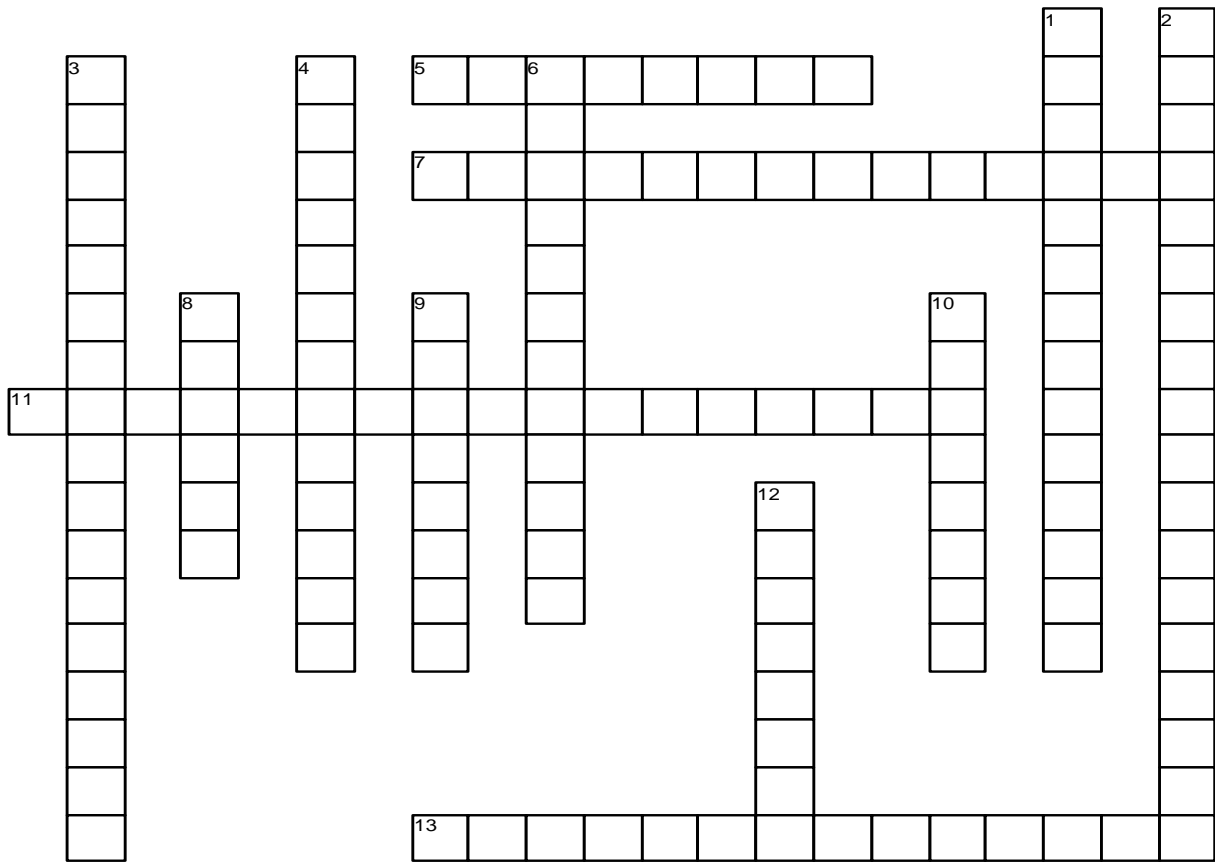


# Fuel Cells and Advanced Technologies

## Chapter 19



<http://jameshalderman.com>

### ACROSS

- 5 A \_\_\_\_\_ is an electrochemical device in which the chemical energy of hydrogen and oxygen is converted into electrical energy.
- 7 Hydrogen is an excellent fuel because it has a very high \_\_\_\_\_ when compared to an equivalent amount of fossil fuel.
- 11 The part of the PEM fuel cell that contains the membrane, catalyst coatings, and electrodes is known as the \_\_\_\_\_ Assembly (MEA).
- 13 The fuel-cell design that is best suited for automotive applications is the \_\_\_\_\_ Membrane (PEM).

### DOWN

- 1 \_\_\_\_\_ cells are based on double-layer technology, in which two activated carbon electrodes are immersed in an organic electrolyte.
- 2 The Proton Exchange Membrane fuel cell is also known as a \_\_\_\_\_ Fuel Cell (PEFC).
- 3 \_\_\_\_\_ Compression Ignition (HCCI) is a combustion process.
- 4 While hydrogen can be used as a fuel, it is not an energy source. Instead, hydrogen is only an \_\_\_\_\_, as energy must be expended to generate the hydrogen and store it so it can be used as a fuel.
- 6 The chemical reaction in a fuel cell is the opposite of \_\_\_\_\_.
- 8 A fuel-cell vehicle (FCV) uses the fuel cell as its only source of power, whereas a fuel-cell \_\_\_\_\_ vehicle (FCHV) also has an electrical storage device that can be used to power the vehicle.
- 9 A single fuel cell by itself is not particularly useful, as it generates less than 1 volt of electrical potential. It is more common for hundreds of fuel cells to be built together in a \_\_\_\_\_ stack.
- 10 A \_\_\_\_\_ vehicle (FCV) uses the fuel cell as its only source of power, whereas a fuel-cell hybrid vehicle (FCHV) also has an electrical storage device that can be used to power the vehicle.
- 12 One of the major challenges for engineers in this regard is the fact that the heat generated by the fuel cell is classified as \_\_\_\_\_ heat.