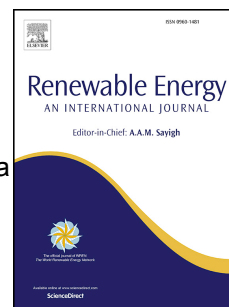


# Accepted Manuscript

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# **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

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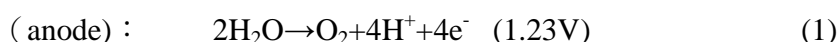
## **Abstract**

Membrane electrode assemblies (MEAs) using commercial  $\text{PbO}_2$  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  $\text{PbO}_2$  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  $\text{H}_2/\text{O}_2/\text{O}_3$ , in addition to  $\text{H}_2/\text{O}_2$ .



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