UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

LIFC – Interdepartmental Laboratory on Fuel Cells and Hydrogen

Enhancing performances and usability of Fuel Cells for clean energy production: novel CARbon based COmposite Materials for Bipolar Plates (**CARCOM**)

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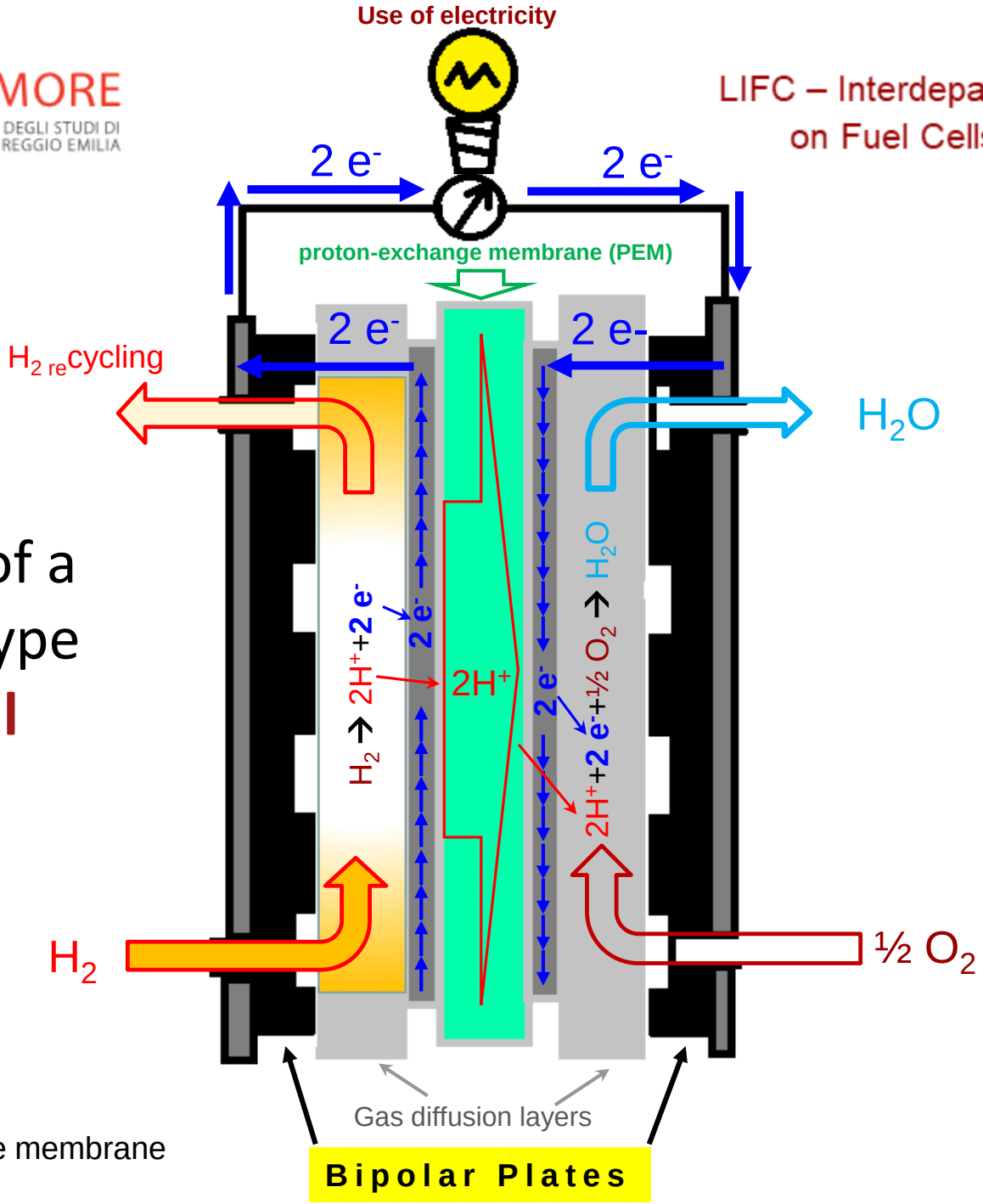
CARCOM is a two year project, funded by **Fondazione Cassa di Risparmio di Modena (FCRMO)** in 2019, with the aims of improving the performances and lowering the cost of **bipolar plates (or flow field plates)**, that are among the main components of **Fuel Cells (FC)**.

Fuel cells (FCs) are devices capable of **producing electricity directly** from a reaction between a fuel (as hydrogen) and a comburent (as oxygen in the air) and only water as a "waste". **FCs** can be used to power any electrical load, in particular electric motors (cars, forklifts, trains, etc.), but also in buildings: hydrogen (by electrolysis of water) can be produced from photovoltaics in surplus during the day, to obtain electricity from the stored hydrogen at any time.

Sketch of a PEM*-type **Fuel Cell**



* proton-exchange membrane

Bipolar Plates constitute an essential part of the **FC** and account for about the 35% of the overall cost and the 80% of the weight. Among their functions are: conducting electricity, transporting the gases that must react (hydrogen and oxygen) and eliminating the water produced. It should be noted that the various functional components of the cell, and the **Bipolar Plates** in particular, are not independent parts, but must be perfectly integrated and adapted to each other.

CARCOM aims at the improvement of the performances of **Bipolar Plates** based on composites formed by carbon derivatives, graphite and other allotropes, and epoxy resins, to be used in proton-exchange membrane **FC** (**PEM-FC**).

Another goal of this project is to evaluate the conditions favoring the entry in the market of the new **CARCOM** solution as a component of **PEM-FC**.

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