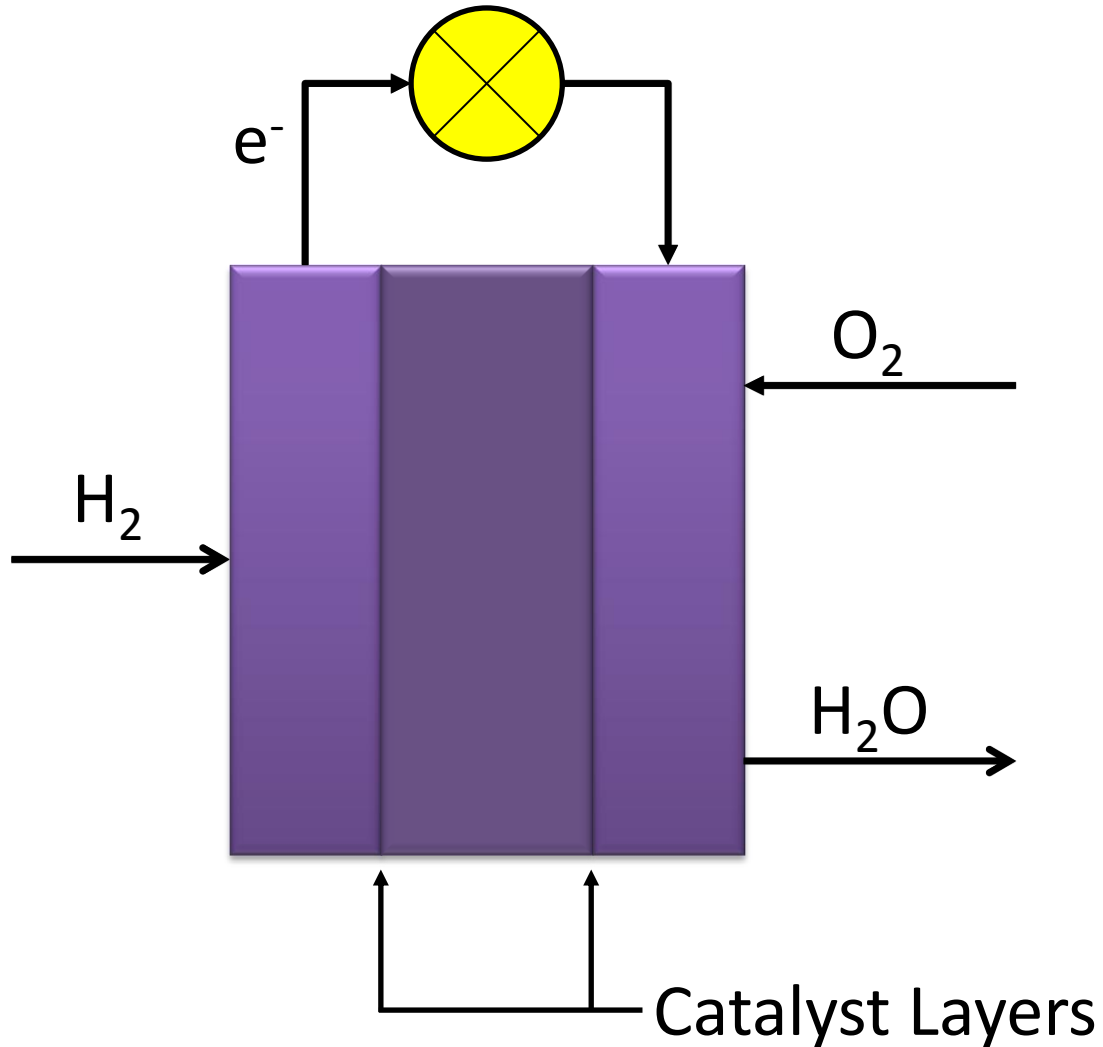


Modelling of a 5 Cell IT-PEFC Stack

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PEFCs



Introduction

Design an MEA that

Operates at 120°C

