

Membrane Electrode Assembly with Enhanced Membrane/Electrode Interface for PEM Fuel Cells

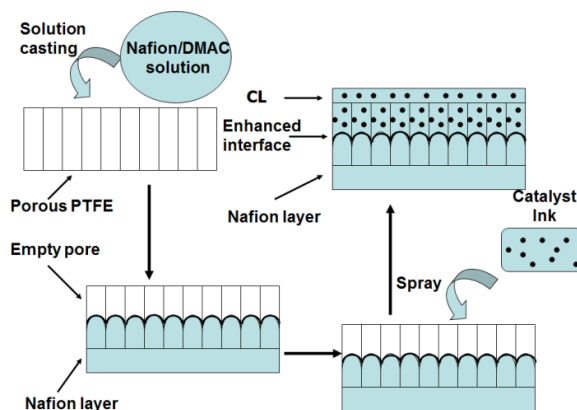
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A novel structure for the membrane electrode assembly (MEA) of proton exchange membrane (PEM) fuel cells was developed by incorporating a porous PTFE matrix within the MEA. The highly porous structure of the PTFE matrix enhanced the membrane/electrode interface on the cathode side of the MEA by increasing the electrochemically active surface area (ESA) of the cathode catalyst. Moreover, the enhanced membrane/electrode interface is expected to improve the mechanical and electrical contact and create stronger bonding between the membrane and the electrode. Scanning electron microscope images confirmed the structure of the enhanced membrane/electrode interface. Cyclic voltammetry showed that the PTFE-enhanced interface resulted in a threefold increase of the cathode's electrochemical surface area (ESA). Higher ESA resulted in higher catalyst activity, which improved the performance of the novel MEA by 20% in comparison with the traditional MEA.



Schematic of the preparation method for the MEA with enhanced membrane/electrode interface