

# International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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## PEM fuel cell based power supply systems

### Overview

Fuel cell are considered to be an ideal choice for power generation as the green house gas emission issues are considerably reduced. PEM Fuel cells are ideally suited for decentralized power generation due to their fast start up, modular nature and low start up temperature. The technological challenges include developing high performance fuel cell stacks and BoP components like the power conditioners, thermal management system etc. The successful commercialization of Fuel cell technologies requires steady hydrogen supply and development automated methods for key components fabrication. One of the aspects that is proposed to be undertaken is improved manufacturing methods. Rapid prototyping or Additive manufacturing has been considered in this project as the conventional methods of making the fuel cells is lengthy with lot of wastage.

### Key Features

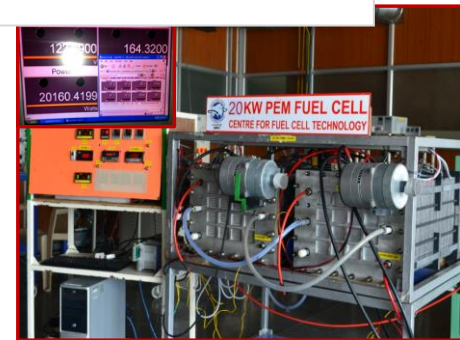
- Developed Grid Independent fuel cell systems in the range of 1-20kW power.
- PEM Fuel cells developed have been continuously operated for 500 hrs and intermittently for several thousand hours with stable performance.
- Suitable control systems for load following cycle, cell monitoring characteristics, power conditioners and thermal management have been developed.

### Potential Applications

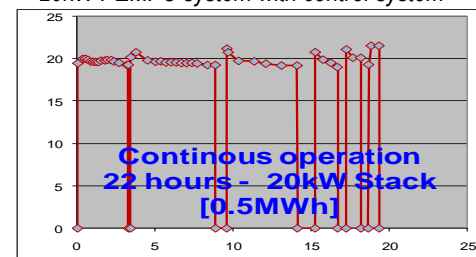
- As decentralised power pack for homes, industries etc.
- As combined heat and power units for homes
- As uninterrupted power source even when the power outage is for long duration (>8hrs)
- As back up power for telecom industries.

### Intellectual Property Development Indices (IPDI)

- Scaled-up from single cell to stack and prototype system developed and demonstrated
- Performance was tested for extended duration at laboratory and industrial environment



20kW PEMFC system with control system



Performance of Fuel cell on continuous operation

IPDI Status	1	2	3	4	5	6	7	8	9	10

### Major Publications

1. An Improved Test Control System useful For Fuel Cell Stack Monitoring and Controlling, K.S. Dhathathreyan, N. Rajalakshmi, Indian Patent application no. 269/DEL/2013
2. A Method of Preparation of Supported Platinum Nano Particle Catalyst in Tubular Flow Reactor Via Polyol Process, K S Dhathathreyan, N Rajalakshmi, K N M Krishna, 1571/DEL/2013
3. S. Pandiyan, K. Jayakumar, N. Rajalakshmi and K. S. Dhathathreyan, "Thermal and Electrical Energy Management in a PEMFC Stack - An Analytical Approach", International Journal of Heat and Mass Transfer, Vol. 51(3-4), p 469-473, 2008

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