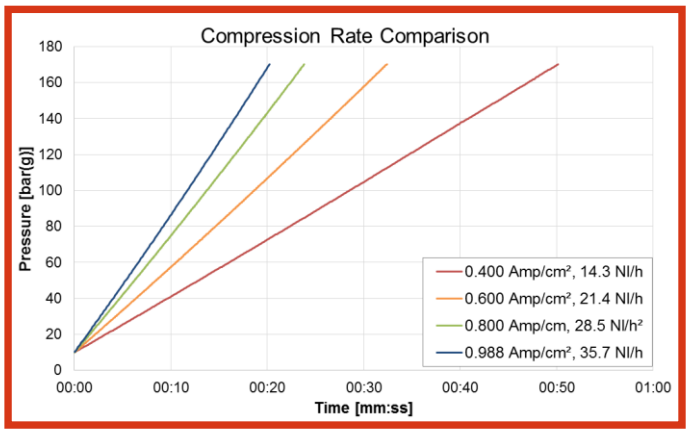
HySA Electrochemical Hydrogen Compression: Generation 2 System

HySA Infrastructure
Hydrogen South Africa

Introduction

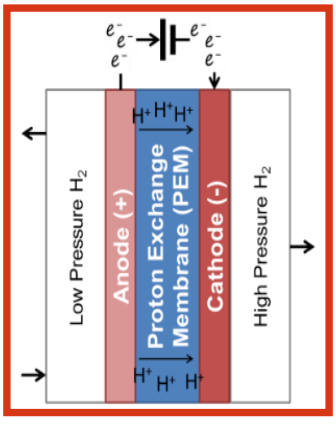
A promising possibility to utilize PGM as electro-catalysts is to electrochemically compress hydrogen to reduce hydrogen storage costs. The same principle can also be used for hydrogen purification.



Working principle

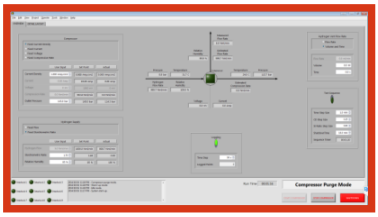
An electrochemical compressor consists of three functional components, i.e. a cathode, an anode and a membrane. The anode and cathode is connected to a DC power source that controls the current. Low pressure hydrogen is fed to the anode, where the hydrogen is oxidized to produce protons and electrons.

The proton passes through the membrane and the electrons moves through the electric circuit. At the cathode, where they are rejoined by electrons to form molecules again. This process will continued until the supply of electricity or hydrogen is stopped.



Specifications

- Discharge pressure of up to 170 Bar(g)
- Maximum compression rate of 35.7 l_N/h



Advantages

- No moving parts
- No energy losses due to friction
- Easer to eliminate product losses (easy to seal)
- Low noise level
- Suitable for small/medium scale
- Relative high efficiency
- Isothermal process
- Purifies hydrogen
- Hydrogen is not contaminated with oil
- Integrated speed control - No VSD require

Improvements for Generation 3

- Increase maximum compression rate to 178.3 l_N/h
- Improve hydrogen supply and humidification sub-system
- Reduce system footprint

Creating opportunities from South Africa's mineral wealth

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