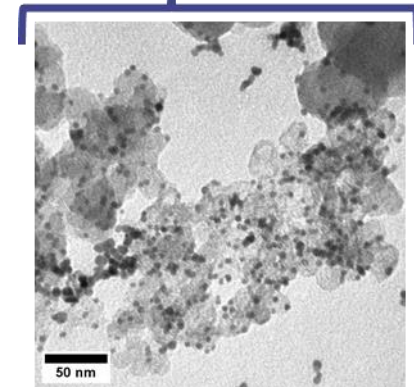
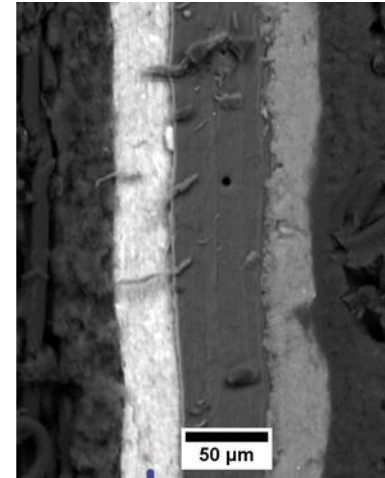
Lowers BoP requirements

Be highly durable

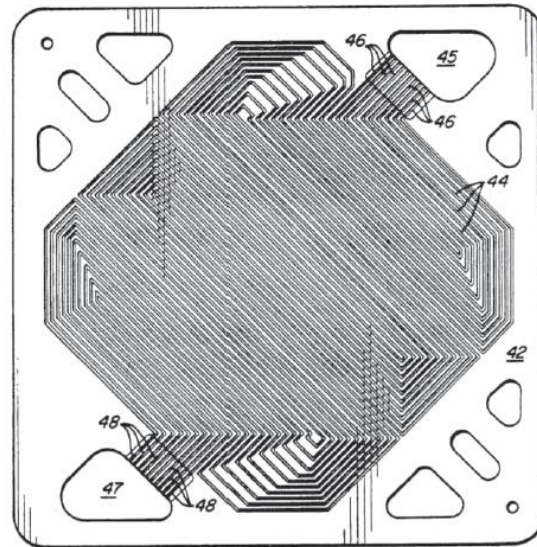
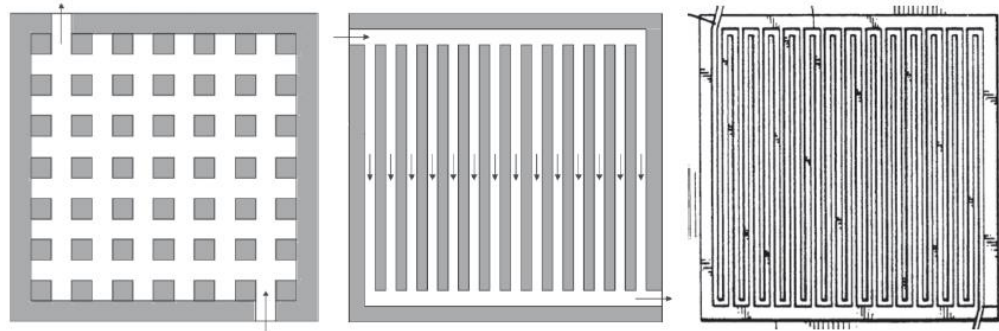
Long Lasting

