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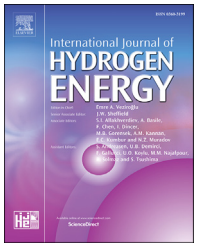

Direct formation of Pt catalyst on gas diffusion layer using sonochemical deposition method for the application in polymer electrolyte membrane fuel cell

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ABSTRACT

In this study, the facile and direct formation of platinum catalyst on a carbon paper (gas diffusion layer) via the sonochemical deposition method is demonstrated. An ultrasound irradiation with a carbon paper substrate in a platinum precursor solution formed interconnected platinum grains on the carbon paper surface. The surface morphology and deposition amount of platinum were strong functions of both ultrasound parameters (power and time) and solution composition. The platinum-deposited carbon paper was then directly used as a gas diffusion electrode in PEMFC without adding the ionomer. This exhibited high stability in the accelerated stress test in a single cell operation. The interconnected grains of platinum on carbon paper had high resistance to dissolution in an oxidizing environment and the absence of carbon support also enhanced resistance to carbon oxidation. Although the overall performance did not exceed that of the commercial Pt/C, this approach may be an option to form a stable platinum catalyst for PEMFCs.

Introduction

Hydrogen is attracting attention as an alternative energy carrier to fossil fuels due to its environmental friendliness. Proton exchange membrane fuel cells (PEMFCs), which use hydrogen as their energy source instead of fossil fuel, have undergone considerable technological advances according to studies in recent years. However, the high cost and poor stability of platinum catalysts still hinder the wider propagation

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