

## Fuel cell performance analysis of carbon composite GDL for PEMFC

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Polymer electrolyte membrane fuel cell (PEMFC) can be used as power source for electric vehicle and small power plant in house or building. It produces electricity, heat and water from hydrogen as fuel and oxygen (usually air) by electrochemical reaction. Membrane electrode assembly(MEA), which is the heart of PEMFCs, consists of catalyst, polymer electrolyte membrane and gas diffusion layer(GDL). The functions of GDL are to act as a gas diffusion media, provide mechanical support, provide an electric pathway, and channel product water away from the electrodes. The GDL is typically carbon-based material, and usually in cloth or paper form.

We propose new concept of GDL and simple manufacturing process of porous carbon composite type. Carbon composite type GDL was successfully prepared from carbon black, graphite, KCl, polymer binder and plastic mesh. The graphite and carbon black powder were homogenized in polymer binder solution, and put them on plastic mesh to make sheet.

A catalyst layer was coated on the new type of the GDL by air spraying until Pt loading reached to  $\sim 0.3\text{mg/cm}^2$ . MEA was prepared by hot pressing the electrode with Nafion 112. The MEA was tested at  $80^\circ\text{C}$  with flowing humidified hydrogen and air. Carbon composite GDLs were characterized by various analyses such as fuel cell test, air permeability, conductivity, porosity, etc. Detail results will be discussed at conference.