High Efficiency

High Power

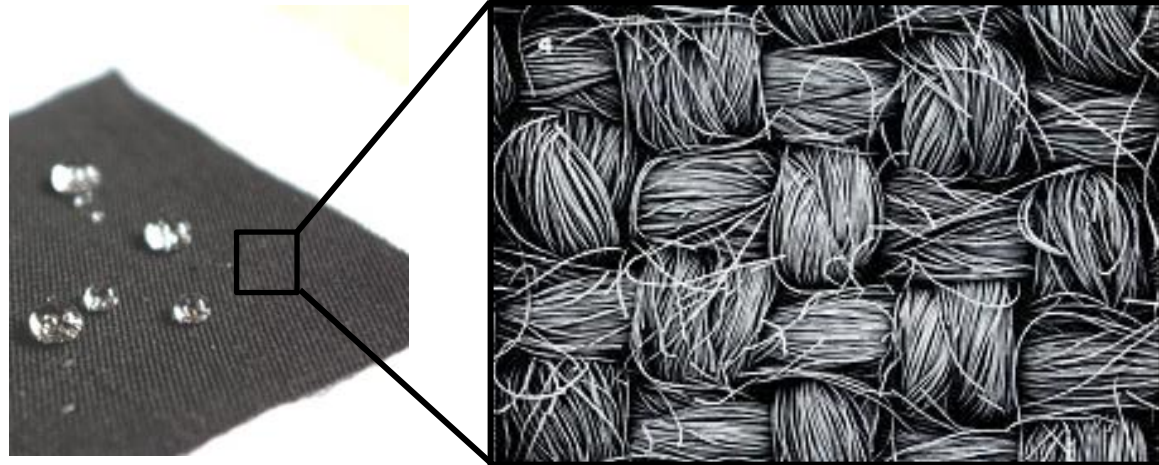


Flow Fields

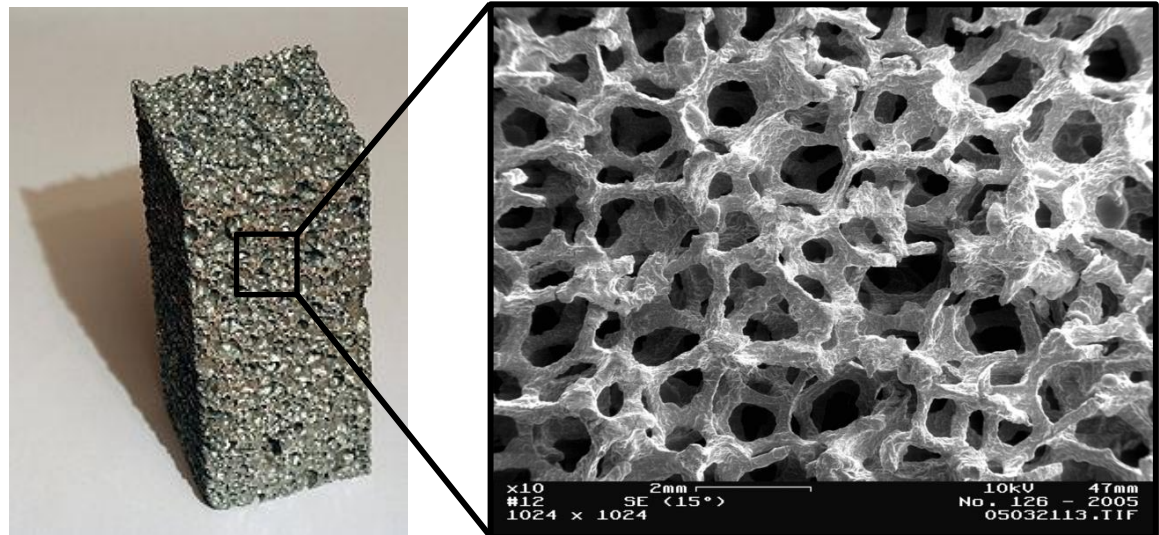


Gas Diffusion Layers

