CHAPTER 1 INTRODUCTION

1.1 Introduction

At present, the renewable energy and environment is increasingly important. Consequently, the fuel cell technology and alternative fuels are produced such as ethanol, biodiesel. A fuel cell is an electrochemical cell that directly converts a source fuel into an electric current. The diagram of a simple fuel cell is shown in Figure 1.1. Fuel cell generates electricity inside a cell through electrochemical reactions between a fuel and an oxidant.

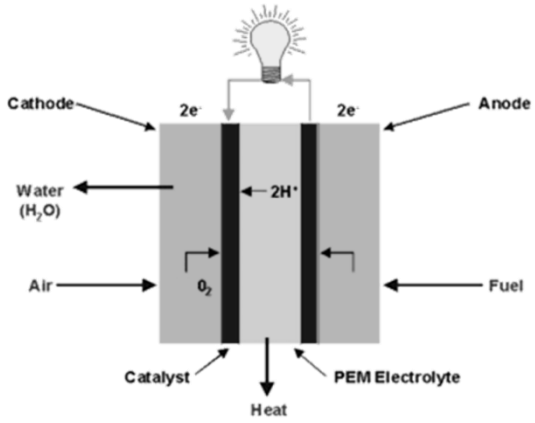

Figure 1.1 Schematic diagram of a simple fuel cell

The electrochemical reactions in fuel cell are important process including oxygen reduction at the cathode and fuel oxidation at the anode. The attractive alcohol fuels are methanol, ethanol, ethylene glycol and glycerol. Glycerol is a by-product of the biodiesel production, thus glycerol should be increased its value by using as fuel in fuel cell. The glycerol oxidation is catalyzed by many metals. In general, the classical oxidation catalyst is platinum. It is most widely used catalyst in fuel cells. However, because of platinum rareness on earth and consequent high cost, substitution of platinum by other catalysts has been widely studied. Gold based catalysts have been identified as candidate materials.

From the preliminary tests [1], gold on carbon appeared to be a great alternative with respect to classic systems. It has been found that a simple, monometallic catalyst was able to operate several times without showing deactivation and very selective when polyhydroxylated molecules were used as the substrates.

There are many previous works studying about oxidation reaction over carbon supported gold catalyst. Study of gold in catalysis has attracted a wide range of interest from laboratory research to industrial development aspects. N. Dimitratos et al. [2] reported that the effect of preparation method and different reduction method has a crucial effect on oxidation state of Au and on gold particle dimension in consequence on the catalytic behavior in the liquid phase oxidation of glycerol. S. Strbac et al. [3]

reported that the catalytic performance of the gold electrodes was markedly to depend markedly on the size of the gold particles.

For this work, the effects of carbon treatment and catalyst preparation methods including PVA protection and citrate protection were studied and investigated for improving the electrocatalyst properties.

1.2 Objectives

1. To study the effect of heat treatment of carbon on Au/C catalyst properties.
2. To study the effect of Au/C catalyst preparation methods (PVA protection and citrate protection) on Au/C property.

1.3 Scopes of work

1. The Au/C catalysts containing 20%, 30% and 40 % wt of Au were prepared by using the PVA protection method and citrate protection method.
2. For the catalyst characterization, three techniques were used including cyclic voltammetry (CV), chronoamperometry (CA), TEM and AAS.

1.4 Expected results

More uniform dispersion and high activity of Au/C catalyst could be obtained by using different catalyst preparation methods and the influence of heat treatment on carbon of Au/C catalyst was explored or was investigated.