

## CHAPTER I

### INTRODUCTION

Over the past decades, food packaging has been developed continuously. One of the inventions is antimicrobial packaging material which incorporates bacteriocin. The film has an ability to inhibit the growth of microorganism especially pathogens. Nisin is bacteriocin which is accepted for the safety for human consumption and widely used in food industry. Nisin can inhibit gram-positive bacteria and it is the only bacteriocin which is allowed to use as a food ingredient by United States Food and Drug Administration (USFDA). Nisin incorporated packaging material can be produced by pouring the needed amount of nisin into polymer solution during the film forming process. Electrostatic spinning is a novel technique for the production of nanofiber which can be constructed into a mat or film. It has a great advantage of being able to produce nanofibers with large surface area to volume ratio (Mit-upphtham et al., 2004). Besides, an electrospinning process is done at ease and the required equipments for electrospinning are not too expensive. Further, since nanofiber offers high surface to volume ratio, only a small amount of polymer sample is needed to produce nanofibers. Therefore, the amount of nisin which is blended with polymer solution for giving an effective condition by electrostatic spinning is less than other film forming methods. The nanofiber production by electrostatic spinning is interesting for many applications such as filtration, and biomedical applications including wound dressings and drug delivery systems. It can be applied in food applications such as antimicrobial packaging material.

The objective of this research was to produce antimicrobial gelatin nanofiber by electrostatic spinning technique. Firstly, the effects of nisin and gelatin concentrations on nanofiber size and morphology were observed. Secondly, the effect of crosslinking on nanofiber mats was investigated. Thirdly, the release of nisin as affected by temperature and water activity was monitored. Lastly, antimicrobial gelatin nanofiber mat's inhibition activity was tested on bacterial growth.