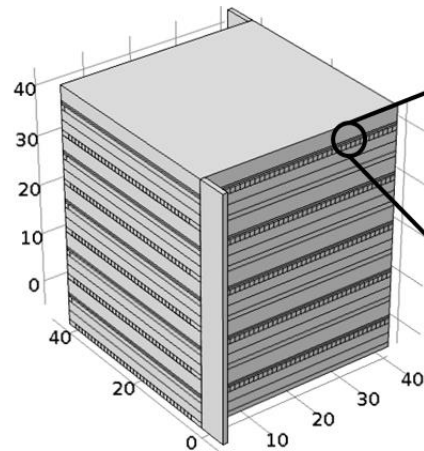
Conventional
Carbon



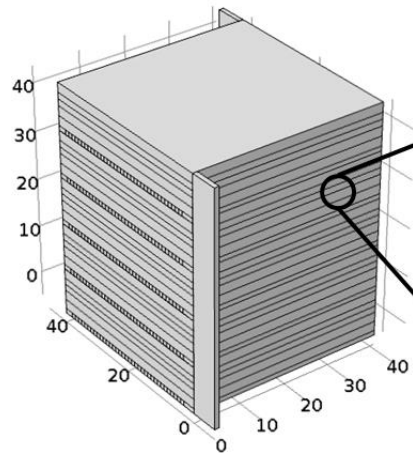
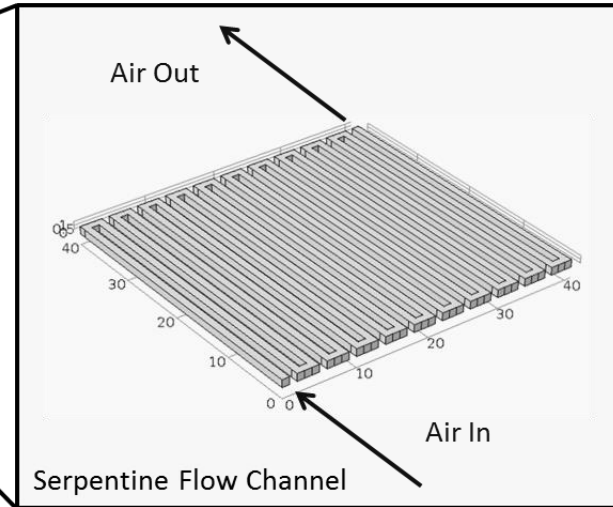
Metallic
Foam



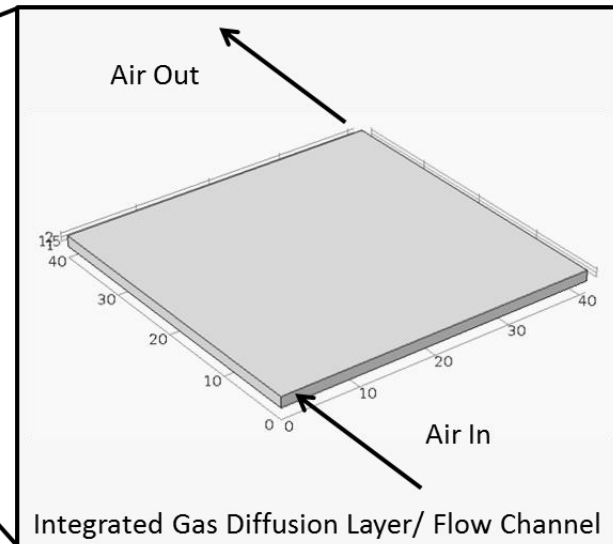
The Model



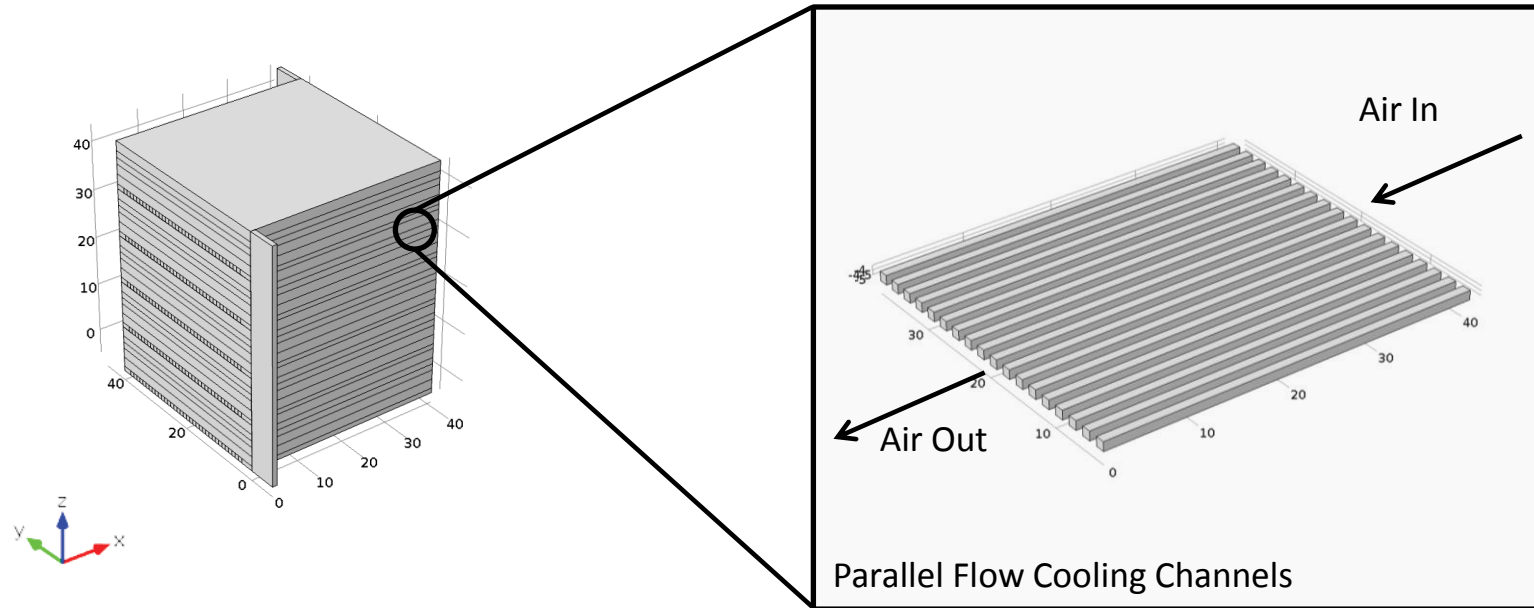
a) Conventional Stack Design



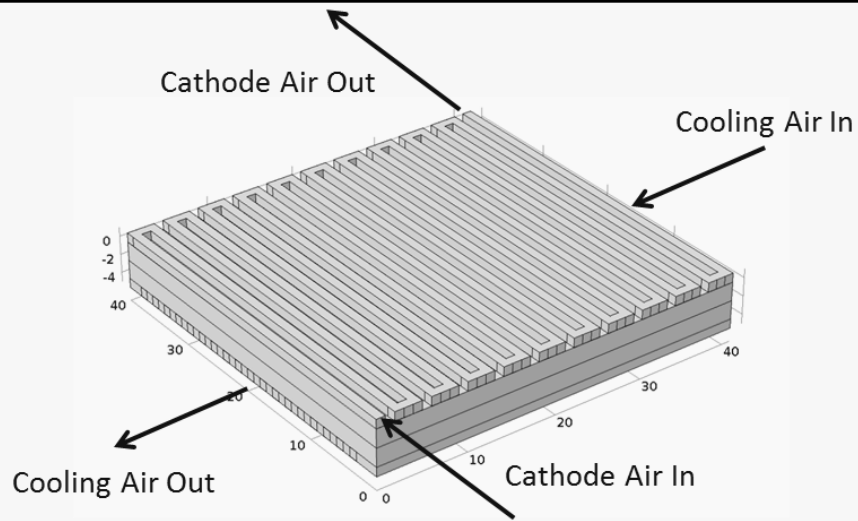
b) Novel Stack Design



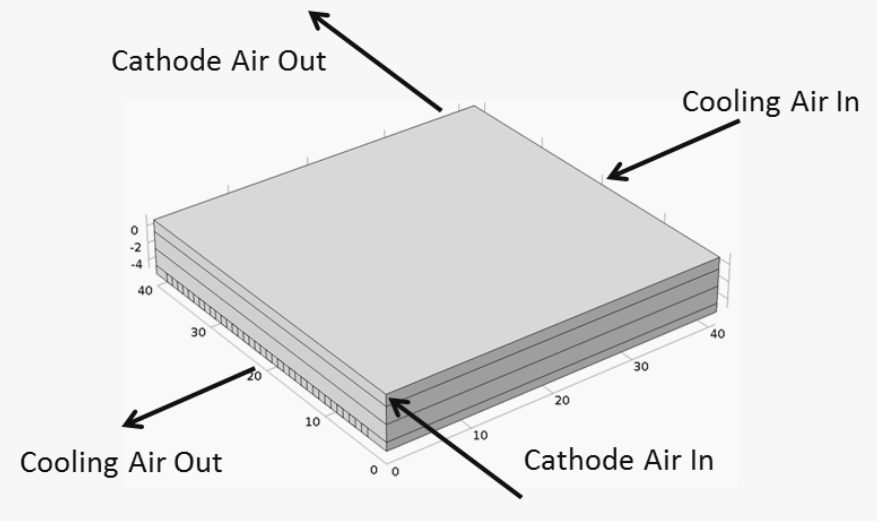
The Model



The Model



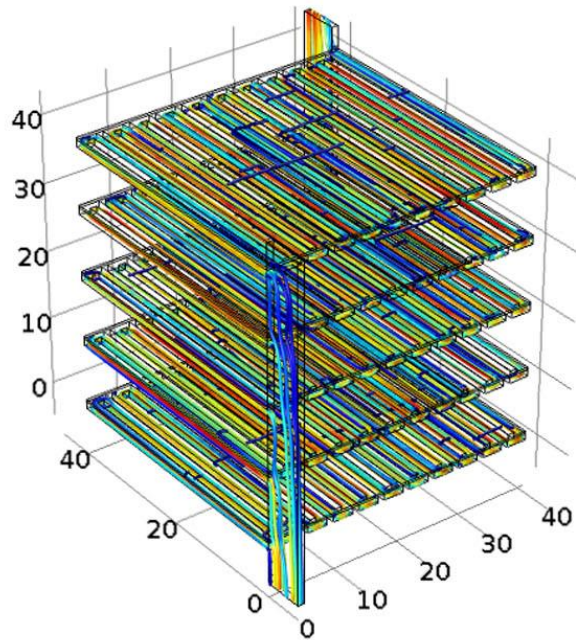
