

CHAPTER I

INTRODUCTION

Solution plasma is a new plasma system which has been proposed by Takai (2008). It is liquid-phase plasma which has been widely utilized in nanomaterial synthesis, surface modification, water treatment, sterilization, and decomposition of organic compound (Takai, 2008). This system is able to produce highly active species such as hydroxyl radical, hydroperoxyl radical, free electron, superoxide anion, and atomic oxygen anion (Potocky *et al.*, 2009).

Chitin, poly β -(1-4)-N-acetyl-D-glucosamine, is a polysaccharide consisting of two monomeric units which are N-acetyl-D-glucosamine and D-glucosamine. Chitin which is the second most abundant biomass resource after cellulose was extracted from a by product of the seafood industry. There are many reports on many applications of chitin such as tissue engineering, wound dressing, drug delivery and cancer diagnosis (Jayakumar *et al.*, 2010, Jayakumar *et al.*, 2011). On the other hand, it has low chemical reactivity due to its high rigid crystalline structure. With the aim of effectively destroying the rigid crystalline structure of chitin and amorphous chitin can be prepared by dissolving chitin in calcium chloride-saturated methanol. (Tamura *et al.*, 2007). Furthermore, chitin cannot be dissolved in common solvents. It can be chemically modified to form common solvent-soluble derivatives such as CM-chitin, chitosan, etc.

Chitosan is the most studied derivative of chitin because it has been widely used in many applications such as biomedical materials, biodegradable packaging, cosmetics and waste water treatment. However, the problems of chitosan production process are the requirement of high alkali concentration in deacetylation reaction and, as a consequence, the presence of high salt concentration in waste water due to the neutralization of the used alkali by acid.

These problems led to a motivation of this study. Plasma has been used in deacetylation reaction of chitin hydrogel to form chitosan in order to avoid the use of high alkali concentration and also to reduce molecular weight of chitosan for better solubility and higher biological activity.