Muhammad Afzal, J Fundam Renewable Energy Appl 2018, Volume 8
DOI: 10.4172/2090-4541-C5-061

3rd International Conference on

Battery and Fuel Cell Technology

September 10-11, 2018 | London, UK

Muhammad Afzal

KTH Royal Institute of Technology, Sweden

Novel electrolyte-layer free fuel cell technology as an alternative of conventional fuel cell technology

Energy has been one of the top challenges to the world for several decades. Energy technologies producing pollution cause global warming and have forced the policy makers to focus on alternate energy technologies which can be environment friendly. Considering several renewable energy conversion technologies, fuel cell is one of the most efficient technologies to supply green energy for stationary and automotive applications. Among many fuel cell families, solid oxide fuel cell (SOFC) is very attractive because of its potential advantages including fuel flexibility and use of non-noble metals for electrode reactions. However, conventional SOFC with high operating temperatures (750-1000°C) faces problems of materials degradation, materials selection and result in high operational and capital costs. In such a situation, lowering of SOFC operational temperature has been a main objective for last two decades. To reach this goal, materials having sufficient ionic conductivity and corresponding electrodes catalytic activities at low temperatures are required. Currently, three in one based electrolyte-layer free fuel cell (EFFC) technology has been investigated as an alternative of conventional fuel cell. Three in one is a mixture of semiconductor and ionic materials with specific combinations which can induce ion conducting properties and changes in band structure resulting in fast charge transfer and redox processes for electrochemical catalyst functions. EFFC devices have demonstrated 500-1000 mW/cm^2 results below 600°C. Upper hand of new technology is that it is easy to fabricate and handle during device operation. This invention has made promising applications for new generation fuel and solar energy conversions.

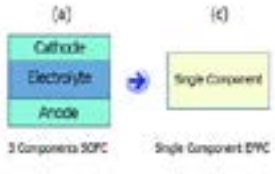

Figure 1

Recent Publications

1. Muhammad Afzal, Sushant Madaan, Wenjing Dong, Rizwan Raza, Chen Xia and Bin Zhu (2017) Analysis of a perovskite-ceria functional layer-based solid oxide fuel cell. International Journal of Hydrogen Energy 42(27):17536-17543.
2. Yuzheng Lu, Muhammad Afzal, Bin Zhu, Baoyuan Wang, Jun Wang, Chen Xia (2017) Nanotechnology based green energy conversion devices with multifunctional materials at low temperatures. Recent Patents on Nanotechnology 11(2):85-92.
3. Muhammad Afzal, Mohsin Saleemi, Baoyuan Wang, Chen Xia, Yunjuan He, Jeevan Jayasuriya and Bin Zhu (2016) Fabrication of novel electrolyte-layer free fuel cell with semi-ionic conductor (Ba0.5Sr0.5Co0.8Fe0.2O3-δ-Sm0.2Ce0.8O1.9) and Schottky barrier. Journal of Power Sources 328:136-142.
4. Muhammad Afzal, Chen Xia and Bin Zhu (2016) Lanthanum-doped calcium manganite (La0.1Ca0.9MnO3) cathode for advanced solid oxide fuel cell (SOFC). Materials Today: Proceedings 3(8): 2698-2706.
5. Muhammad Afzal, Rizwan Raza, Shangfeng Du, Raquel Bohn Lima and Bin Zhu (2015) Synthesis of Ba0.3Ca0.7Co0.8Fe0.2O3-δ composite material as novel catalytic cathode for ceria-carbonate electrolyte fuel cells. Electrochimica Acta 178:385-391.

Biography

Muhammad Afzal obtained his M.Sc in Applied Physics from KTH Royal Institute of Technology, Stockholm, Sweden in 2013 and is continuing PhD in Energy Technology. Today he is an emerging well known scientist in Solid Oxide Fuel Cell and Electrolyte-layer Free Fuel Cell (EFFC) and Manager for Advanced Fuel Cell and Solar Cell Group at KTH under the leadership of Professor Bin Zhu. He is an international referee for International Journal of Hydrogen Energy, J. Phys Chem B & C, J. Scanning, Electrochimica Acta, Advaced Energy Materials, Journal of Power Sources, Recent Patents on Nanotechnolgy, etc and the Editorial Board Member of several International Journals. He has published more than 20 papers in refereed international journals and more than 10 contributions in conferences.

afzalm@kth.se

Notes: