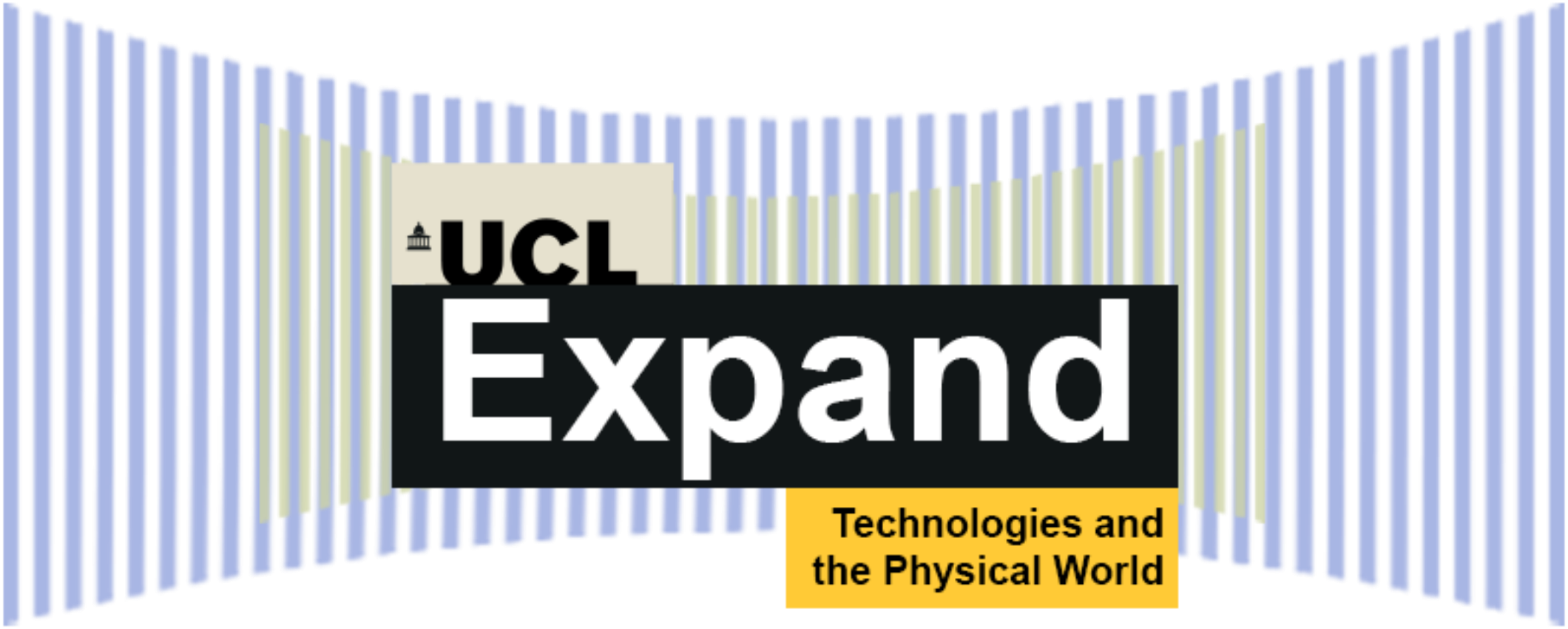

Fuel Cells: The future of Hydrogen Energy

Introduction

My name is Llŷr Gwynedd – pronounced Lear

1st year PhD Student at UCL

Electrochemical Innovation Laboratory (EIL) member studying Hydrogen Fuel Cells.

Why are you here?

Why are you here?

- What brings you to the Technologies and Physical World?
- General love of Science and Technology? Something specific?
- What makes you want to get into science, technology or engineering?

Rewind

- Let’s get to know eachother!

- Don’t be shy

Let’s play

2 Truths 1 Lie

How to play?

Each person must think of 2 truths and 1 lie about themselves.

The group will try guessing the lie.

Pair up

To further get to know each other…

- Find a partner (or 3s)

- Introduce yourselves

- Discuss what makes science, technology or engineering interesting to you. Find out which subject (e.g maths, physics, biology) and/or topic (e.g materials, nanotechnology, energy) they are interested in.

Reminder - Why are you here?

- What brings you to the Technologies and Physical World?
- General love of Science and Technology? Something specific?
- What makes you want to get into science, technology or engineering?

Our aims

- Four online sessions

- Focusing on four important skills in higher education
  - Research and Analysis
  - Critical Thinking
  - Academic Writing
  - Presenting Findings

Project

- Present a 10-minute talk on research around fuel cells
- Content is delivered today and throughout the online sessions
- Additional background research is expected

Topic – Hydrogen Fuel Cells

Starting with the basics

1. What is the purpose of a hydrogen fuel cell?

   Discuss amongst yourselves

Topic – Hydrogen Fuel Cells

Starting with the basics

1. What is the purpose of a hydrogen fuel cell?

   To generate electricity/power using hydrogen as the fuel

Topic – Hydrogen Fuel Cells

Starting with the basics

2. What are the benefits of generating electricity using hydrogen fuel cells?

   Discuss amongst yourselves – use the post-it notes to jot down some ideas

Topic – Hydrogen Fuel Cells

Benefits of Hydrogen Fuel Cells

- No harmful emission – no CO_2 or other greenhouse gases
- Higher energy efficiency than internal combustion engines
- Wide variety of sources for hydrogen
- Hydrogen can be used to store energy

Topic – Hydrogen Fuel Cells

Starting with the basics

3. What are some considerations of generating electricity using hydrogen fuel cells?

   Discuss amongst yourselves – use the post-it notes to jot down some ideas

Topic – Hydrogen Fuel Cells

Considerations of Hydrogen Fuel Cells

- Storage and transport of hydrogen can be expensive
- Lower energy efficiency than Lithium-ion batteries
- Some methods of producing hydrogen generate greenhouse gasses

Light reading

Read the sections:
“What is a Fuel Cell?” page 10 and
“The Challenges of Hydrogen” pages 11-13

taken from H_2 Educate *(2015)*

Using this research summary, try to complete the related worksheet.

What did we learn?

From the research snippet:

What is a PEMFC?

What did we learn?

From the research snippet:

What is a PEMFC?

Proton **E**xchange **M**embrane **F**uel **C**ell or

Polymer **E**lectrolyte **M**embrane **F**uel **C**ell

What did we learn?

From the research snippet:

What material is the catalyst usually made of?

What did we learn?

From the research snippet:

What material is the catalyst usually made of?

Platinum

What did we learn?

From the research snippet:

Describe a way hydrogen can be stored.

What did we learn?

From the research snippet:

Describe a way hydrogen can be stored.

1. In a gas tank (compressed or at standard pressure and temperature)
2. Liquefied by compressing and cooling
3. Stored in material-based technologies

What did we learn?

From the research snippet:

What are some of the physical properties of hydrogen?

What did we learn?

From the research snippet:

What are some of the physical properties of hydrogen?

1. Odourless
2. Colourless
3. Tasteless

What did we learn?

From the research snippet:

What are some of the physical properties of hydrogen?

1. Odourless
2. Colourless
3. Tasteless

Why might these properties be important to consider when working with hydrogen?

What did we learn?

From the research snippet:

Reducing the cost of hydrogen, reducing the cost and durability of fuel cells, and improving hydrogen storage technology are all important factors that need to be addressed for a successful future with hydrogen. What is another important factor?

What did we learn?

From the research snippet:

Of course, Educating consumers.

What did we learn?

From the research snippet:

Of course, Educating consumers.

This also includes you!

What next?

In our next sessions,

1. Discussing hydrogen generation and storage technology
2. The basic of fuel cells and various types
3. Integration of fuel cells into modern society and the prospect of a hydrogen economy

Next steps

Before our next session…

Review the information you have been presented today and get involved in your own research!

What's coming up?

Drop-in sessions are run on the following evenings from 6pm – 7pm.

Monday 26th February

Monday 4th March

Monday 11th March

Monday 18th March

Monday 25th March

Your next subject session will be on the 21st of February from 6pm – 7:30pm.

Any questions?

If you need any support, or have any further questions, please don't hesitate to send the UCL Expand Team an email at wp.post16@ucl.ac.uk or drop us a text on **07857630033.**