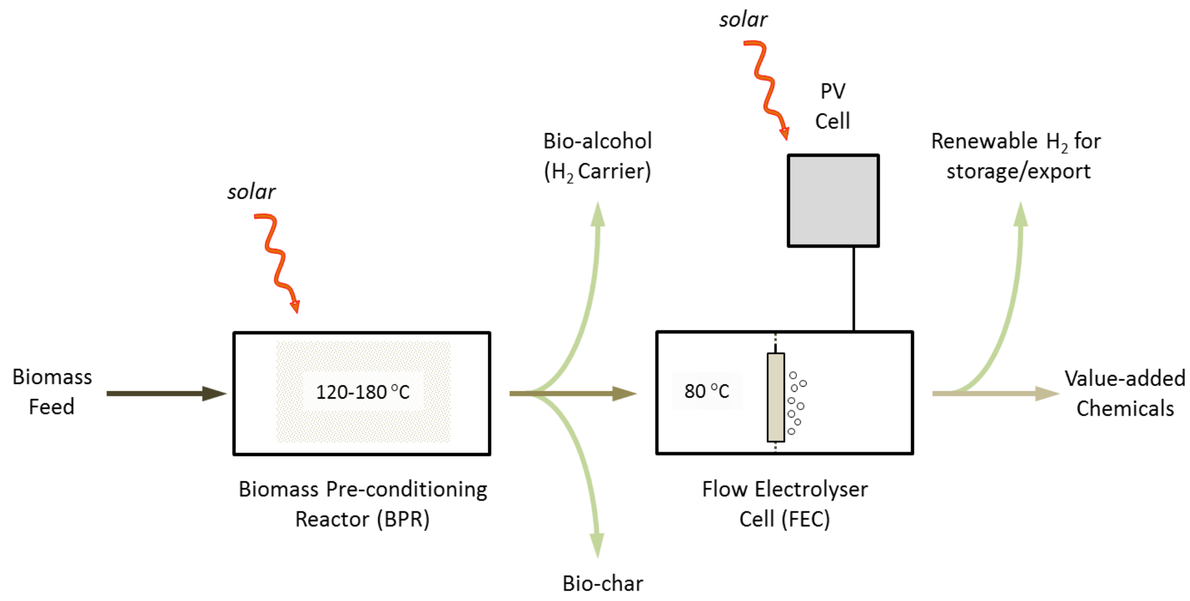
A Waste Biomass Electrolyzer for Renewable Hydrogen

Faculty of Engineering/ School of Chem Eng

A Tandem Solar-Electrochemical Biomass Electrolyzer

Transforming waste biomass into renewable hydrogen and value-added products:

- Input (waste): carbohydrates, waste food oils, agricultural wastes (in acidic solution).
- Output: high-purity H_2, polymer precursors (e.g., FDCA), chemical feedstock (e.g., DFF).
- Operating Temperature:
  120 ‘C (solar) / 80 ‘C (electrolyser)
- Projected system throughput:50 mL(soln)/min
- Estimated H_2 production cost: AU$12 / kg_{H2}
- Technology readiness level (TRL): 3



COMPETITIVE ADVANTAGES

- **2x energy efficiency of a water electrolyser**.
- **Produces high purity H_2 and valuable chemicals simultaneously**.
- **Exploits solar energy** (solar-thermal/PV) – lower dependence on external energy source.
- **Zero CO_2 footprint** – no environmental impact
- **Zero water loss** (theoretically) – water is an expensive resource.

This technology highlights an economic pollution-free transforming of waste into ‘gold’ at a better efficiency than current water electrolyzers.

SELECTED RECENT PROJECTS and SUCCESSFUL APPLICATIONS

ARENA Project: (AU$1.045 million)
A Zero-Emission Tandem Array for Transforming Waste Biomass into Renewable Hydrogen

FACILITIES AND INFRASTRUCTURE

- In-situ synchrotron X-ray facility.
- Microscopy (TEM) and microanalysis (XRD/XPS).
- In-situ Raman, UV-Vis spectroscopy.
- Redox Flow Electrolyzers
- Parallel Chemical Reactors
- High-End Electrochemical Workstation
- Chromatography (GC/HPLC)

OUR EXPERTS

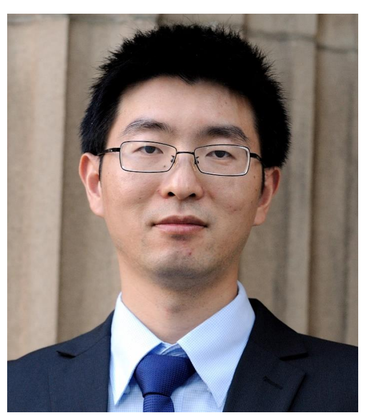
PartCat Research Group, UNSW

A/Prof. Da-Wei Wang
da-wei.wang@unsw.edu.au

A/Prof. Jason Scott
jason.scott@unsw.edu.au

Dr Kuang-Hsu (Tim) Wu

kuang-hsu.wu@unsw.edu.au



新南威尔士大学火炬创新园区
Torch Innovation Precinct at UNSW

A/Prof. Da-Wei Wang
da-wei.wang@unsw.edu.au