Ariel University



Integration of Energy Case Including Hydrogen Generator

Offir Dahan, Idan Dayee Alex Schechter, Idit Avrahami

Feul Cell = An endless Battery

- batteries have low power density
- short driving range

בשומרוו

 Confined to areas with electrical power supply





Hydrogen Storage

Hydrogen Tanks:

- Very low energy density
- Inefficient and expensive
- Extremely flammable
- Volatile





H₂ Production via Chemical Reaction

- On site
- On -demand
- High energy density
- Continuous
- Field conditions
- For long duration





Hydrate Sodium + Water

Cheap, light, non-polutant Convenient reaction temperature

For example:



Theoretical production:

100 gr. Solution (water + sodium) => 10.6 gr. Hydrogen



A Mechanical Generator for an Active H₂ Production

Water + Sodium Motor Drainage

ניברסיטת

400 gr Sodium+ 200 mL water 30 Watt of continuous electrical power for about 8 hours

> Dimensions: 12X12X28 cm

Weight ~2 Kg

Energy Efficiency

1kg sodium, 2\$*
Equals in energy to
28 kg* batteries,
2800\$

Nonpolluting!!

* Projected future costs of SBH
* According to 60% efficiency of Li-ion batteries with 150 Whr / kg.

בשומרוו





Integration of Energy Case Hydrogen Generator + Fuel Cell

- Portable case for electric vehicles
- Produces hydrogen ondemand
- Fuel cell converts hydrogen into energy
- Energy used to extend range of car's battery





Energy Flow in the Energy Case





Energy Case

- Portable
- continuous for a period of 8 hrs
- Output Voltage 30 V
- Power 30 Watt
- Suspension and restraint vibrations systems
- condenser to prevent water evaporation
- Self-controlled
- Safe and Easy-to-use

Dimensions: 16 X 32 X 32 cm

Total weight: 4 kg





Pipeline





Control Logics



אוניברסיטת אריאל בשומרון

Printed Control Circuit

Flow sensor **Pressure** sensor Material 000 **Operation of:** Motor Valve controller fan • Temp sensor

אוניברסיטת אריאל בשומרון



Demonstration

The Generator



Summary

Key Benefits:

- Continuous power supply in field conditions
- Efficient, friendly, portable, light and cheap
- Even during night (or in areas without sun)

Samples for Portable Applications:

- Electric Bicycle
- SUVs and ATVs
- Agricultural machinery (remote areas)
- UAS
- Motor boats
- Military vehicles

Robots tunnels, burrows or treatment pipeline





