

## Fuel cell technology

What are fuel cells?

- electrochemical device converting chemical energy into electrical energy
- basic elements: porous anode and cathode electrodes; electrolyte layer sandwiched between two electrodes; fuel:  $H_2/O_2$

Types of fuel cells

- classified by electrolyte
- Polymer Electrolyte Fuel Cell (PEFC), Alkaline (AFC), Phosphoric Acid (PAFC), Molten Carbonate (MCFC), Solid Oxide (SOFC)
- working conditions

Fuel cell performance

Efficiency of fuel cell

Fuel cell system

Actual fuel cell performance

- Irreversible losses: activation, Ohmic, concentration polarisations

Efficiency of actual fuel cell and fuel utilisation

Worked example 1

Worked example 2

Fuel cell systems

Hydrogen economy

Methods of hydrogen production

- steam reform, biomass conversion, reverse of fuel cell

Hydrogen storage

- compressed gas, metal hydride, liquid hydrogen