ALBERTA INNOVATES

CLEAN RESOURCES

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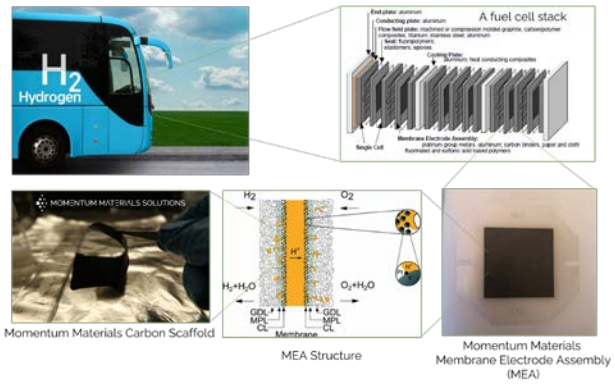
HYDROGEN

FUNDING DETAILS

Development of Precisely Controlled Membrane Electrode Assembly for High Performance and Durable Hydrogen Fuel Cells

The world is currently racing towards net-zero emission goals, translating to significant momentum in the hydrogen fuel cell market. The heart of these fuel cells is the membrane electrode assembly (MEA) where hydrogen conversion occurs, generating clean and reliable power. Momentum Materials Solutions, a Calgary start-up company, is developing a new generation MEA based on a novel and proprietary nanoporous and self-supported carbon scaffold with a controllable porous structure. Unlike conventional MEAs, we are introducing precise control into these new generation MEAs through nano-engineering, resulting in ultra-high performance and lifetime, bringing an extraordinary fuel cell experience to end users.



RECIPIENT:
Momentum Materials Solutions

PARTNERS:
None

TOTAL BUDGET:
$1,000,000

AI HCOE FUNDING:
$500,000

PROJECT DATES:
FEB 2023 – JAN 2025

PROJECT TRL:
Start: 4
End: 6

APPLICATION

The membrane electrode assembly (MEA) is the core component of a proton exchange polymer (PEM) fuel cell and thus plays a critical role in the fuel cell performance. PEM fuel cell utilize hydrogen gas and air to efficiently, quietly and reliably produce electricity. The only by-products are water and heat. PEM fuel cells are ideally suited for both transportation and stationary applications, including private & commercial vehicles, ships, trains, airplane, and more.

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PROJECT GOALS

To further improve the performance and lifetime while reducing the production cost of membrane electrode assemblies (MEAs), better control and design of the MEA structure, specifically the catalyst and the proton-conducting ionomer loading and distribution within our nanoporous carbon scaffold, are still needed. These critical features have been optimized by the fuel cell community, but only for carbon powder based MEAs, rather than a self-supported carbon sheet, with MMS being unique in the world in moving in this new direction. The overall goal of this work is to develop methods that allows us to precisely control both the catalyst and ionomer loading and placement within our nanoporous carbon scaffolds, then identifying the most economic, reproducible and scalable methods for future MEA product manufacturing.

BENEFITS TO ALBERTA

Our project aligns fully with Alberta's planned hydrogen pathway. Furthermore, the IP generated from this project will help us build a successful product that will make a significant contribution to Alberta's net-zero emissions goals and will be transferred into accumulative > $100 M income in 10 years, making a major contribution to Alberta's GDP. This will also result in more jobs for Albertans and will attract new talent to Alberta, while also serving as a good example of Alberta's support of female-founded start-ups and highly diverse teams. Producing high performance MEAs in Alberta will also promote the adoption of hydrogen fuel cell electric vehicles and energy storage solutions in Alberta and Canada, while also lowering GHG emissions and improving sustainability overall.

1 Student Trained

2 Patents

5-10 Project Jobs

30-50 Future Jobs

3 New Products/Services

3 Publications

3–3.6 kt/yr Project GHGs Reduced

10k-11k kt/yr Future GHGs Reduced

CURRENT STATUS

JAN 2023

Preparation for project start.