Research and Development of the Bipolar Plate Integrated with Coolant Channels for PEMFCs

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ABSTRACT

For the fuel cell technology of nowadays, the cost of bipolar plates accounts for an important portion of the total cost of a proton exchange membrane fuel cell （PEMFC）. Therefore, the emergences of novel bipolar plates, with good physical and chemical properties and low cost, might make the fuel cell era arrive earlier, which will help reduce the air pollution problem on the earth. Both the sheet metal and the plastics materials have the characteristics of being easy-to-fabricate and inexpensive, the composite material bipolar plate made of corrugated sheet metal, then covered with plastics to form flow channels and finally plated with gold on the current collector ribs, promise to replace the expensive bipolar plate being currently used in PEMFCs. This is due to its merits of low cost, good corrosion resistance, efficient heat transfer good electrical conductivity, and being robust compact, as well as lightweight. The main purpose of the present research is to fabricate the prototypes of such kind of bipolar plates and to conduct the experiments to validate this innovation, with the hope that the novel bipolar plates could be put widely in service for PEMFCs and set a mile-stone in fuel cell technology. The results show that the technology of bipolar plate is feasible and is superior to the existing ones. According to the single cell test, the power attained 0.334W/cm2. If the PEMFC stacks that made with this integrated bipolar plates, can be put to coolant and long-time test as the continued research, the outcomes might greatly benefit the development of the PEMFC ’s technology.

Keywords : Proton Exchange Membrane Fuel Cell, Bipolar Plate, Coolant Channel, Composite Material

Table of Contents

封面內頁 簽名頁 中文摘要.....v 英文摘要.....vi 誌謝.....viii 目錄.....ix 圖目錄.....xi 表目錄.....xiii 第一章 緒論.....1 1.1 前言.....1 1.2 研究動機.....2 1.3 燃料電池的基本介紹.....4 1.3.1 歷史.....4 1.3.2 基本原理與組成元件.....6 1.3.3 種類.....9 1.3.4 燃料電池的性能.....10 1.3.5 特色.....12 1.4 相關文獻.....13 第二章 雙極板研製與離線測試.....22 2.1 設計背景.....22 2.2 設計的方向.....23 2.3 現有雙極板製程相關問題與討論.....24 2.4 雙極板研製與接合製程.....26 2.4.1 金屬基板設計與製備.....26 2.4.2 塑膠板材設計與製備.....27 2.4.3 金屬基板與塑膠板材接合製程.....28 2.4.4 防蝕處理.....29 2.5 雙極板之離線性質測試.....29 2.5.1 導電性測試.....30 2.5.2 氣體洩漏測試.....31 2.5.3 壓縮測試.....32 第三章 單電池組裝及性能驗證.....46 3.1 單電池元件構造.....46 3.2 單電池電阻分析.....47 3.2.1 內電阻分析.....47 3.2.2 接觸電阻分析.....48 3.3 單電池性能探討與驗證.....49 第四章 結論.....57 參考文獻.....60

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