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

Balapur P.O., Hyderabad – 500005, Telangana, India

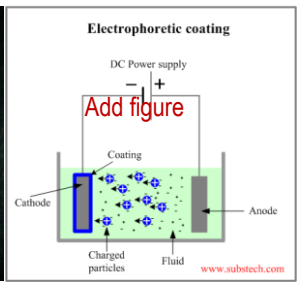
Development and Manufacturing of metallic Flow field Plates for PEM Fuel cells

Overview

PEMFC technology has already been demonstrated in portable, stationary power, transport and several niche applications. For large scale commercialization technological advances are needed interms of cost reduction and manufacturing methods for producing some of the components. The major cost components are bipolar plates, catalyst and membrane. Bipolar plates facilitates the distribution of the reactants to the electrodes and presently constitutes about 50% of the cost (for graphite plates) and 75% of the weight and volume. Alternative materials to graphite and its composites are SS based metallic flow field plates which is likely to reduce the weight and volume by more than 50% as they can be made thinner unlike the graphite / carbon composite plates. The major challenge in developing the metal flow field plate lies in forming a complex flow field design on both sides of the plate for the supply of reactants and bond them together for proper sealing in case of multiple cells. An earlier study by ARCI led to the development of bipolar plates based on exfoliated graphite which reduced the machining cost of making bipolar plates.

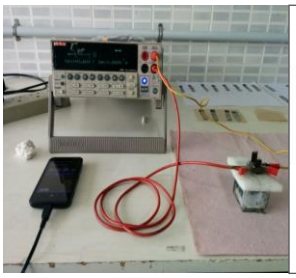
Key Features

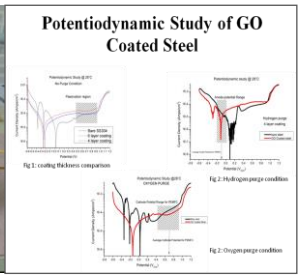
- Develop metallic bipolar plate by hydroforming technique with an industry partner after flow field and die design optimization
- Study of its corrosion properties under fuel cell conditions
- Development of suitable seals for optimum contact and prevent leakage of reactant gases.
- Development fuel cells and performance optimization at single cell and stack level.



Potential Applications

- Light weight PEMFC stack for vehicular applications





Intellectual Property Development Indices (IPDI)

- Corrosion studies on various coated and bare metallic plates being studied.
- SS based bipolar plates stack was developed using conventional technology for development of seals.

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

Major Publications

1. An Improved Process for the Preparation of Exfoliated Graphite Separator Plates useful in Fuel Cells, the Plates Prepared by the Process and a Fuel Cell Incorporating the Said Plates, K.S. Dhathathreyan,N. Rajalakshmi,S. Pandiyan patent application no. 1206/DEL/2006

Centre for Fuel Cell Technology (CFCT)
ARCI, IITM Research Park, Taramani Chennai, India
Tel : +91 44 6632708 / 66632707; Fax : +91 44 66632702
Email: rajalakshmi [at] arci [dot] res [dot] in / gopy [at] arci [dot] res [dot] in