a) Conventional Stack Design



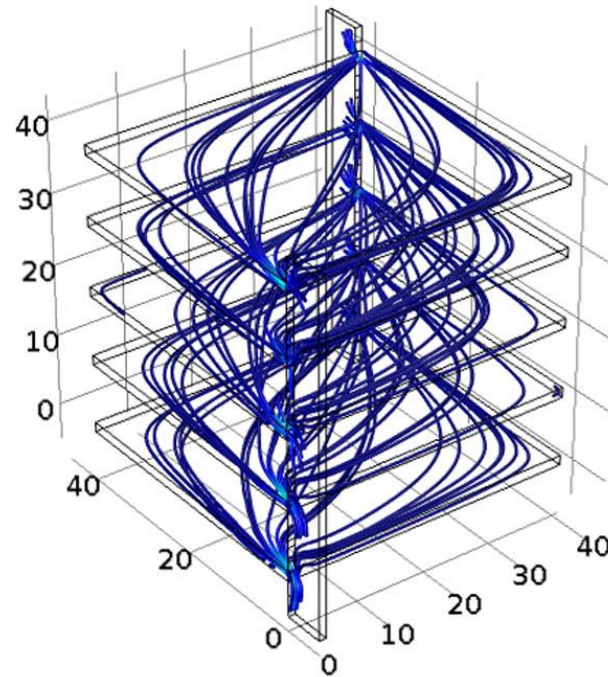
b) Novel Stack Design



Velocity



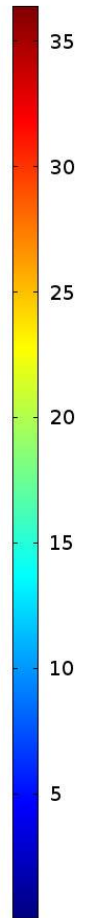
A - Conventional Flow Field/GDL



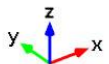
B - Integrated Flow Field/GDL

Velocity / m/s

