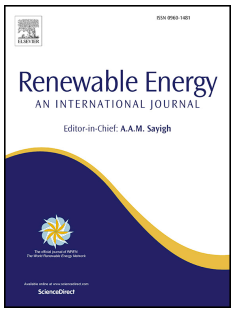
Accepted Manuscript



Innovative anode catalyst designed to reduce the degradation in ozone generation via PEM water electrolysis

Jyun-Wei Yu, Guo-Bin Jung, Chi-Wen Chen, Chia-Chen Yeh, Xuan-Vien Nguyen, Chia-Ching Ma, Chung-Wei Hsieh, Cheng-Lung Lin

PII: S0960-1481(17)30335-X

DOI: 10.1016/j.renene.2017.04.028

Reference: RENE 8723

To appear in: *Renewable Energy*

Received Date: 30 January 2017

Revised Date: 9 April 2017

Accepted Date: 13 April 2017

Please cite this article as: Yu J-W, Jung G-B, Chen C-W, Yeh C-C, Nguyen X-V, Ma C-C, Hsieh C-W, Lin C-L, Innovative anode catalyst designed to reduce the degradation in ozone generation via PEM water electrolysis, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.04.028.

Innovative anode catalyst designed to reduce the degradation in ozone generation via PEM water electrolysis

Jyun–Wei Yu*, Guo–Bin Jung, Chi–Wen Chen, Chia–Chen Yeh, Xuan–Vien Nguyen, Chia–Ching Ma, Chung–Wei Hsieh, Cheng–Lung Lin

Department of Mechanical Engineering & Fuel Cell Center, Yuan Ze University, Taoyuan 320, Taiwan;

*****Correspondence: risx79@gmail.com

Abstract

Membrane electrode assemblies (MEAs) using commercial PbO_2 powder as the anode catalyst to generate ozone via water electrolysis were traditionally adopted. We found that commercial MEAs evinced the typical degradation phenomenon after a current interruption and restart during operation, where the performance degraded and partially recovered after the resumption of current. In this study, homemade MEAs using PbO_2 powder and additives were developed, which ameliorated the degradation phenomenon. SEM and XRD analysis were used to compare the anode structure of the homemade to commercial MEAs after short–and long–term operation post–resumption of current after an interruption.

Keywords: water electrolysis, ozone generation, membrane electrode assembly, membrane degradation

1. Introduction

Currently, hydrogen is considered the best energy storage carrier, can be used on the renewable to process energy unstably situation, proton exchange membrane (PEM) electrolysis is good for renewable and intermittent power sources. It provides a sustainable solution for the production of hydrogen and has advantage of high voltage efficiency, low operating temperature, whereas disadvantages are high cost of components, and acidic corrosive environment [1]. Raising applied voltage accompanied with proper anode catalyst can be used to generate $H_2/O_2/O_3$, in addition to H_2/O_2.

（anode）： $2H_2O \rightarrow O_2+4H^++4e^-$ (1.23V) (1)