



Technology Summary: Gas Diffusion Layer for PEM Fuel Cells

Opportunity Statement

Gas diffusion layers (GDLs) are key components in PEMFCs. GDLs bring the gaseous reaction media (hydrogen and air) to the catalytically active layers, and at the same time establish an electrical contact between the catalytically active layers. One of the basic materials most widely used for GDLs, **carbon paper**, has remained virtually unchanged over the past three decades.

GDLs have the following key roles in PEMFCs:

- Catalyst layer support
- Gas permeability
- Mechanical and chemical durability
- Electrical and heat conductivity

Problem

Carbon papers have high stiffness, but they also have poor elasticity and are brittle. On application of pressure, carbon papers tend to break down, which results in poor electrical conductivity. Many conventional carbon papers employed in PEMFCs are too fragile to be processed in a roll-to-roll fashion, thus making them less suitable for mass production. In summary, the main limitations of carbon paper include:

- Cost
- Poor elasticity
- Brittleness
- Inflexibility

Therefore, there is a need for a technological solution which addresses the limitations of cost and performance of carbon paper in PEMFC applications.

360ip's Partner Solution

360ip's Partner has developed a novel process for manufacturing carbon paper with a lower cost and better performance compared to conventional carbon paper. The carbon paper produced according to this technology provides advantages of low specific resistance, high strength and uniform porosity.

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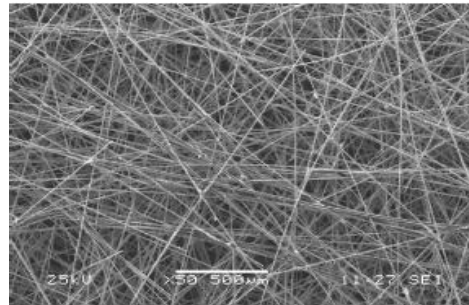
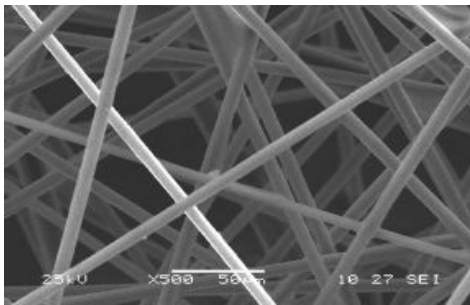
The 360ip Partner's solution addresses the limitations of current carbon paper through the following:

- Specific resistance: As low as 2.7mΩcm
- Air permeability at room temperature of more than 2036 to 2853 ml.mm/(cm²·hr·mmAq)
- Porosity of 75-78%
- Bending strength of more than 45MPa
- Ability to accommodate roll-to-roll processing
- Energy density comparable to that of the competitor's under identical conditions

Compared to existing commercially available fuel cell carbon papers, the Partner's technology can provide the following advantages:

- Improved elasticity and lower brittleness
- Improved electrical conductivity
- Improved strength to help in mass production
- Lower cost

SEM of Partner's carbon paper preform



Patents

360ip's Partner has filed one patent on the process.

Summary

360ip's Partner has developed a novel technology to manufacture carbon paper with lower cost than conventional processes. The performance of carbon papers made from this novel approach has been proven to match or surpass that of conventional carbon papers.

360ip is seeking interested parties for the licensing, further development and commercialization of this technology-based solution.

For additional information, contact:

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