Abstract

The electrochemical oxidation of dissolved CO on gold in acid electrolyte without the influence of adsorbed CO. The electrooxidation of dissolved CO by using rotation disk gold electrode in acidic system is in diffusion control which is also observed in limiting currents of the electrooxidation of dissolved CO on gold microelectrode in acid electrolyte. The cyclic voltammograms of the oxidation potentials of dissolved CO by using rotation disk gold electrode and microelectrode indicate the potential windows of gold oxides regions may affect the starting oxidation potentials of the dissolved CO and the electrodes surface treatments and conditions may also affect the starting oxidation potentials of the dissolved CO.

Introduction

The electrochemical oxidation of carbon monoxide on gold electrodes had been studied since 1960[1,2], most of papers discuss the surface adsorbed CO and the effects of gold surface conditions on the oxidation potentials of adsorbed CO[3,4]. There are several reasons why carbon monoxide adsorption above was studied, (a) CO is one of intermediates of methanol oxidation, (b) CO in reformate gas for Hydrogen fuel cell[5,6]. The oxidation of carbon monoxide attract substantial interest in the gas-solid phase reaction electrochemically catalytic reaction on gold[7,8]. The electrochemical oxidation of CO on Au electrode indicates the less positive potentials due to negligible influence of strong adsorbed CO in comparison of the adsorbed CO oxidation on Pt electrode in acid media. The reaction of surface adsorbed CO and CO-like species from stepwise dehydrogenation of methanol with the surface oxide of platinum is believed to be the surface reaction of the electrochemical oxidation of methanol. The dissolved carbon monoxide oxidation maybe starded by the surface adsorbed CO [9] and the study of the oxidation of dissolved CO is not much seen in the literature. However in oxidizing dissolved CO in an aqueous solution, gold is the most active electrode material prior to platinum.[10]

Result and discussion

The electrochemical oxidation potential of surface adsorbed CO on gold are much more positive than solution phase CO depending on experimental conditions[11]. The oxidation currents of dissolved CO (10^{-3} M) on gold electrode in 1M HClO4 exhibit pure diffusion control behavior as shown in Figure1, 2.

Both rotating disk electrode and microelectrode system in different concentrations of CO with indicates CO concentrations dependent currents as shown in Figure3, 4.

Conclusions

Detecting the initial potential of CO which in the system are both at 0.6V vs. RHE, by comparison of electrochemical oxidation gold RDE and gold microelectrode. The oxidation process is a mixed-control process at other potential ranges. Control the potential windows of gold oxides regions may affect the starting oxidation potentials of dissolved CO in acidic system by using RDE but not observed in microelectrodes.

References