

Die-cast axial compression process for standalone monolithic diffusion layer integrating microporous and gas diffusion layers

IITM Technology Available for Licensing

Problem Statement

- Current methods of coating Micro Porous Layers (MPL) onto Gas Diffusion Layers (GDL) in PEMFCs lack uniformity, leading to issues such as uneven thickness, crack formation, and water accumulation.
- The bilayer system of MPL and GDL results in high material costs, poor control over properties, and water accumulation at interfaces, affecting fuel cell performance.
- There is a need to develop a cost-effective, mechanically stable, and uniformly thick standalone monolithic diffusion layer (SMDL) that combines the functions of MPL and GDL to address these issues.

Intellectual Property

- IITM IDF Ref. 1650
- IN 466746 - Patent Granted

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Technology Category/ Market

Category - Advanced Materials

Applications- Aerospace, Automotive

Industry- Energy Storage, Automotive, Industrial Automation

Market - PEM Fuel Cell Market size valued at USD 3.06 billion in 2023 and is estimated to grow at over **8.3% CAGR** from 2024 to 2032.

Research Lab

Prof. Prathap Haridoss,
Dept. of Metallurgical and Materials Engineering

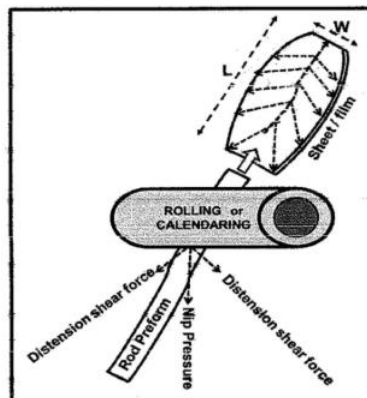
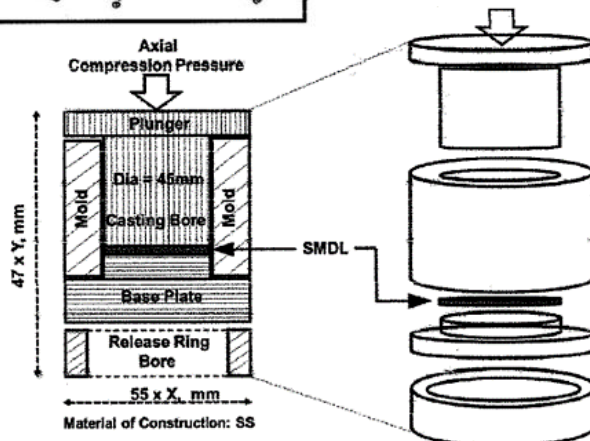


FIG. 1. Rolling / Calendaring of a Preform to sheet. Die Cast Axial Compression Mould.

FIG. 2. Die Cast Axial Compression Mould.



Technology

1

Current methods of coating MPL onto GDL lack uniformity, resulting in uneven thickness and crack formation, leading to water accumulation and reduced fuel cell performance.

2

The bilayer system of MPL and GDL incurs high material costs and lacks control over properties, affecting fuel cell efficiency.

3

Developing a cost-effective, mechanically stable, and uniformly thick SMDL combining MPL and GDL functions is essential to address these issues and improve fuel cell performance.

CONTACT US

Dr. Dara Ajay, Head-TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpiis.iitm.ac.in
sm-marketing@imail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719

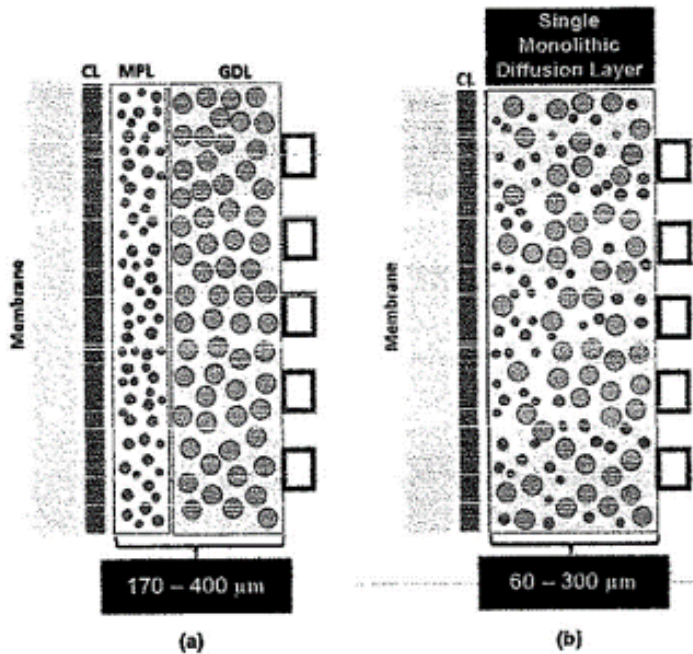


FIG. 3. Schematic of (a) Conventional MPL-GDL Bilayer; (b) SMDL of this Invention.

Key Features / Value Proposition

1. Uniform Coating Technology:

Revolutionizes PEMFC manufacturing with a process for uniformly coating MPL onto GDL, ensuring consistent thickness and reducing crack formation.

2. Cost Efficiency:

Drastically reduces material costs by eliminating the need for separate MPL and GDL layers, making fuel cell production more economical.

3. Enhanced Performance:

Improves fuel cell efficiency and durability by providing a mechanically stable SMDL with optimized porosity and conductivity.

4. Water Management:

Solves water accumulation issues with improved water transport properties, preventing pore clogging and maintaining optimal performance.

CONTACT US

Dr. Dara Ajay, Head-TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:

<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in

sm-marketing@imail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719