Electrochemical Devices

Chemical Technology

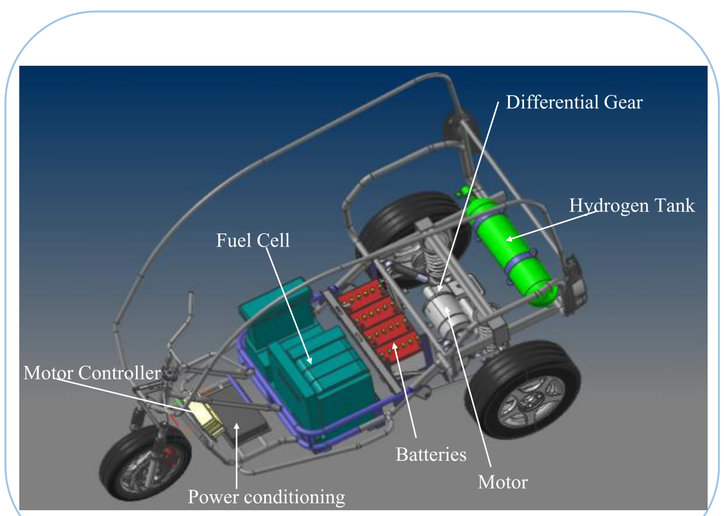
Chulalongkorn University

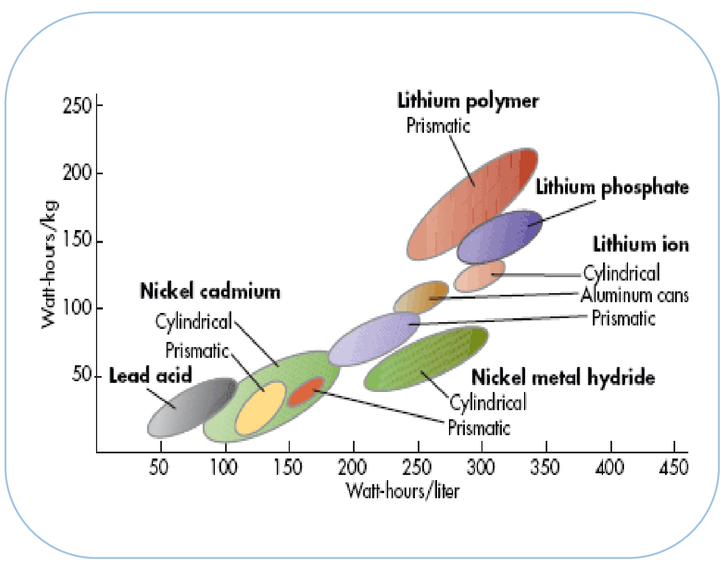
Project Goal :

To develop expertise in fuel cell, photovoltaic cell and battery technologies and to become a leading research group in the area.

Objectives :

- **To produce reliable and cost-effective fuel cells, including PEMFC and DMFC, using domestically available materials.**
- **To develop novel techniques to improve the efficiency of batteries, such as valve-regulated lead-acid and Li-polymer batteries.**
- **To further enhance the overall energy conversion efficiency of dye-sensitized photovoltaic cells by improving their sensitizing capabilities as well as to develop the large scale devices based on this technology.**
- **To develop skilled workforce for fuel cell, photovoltaic cell and battery industries and to instill environmental responsibility in them.**





Rationale :

Novel fuel cells, photovoltaic cells and batteries have been seen more and more often in commercial innovative products. Recently, they have been viewed as synergic, rather than separated and competing, technologies for alternative energy utilization. Photovoltaic cells generate electricity directly from solar energy for daytime use. The extra power is stored in batteries or is used for solar hydrogen generation for fuel cells, to meet power requirements during night time. However, the integration of technologies is still challenging. Our research group is engaged by facility units, people and collaborations required to provide the solutions for the region.

Research Themes :

- **Development of chitosan membrane / carbon composite flow field plates.**
- **Development of carbon monoxide-tolerant platinum alloy and non-platinum catalysts for oxygen reduction and hydrogen oxidation.**
- **Optimization and large scale assembly of dye-sensitized solar cells (DSSC).**
- **Development of environmentally-friendly battery.**

Equipments :

Fuel processor testing system, Fuel cell testing station, Proton conductivity measurement system, Impedance analyzer, Multi-channel scanner, Four-point probe, Potentiostat, Ultrasonic spray deposition machine, Material inkjet printer, Compression mould, ANSYS simulation software, etc.

Collaborations :

- **École Polytechnique Fédérale de Lausanne, Switzerland**
- **University of Innsbruck, Austria**
- **Yonsei University, Korea**
- **Institut Nataional Polytechnique de Toulouse, France**

Research Members :

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