acid onto chitosan chain. For chitosan-clay aerogel, the studies on controlling gel strength are needed either by varying the chain length of crosslinker or the crosslinker content.