

# Ethanol Electrooxidation on Ti Surface Modified by Pt Deposition

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## Abstract

The characterization of various Pt deposits onto Titanium support were carried out by cyclic voltammetry (CV) in acid media. After that, the electrodes were applied to ethanol electrooxidation in order to compare their electroactivity. The results obtained showed that the best current density was reached for the 20<sup>th</sup> cycle of deposition.

## Introduction

In last two decades, we had an increase of studies about electrooxidation of small organic molecules, because they are good candidates to be used in fuel cells. Among them is ethanol and due your great disponibility and easy manipulation it has attracted attention of many research centers.<sup>1</sup> This way, several studies have been accomplished for electrooxidation of ethanol in electrodes containing different metals, especially nobel metals, as Pt or Pt-based electrocatalysts. For a high utilization of this noble metal it is essential to prepare platinum deposits of maximum specific surface area. In this present work, electrodes of titanium (Ti) were modified by platinum (Pt) with different amounts of Pt on Ti. In addition, the electrochemical activity of the modified electrodes for ethanol electrooxidation was evaluated by CV.

## Results and Discussion

The modification of Ti was made with successive cycling (-0.25 – 1 V, 100 mV.s<sup>-1</sup>) in acid containing H<sub>2</sub>PtCl<sub>6</sub>.xH<sub>2</sub>O (10<sup>-3</sup> mol.L<sup>-1</sup>). Figure 1 shows CVs for different Ti-Pt electrodes. CVs showed peaks associated with adsorption/desorption processes in low potential, as well as, the characteristic region of reduction and formation of Pt oxides. After electrochemical characterization, the activity of different electrodes for ethanol electrooxidation was made by CV (Figure 2). Currents values were normalized by coulombic charge for hydrogen desorption region observed between 50 – 400 mV (Figure 1). According anodic profiles, the electrode modified with twenty cycles presented the best electrocatalytic activity.

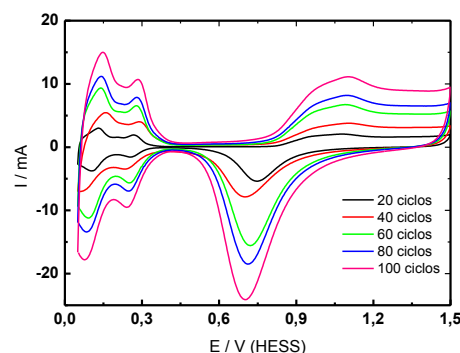


Figure 1. VC's for different deposits of Ti-Pt (H<sub>2</sub>SO<sub>4</sub> 0.5 mol.L<sup>-1</sup>, 100 mV s<sup>-1</sup>).

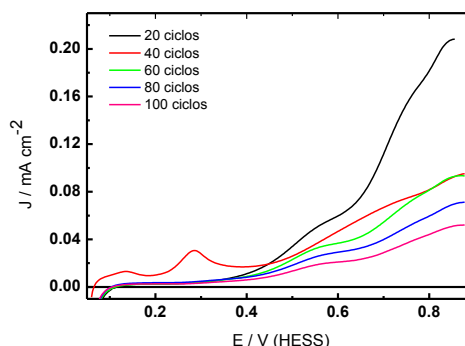


Figure 2. Anodic profile (1<sup>st</sup> cycle) of ethanol electrooxidation (EtOH 0.1 mol.L<sup>-1</sup>, 20 mV s<sup>-1</sup>).

## Conclusions

The comparative study of deposits of Pt on Ti suggests that the deposit with 20 cycles showed the best performance. For surfaces with the greater coverage of Pt the electroactivity decrease, indicating that although particles of Pt increase, on the other hand, do not contribute to the continued of ethanol electrooxidation, probably because the surface becomes inactive with a larger amount of species that block actives sites.

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