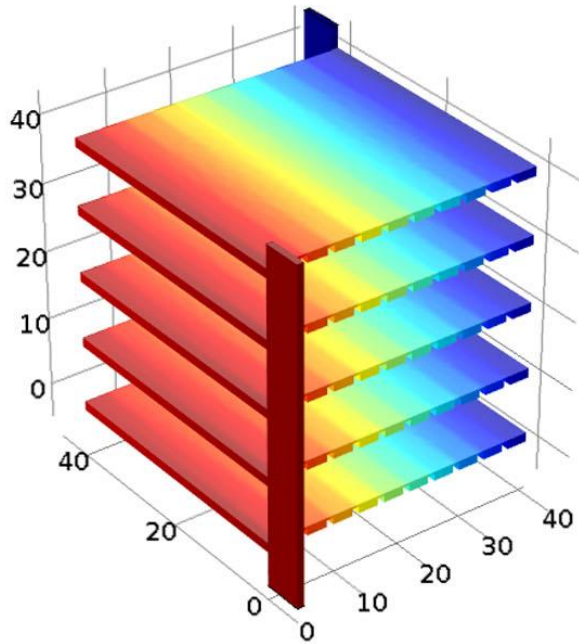
▲ 36.371



▼ 1.199×10^{-5}

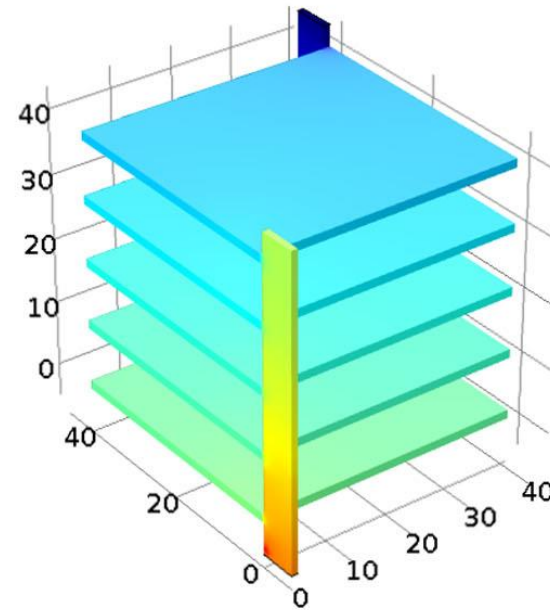
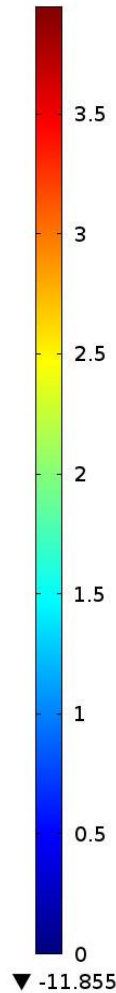


Pressure



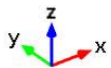
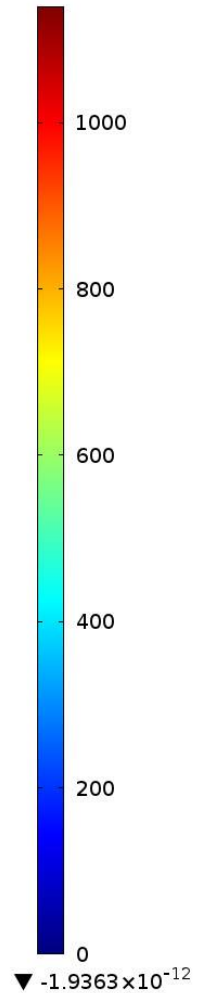
A - Conventional Flow Field/GDL

