

附件四、技術說明表



微波電漿處理不銹鋼纖維紙應用於鹼性水電解

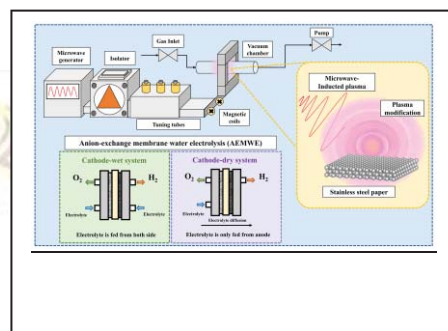
提案人： 陳建彰 教授

單位： 國立臺灣大學 應用力學研究所

簡歷：

[ps://www.iam.ntu.edu.tw/zh/component/content/article/166-menber/professors/professor-info/1197-jian-zhang-chen?Itemid=819](https://www.iam.ntu.edu.tw/zh/component/content/article/166-menber/professors/professor-info/1197-jian-zhang-chen?Itemid=819)

<https://iamjzc105a.wixsite.com/website>



市場及需求：本技術可用於鹼性電解水及陰離子交換膜水電解之觸媒，也能用於過濾材之快速親水處理

技術摘要(含成果)：利用高能效的微波電漿（MP）過程來改進由不銹鋼纖維紙（SSP）製成的具有析氧反應（OER）催化活性的氣體擴散層或多孔傳輸層（PTL）。經氬氣微波電漿（SSP-ArMP）處理的 SSP 表現出更低的過電位、降低的 Tafel 斜率、更低的電荷轉移電阻（ R_{ct} ）和更高的雙層電容（ $2C_{dl}$ ）。在 70°C 下，陰極濕式和陰極乾式 AEMWE 操作分別在 1.80 V 和 1.86 V 時達到 1000 mA/cm^2 ，對應的氬氣生產能耗分別為 46.67 和 47.96 kWh/kgH₂。陰極濕式和陰極乾式操作顯示出相似的穩定性特徵。

優勢：本技術可直接用氣體擴散層當作觸媒層，不需另外鍍觸媒，沒有觸媒層剝落的問題，具長時間穩定性。另外，本技術製程只需約 15 秒，就可增加水電解的效能。

競爭產品：NiFe 觸化劑塗佈氣體擴散層

專利現況：

專利申請中

聯絡方式(請不用填)：

臺大產學合作總中心

Tel: 02-3366-9945, E-mail: ordiac@ntu.edu.tw

本資料僅供國立臺灣大學專利/技術申請使用，嚴禁使用全部或部分內容於其他用途。若有疑問請與我們聯繫，我們將盡力協助您。



Microwave plasma processed stainless steel fiber paper for alkaline water electrolysis

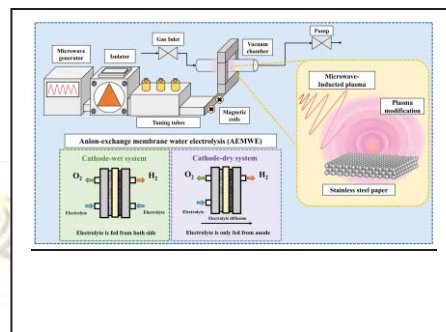
PI : Prof. Jian-Zhang Chen

Institute of Applied Mechanics, National Taiwan U.

Experience:

[ps://www.iam.ntu.edu.tw/zh/component/content/article/166-member/professors/professor-info/1197-jian-zhang-chen?Itemid=819](https://www.iam.ntu.edu.tw/zh/component/content/article/166-member/professors/professor-info/1197-jian-zhang-chen?Itemid=819)

<https://iamjzc105a.wixsite.com/website>



Market Needs: This technology can be applied as self-catalyzed gas diffusion layer (porous transport layer). No additional catalyst layer is required for water electrolysis. This technology can also applied for ultrafast hydrophilicity surface processing of filtering porous felt.

Our Technology: Anion exchange membrane water electrolysis (AEMWE) shows great potential for water splitting. The catalyst layer (CL), porous transport layer (PTL), and design of the operation system are crucial for advancing AEMWE technology. In this study, we propose a technique in which a rapid high-energy-efficiency microwave plasma (MP) process is used to improve a PTL made of stainless steel fiber paper (SSP) with catalytic activity for the oxygen evolution reaction (OER). SSP treated with Ar microwave plasma (SSP-ArMP) demonstrated a lower overpotential, reduced Tafel slope, lower charge transfer resistance (R_{ct}), and higher double-layer capacitance ($2C_{dl}$). At 70°C, cathode-wet and cathode-dry AEMWE operation reaches 1000 mA/cm² with 1.80 V and 1.86 V, corresponding to hydrogen production energy consumption of 46.67 and 47.96 kWh/kgH₂, respectively. Both cathode-wet and cathode-dry operations showed similar stability characteristics.

Strength: This technology can directly apply gas diffusion layer as the catalyst without the need for additional catalyst for water electrolysis. Therefore, no peeling problem exists such that it possesses long term stability. This technology processing time requires only 15 s to improve the performance of water electrolysis.

Competing Products: NiFe-coated gas diffusion layer.

Intellectual Properties: Patent pending

Contact (do not need to fill out):

Center for Industry-Academia Collaboration, NTU

Tel: 02-3366-9945, E-mail: ordiac@ntu.edu.tw

This information herein is intended for potential license of NTU technology only. Other usage of all or portion of this information in whatever form or means is strictly prohibited. Kindly contact us and we will help to achieve your goal the best we can.