CHAPTER I

INTRODUCTION

The rational of the study

In recent years, the nanotechnology can simply be defined as the technology at the scale of one-billionth of a meter. It is the design, characterization, synthesis and application of materials, structures, devices and systems by controlling shape and size at nanometer scale [1]. There has been a considerable interest in the development of novel delivery systems for bioactive molecules using nanotechnology [2].

The nanocarrier had many advantages such as protect any molecules from premature degradation, interacting with the biological environment, enhance absorption into a selected tissue (for example, solid tumor), control the pharmacokinetic and tissue distribution profile and improve intracellular penetration [3]. Sericin is a glue protein derived from silk fiber. Most of sericin must be removed during raw silk production at a reeling mill and other stages of silk processing. At present, sericin is mostly discarded in silk processing wastewater. The cocoon production is about 1 million tons (fresh weight) worldwide and this is equivalent to 400,000 tons of dry cocoon. Processing of this raw silk produces about 50,000 tons of sericin. If this sericin protein is recovered and recycled, it can represent a significant economic and social benefit [4].

Sericin is a macro molecular protein which is soluble in water. It consists of polar side chains made of hydroxyl, carboxyl and amino groups that enable easy cross-linking, copolymerization and blending with other polymers to form improved biodegradable materials [5]. Kwang Yong Cho *et al.* reported the success of preparing sericin nanoparticles conjugated with poly (ethylene glycol). The nanoparticles of sericin–PEG conjugated had sizes ranging about 200–400 nm in diameter [6]. Hanjin Oh et al. prepared sericin beads using LiCl/DMSO solution as a solvent. The result showed that sericin beads swelled at pH 7.4 and 9.2 more than pH 2.2 and 4. In the stomach simulated environment, only 20 % of the diclofenac loaded-sericin beads were released, while the remaining of 80 % was released in the intestine simulated environment. These results suggested that sericin beads could be applied as a carrier system for bioactive materials.[7]

Niacinamide is the water-soluble amide of nicotinic acid. It is also called vitamin B3. Niacinamide shows many benefits in cosmetic application [8-10]. Because of its low oil solubility, niacinamide is hardly penetrating to the stratum corneum of the skin. So, in this study, we prepare niacinamide-loaded sericin nanoparticles for cosmetic application using water in silicone technique.

Objectives of the study

1. To develop sericin nanoparticles containing niacinamide.
2. To characterize prepared niacinamide-loaded sericin nanoparticles under various conditions.
3. To observe the skin permeation profile of niacinamide loaded nanoparticles.

Expected outputs of the study

1. The procedure for preparing niacinamide-loaded sericin nanoparticles.