Pressure / Pa
 $\blacktriangle 3.9442 \times 10^4$
 $\times 10^4$



B - Integrated Flow Field/GDL

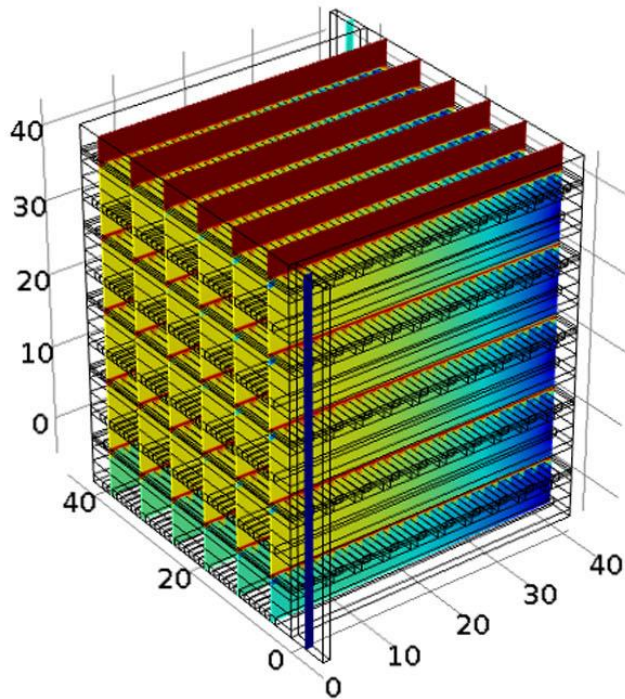
Pressure / Pa
 $\blacktriangle 1138.6$



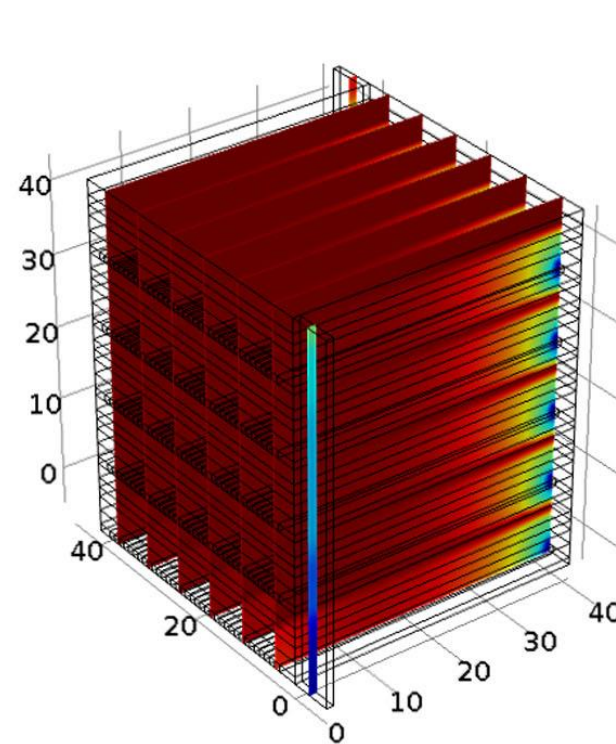
Temperature

Temperature / K

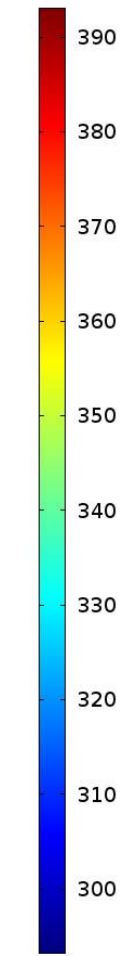
▲ 392.99



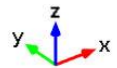
A - Conventional Flow Field/GDL



B - Integrated Flow Field/GDL



▼ 293.15



Conclusions

Integrated flow field/GDL:

Improved flow characteristics

Simplified thermal management

Increased system efficiency

Simpler system management

Future Work

Integrated flow field/GDL

Optimisation of stack flow

Optimisation of stack gas manifold

Optimisation of stack cooling

Further investigation into electrochemical
importance of the GDL

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- Advantage WM

EPSRC

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Thank You For Listening!

Any Questions?

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